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Research Article

EMERGENCY DEPARTMENT VISITS AND HOSPITALIZATION RATES IN EXTREME DIFFERENT WEATHER CONDITIONS

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A B S T R A C T

Objective: This study compares emergency department (ED) admission and hospitalization numbers in different weather conditions and control periods. The aim of the study is to assess the needs and the preparedness for different weather conditions in the context of a regional hospital (Ziv Medical Center– ZMC).
Method: Data was obtained retrospectively from ZMC's records for periods of snowstorm, heat wave, and haze storm, and included number of EDadmissions, age and gender, number of hospitalizations, hospitalization wards, and main diagnoses. For each period of extreme weather condition, a control period was chosen.
Results: Comparing to control periods, we found an increase in EDadmissions during heat waves and haze storms, and a decrease during snowstorms. Hospitalization rate was high during heat waves, and did not change during haze storm in comparison to the control period.
Conclusions: We conclude that different resources need to be allocated to the ED and hospitalization wards during different changes in weather conditions.

INTRODUCTION

Climate changes have increased the world-wide frequency of extreme weather events such as heat waves, cold spells, floods, storms, and droughts. (Intergovernmental Panel on Climate Change, 2013) These extreme events potentially affect the health status of millions of people, increasing the incidence of disease and death. (Frumkin *et al*., 2008)

As climate change impacts arefelt around the globe, people are increasingly exposed to changes in weather patterns, wildlife, and vegetation, as well asaccess and availability of water and quality food in their local regions. These changes can impact human health and well-being in a variety of ways: increased risk of foodborne and waterborne diseases; increased frequency and distribution of vector-borne disease; increased mortality and injury due to extreme weather events and heat waves; increased respiratory and cardiovascular disease due to changes in air quality and increased allergens in the air; and increased susceptibility to mental and emotional health challenges. (Willox *et al*., 2012)

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While climate change is a global phenomenon, the impacts are experienced most acutely in place; as such, a sense of place, place-attachment, and place-based identities are important indicators for climate-related health and adaptation. (Willox *et al*., 2012)

Heat-related illnesses (e.g., heat cramps, heat exhaustion, heat syncope, heatstroke, and heat rashes) can occur when high ambient temperatures overcome the body's natural ability to dissipate heat. Older adults, young children, and persons with chronic medical conditions are particularly susceptible to these illnesses and are at high risk for heat-related mortality. (Crimmins *et al*., 2016)

An important study was undertaken following the Chicago heatwave in 1995. Semenza *et al*. (1999) describe medical conditions treated in all 47 non-VA hospitals in Cook County, IL, during the 1995 heat wave and characterized the underlying diseases of the susceptible population, with the goal of tailoring prevention efforts. The study showed that during the week of the heat wave, there were 11% more hospital admissions than average and presented the reasons' variability. Individual risk factors for dying during the heatwave were identified: chronic illness; confined to bed; unable to care for themselves; isolated; without air conditioning.

Anderson *et al*. (1995) studied the unique air pollution episode in London in 1991 during which concentrations of nitrogen dioxide rose to record levels, associated with moderate increases in black smoke. The study showed the risk of the hospital admission and hospitalization per reason and age group, and found that in ages 0-14 there was no increase in the hospital admission for all respiratory diseases except asthma. However, in the older population (>65 years old) the risk of the admission and hospitalization was significantly increased for all respiratory diseases and lung obstructive diseases. Non-significant increase was also recorded for heart diseases. The association between temperature and morbidity was researched by Basu *et al*. (2012) Their study examined the association between mean daily apparent temperature and emergency department visits in California, and included more than 1.2 million ED visits. The analysis showed that the increased temperatures were found to have same-day effects on ED admission for several outcomes (e.g., ischemic heart disease, ischemic stroke, cardiac dysrhythmia, diabetes, acute renal failure). Age and race/ethnicity seemed to modify some of these impacts.

A study conducted in Shanghai reported significant increase in total, cardiovascular, and respiratory hospital admissions during extreme weather conditions (Ma *et al*., 2011) and recommended that the public health programs should be tailored to prevent extreme temperature-related health problems in the city.Yang *et al*. (2016) performed a meta-analysis of the health implications of the haze storms. Significant effects of extreme weather on the population were found, including the correlation between the dust-haze and mortality in different age groups.

A number of studies showed an increase in ED admissions and hospitalizationsin patients with acute urinary retention (Lee *et al*., 2017) and stroke (Guo *et al*., 2017) during periods of cold temperature. Significant effects of the low temperature on the public health were found.

Whatever the environmental challenge, people suffering with health problems seek medical services in different facilities. The less severe medical problems may be treated at the local community clinics that are not always available during the events. The regional hospitals treat more complicated medical issues and those who are referred from the primary clinics. Understanding the trends of hospital admission and morbidity in different populations and in different indications will help to understand the health impact of different environmental challenges and plan the work of the emergency rooms in hospitals during extreme weather conditions.

The aim of this paper is to describe the health problems during three different environmental scenarios (heat wave, snowstorm, and haze storm) and to discuss the implications on medical administration at the hospital level.

Ziv Medical Center (ZMC) is the northern-most government hospital in Israel. It is located in Safed and serves as a regional hospital to more than 250,000 residents of the Upper Galilee and Golan Heights. This rural peripheral region is characterized by sparse public family practice clinics, and theED of ZMC is the address for the citizens in each emergency. The patients are a mix of Jews, Muslims, Christians, Druze, Bedouins, and Circassians.

Israel sustained a haze storm in September 2015, a severe snowstorm in December 2015, and a heat wave in February 2016. The clinical course of morbidity and emergency room admissions is poorly documented for this period.

It is known that extreme weather conditions influence the morbidity of different populations and thus we hypothesized changes in the emergency room routine work. In addition, we assume that different origins may also have an effect on admissions to the hospital in unusual weather conditions.Thus, in order to study the effect of unusual weather on the hospital routine, we initiated a retrospective observational study in a local population to identify factors associated with morbidity and emergency room admissions. Understanding the trend of hospital admissions and morbidity in different populations and in different indications will help to plan the work of the emergency rooms in hospitals during extreme weather conditions, and support the population with adequate medical services according to the situation.

METHODS

The study was conducted according to Declaration of Helsinki and according to Good Clinical Practice guidelines.

In order to create a control group we took a period of two weeks before the extreme weather, of the same number of days that the abnormal weather continued. All patients arriving to theED of ZMC during these days were included in control group, and all patients admitted during the days of extreme weather were included in the study group (Table 1). The information was analyzed by age group, sex, origin, reason for the admission, discharge or hospitalization to a specific ward.

The hypothesis of the study says that weather changes should lead to a change in the number of EDadmissions, as well as their reasons. Based on the anthropological characteristics of the region, we supposed that the origin of the patient may be a variable that influenced the ED admission.

Data regarding the weather in the Safed area and study groups was obtained from the Israel Meteoroidal Service (2017) (Table 1).

Table 1 Extreme Weather and Control Periods

Period		Extreme weather	Control
Haze storm	Dates	Sept. 8–13, 2015	Aug. 25–30, 2015
	Temp (°C)	25-37	22-32
	Haze	Severe	No
	Wind speed (km/h)	15	15
Snow storm	Dates	Jan. 24–26, 2016	Jan. 10–13, 2016
	Temp (°C)	0-4	8-11
	Rain/Snow	Snow	Drizzle
	Wind speed (km/h)	80	20
Hot weather	Dates	Feb.15–18, 2016	Feb. 1–4, 2016
	Temp (°C)	19-30	2-10
	Rain	None	Drizzle
	Wind speed (km/h)	15	15

Patient population

All patients admitted to the ED of ZMC in the mentioned time points of the extreme weather condition and two weeks before the time points (using the same number of days the weather condition continued), men and women of all ages were included in the study.

ED visit data were obtained from the medical records department of ZMC. Patients' visits, demographics, and

clinical characteristics were recorded in the ED.The total number of all ED visits was computed on an ongoing basis.

Statistical analysis

For categorical variables, summary tables are provided giving sample size. Pearson's chi-square was applied for testing the correlations between the study groups for the categorical parameters. P value of 5% or less is considered statistically significant. The data were analyzed using the SPSS version 24 (SPSS Inc., Chicago, IL, USA).

RESULTS

Snow Storm

The snowstorm began on January 24 and lasted 3 days. Usually there are snowstorms in our region(Safed, 900 m above sea level [m.a.s.l.]) once a year and last for several days except ata specific area in the Golan Heights (average 1,100 m.a.s.l.) that last for weeks and sometimes for months at Mount Hermon (2,184 m.a.s.l.). This time it affected a wider area and lasted for a longer period with extreme temperatures and wind speed.

Table 2 summarizes the patients' demographics and the clinical data during both periods. During the snowstorm period, 570 patients arrived to our ED compared to 758 patients during the control period (the period between January 10 and 13). This decline (188 fewer patients during the snowstorm compared to the control period) occurred in the different age groups, different sex, and origins.

Of the 570 patients that were admitted to the EDduring the snowstorm period, 200 (35.1%) were hospitalized in various departments. During the control period, 222 patients were hospitalized (out of 758; 29.3%). Thus, the hospitalization rate wassignificantly higher during the snowstorm (p<0.05).The distribution of hospitalizations in the various departments was identical during the storm and in the two weeks before it (data not shown). In addition, It was found that significantly more people aged 50-96 were hospitalized during the storm than in the two weeks before it (44% and 28%, respectively;p<0.05) (Table 2).

snowstorm period compared with control period (6 vs. 3 cases, respectively).

Haze Storm

The haze storm lasted 6 days (September 8-13,2015) and was characterized by extremely high temperatures, yellow sky, and fine dust particles present in a portion of the atmosphere. The Israel Ministry of Health published warnings asking people suffering from chronic (especially heart and lung) diseases to stay home; no data is available concerning response rate.
Table 3 summarizes the patients' demographic and the clinical data for both periods.

During the haze storm period, 1408 patients arrived to our ED compared to 1086 during the control period (August 25–30, 2015).As seen in the table, 322more patients, in different age groups, sex, and origins, were admitted to ZMC's ED during the 6 days of the storm than two weeks before. However no significant difference was found in the rate of patients hospitalized in different departments-26.2% vs. 27.7%, respectively (p<0.39).

In all other parameters, no significant differences were seen in the hospitalization rates during the storm compared to the control period (Table 3).

As in the snowstorm period, we noticed more mortalities compared to the control period (7 vs. 4, respectively).

Hot Weather

The weather in our area in February is mostly rainy with low to moderate temperature, unlike our summer, which is characterized by high temperatures. At the end of February 2016, we had abrupt and unexpected hot weather for 3 days with temperature that reached 30.8 degrees Celsius (Kefar Blum-about 20 km fromSafed-average temperature during the same periodwas 18.4 degrees Celsius), which is 2-3–fold higher thanthe regular temperaturein the same area. The extremely hot weather lasted 4 days (Feb. 15–18, 2016), and we chose the period between February 1 andFebruary 4, 2016 as the control period.

Table 2 Distribution of patients admitted to the ED according to demographic criteria and time of admission (before/during the snowstorm).

		Admission time	Total admitted to ED	Discharged *	Hospitalized	Hospitalized %	*p*
ED		Before the storm	758	532	222	29.3	0.025
		During the storm	570	370	200	35.1	
Age	0-19	Before the storm	222	165	57	25.7	0.343
		During the storm	125	87	38	30.4	
	20-49	Before the storm	336	252	84	25.0	0.141
		During the storm	277	193	84	30.3	
	50-69	Before the storm	112	81	31	27.7	0.014
		During the storm	98	55	43	43.9	
	70-100	Before the storm	88	38	50	56.8	0.393
		During the storm	70	35	35	50.0	
Sex	Male	Before the storm	371	271	100	27.0	0.022
		During the storm	253	163	90	35.6	
	Female	Before the storm	387	265	122	31.5	0.372
		During the storm	317	207	110	34.7	
Religion	Jewish	Before the storm	496	347	149	30.0	0.133
		During the storm	397	259	138	34.8	
	Other	Before the storm	256	183	73	28.5	0.082
		During the storm	158	100	58	36.7	

*Discharge - including patients discharged at their own discretion.

Although they are small numbers that don't enable us to discuss it more fully, we noticed more mortalities during the

Table 3 Distribution of patients admitted to the ED according to demographic criteria and time of admission (before/during the haze storm).

		Admission time	Total admitted to ED	Discharged*	Hospitalized**	Hospitalized %	*p*
ED		Before the storm	1086	785	301	27.7	0.399
		During the storm	1408	1039	369	26.2	
Age	0-19	Before the storm	273	227	46	16.8	0.763
		During the storm	309	254	55	17.8	
	20-49	Before the storm	516	384	132	25.6	0.310
		During the storm	660	508	152	23.0	
	50-69	Before the storm	161	107	54	33.5	0.257
		During the storm	234	168	66	28.2	
	70-100	Before the storm	117	56	61	52.1	0.968
		During the storm	168	80	88	52.4	
Sex	Male	Before the storm	521	397	124	23.8	0.902
		During the storm	681	521	160	23.5	
	Female	Before the storm	565	388	177	31.3	0.315
		During the storm	727	518	209	28.7	
Religion	Jewish	Before the storm	718	533	185	25.8	0.942
		During the storm	918	680	238	25.9	
	Other	Before the storm	368	252	116	31.5	0.125
		During the storm	490	359	131	26.7	

*Discharge - including transfer to another hospital.
**Hospitalization - including patients who died in the ED in the study and the control groups.

Table 4 summarizes the patients' demographic and the clinical data for both periods.

During the hot period, 924 patients were admitted to the ED compared to 882during the control period (42 more patients). Although 42 patients were admitted to our EDduring the hot period, we found no differences in sex and origin. There was an increase in ED visitsin the different age groups except the 50–69 age group (a decline of 14 patients during the heat wave). However, no significant difference was found in the rate of patients hospitalized in different departments (27.9% vs. 29.6%, respectively).In this event, too, no significant differences were seen in the hospitalization rates during the heat wave compared to the period before it (Table 4).

Comparison between the "heat wave" group and the control group found the same number of mortalities. (Anderson *et al*., 1995)

Hospital wards

In all the three analyzed periods, no differences were found in the rates of hospitalization in different wards between the time of extreme weather and the control periods (Table 5): 16.5–20.3% were hospitalized in the maternity ward, 9.6–14.4% were hospitalized in the pediatric ward, 19.8–24.6% in the internal medicine ward, 11.3–13.6% in surgical ward, and 3.4–8.2% in the intensive care wards (pediatric, general, and cardiology).

Throughout the three extreme weather periods most hospitalizations were to the internal medicine wards (26–30%), maternity ward (17–20%), pediatric and surgical wards (about 12%) (Table 5). In all three periods, no significant relations were found between the hospitalization wards, the event, and the control periods.

Throughout all the periods discussed, about half of the hospitalizations, both in the extreme weather periods and in the control periods, were due to childbirth (48–54%). About onethird of the patients admitted to the ED due to diseases were hospitalized. In all periods about 7–15% of the patients admitted due to fall, cut, or bruising were hospitalized (Table 6).

Table 4 Distribution of patients admitted to the ED according to demographic criteria and time of admission (before/during the heat wave in February 2016).

		Admission time	Total admitted to ED	Discharged*	Hospitalized**	Hospitalized %	*p*
	ED	Before the heat wave	882	621	261	29.6	0.433
		During the heat wave	924	666	258	27.9	
Age	0-19	Before the heat wave	230	186	44	19.1	0.664
		During the heat wave	251	199	52	20.7	
	20-49	Before the heat wave	398	292	106	26.6	0.180
		During the heat wave	412	319	93	22.6	
	50-69	Before the heat wave	159	106	53	33.3	0.765
		During the heat wave	145	99	46	31.7	
	70-100	Before the heat wave	95	37	58	61.1	0.628
		During the heat wave	116	49	67	57.8	
Sex	Male	Before the heat wave	412	304	108	26.2	0.231
		During the heat wave	428	331	97	22.7	
	Female	Before the heat wave	470	317	153	32.6	0.975
		During the heat wave	496	335	161	32.5	
Religion	Jewish	Before the heat wave	600	429	171	28.5	0.972
		During the heat wave	623	446	177	28.4	
	Other	Before the heat wave	276	188	88	31.9	0.189
		During the heat wave	294	215	79	26.9	

*Discharge - including transfer to another hospital.
**Hospitalization - including patients who died in the ED in the study and the control groups (number)

Table 5 Distribution of hospitalizations in different wards according to the three periods examined.

	Heat wave		Snowstorm		Haze storm	
Ward	N	%	n	%	N	%
Maternity	43	16.8	39	19.5	69	18.8
Pediatric	31	12.1	27	13.5	36	9.8
Surgical	29	11.3	23	11.5	44	12.0
Neurology	7	2.7	10	5.0	13	3.5
Obstetrics and gynecology	12	4.7	5	2.5	18	4.9
Ophthalmology	0	0	1	0.5	1	0.3
Internal Medicine	74	30.1	52	26.0	102	27.8
Otolaryngology	3	1.2	8	4.0	6	1.6
Urology	12	4.7	14	7.0	31	8.4
Orthopedics	22	8.6	12	6.0	15	4.1
Interim ICU	10	3.9	6	3.0	11	3.0
Pediatric ICU	1	0.4	0	0	3	0.8
General ICU	1	0.4	0	0	4	1.1
Cardiac ICU	5	2.0	1	0.5	8	2.2
Psychiatry	3	1.2	2	1.0	6	1.6

DISCUSSION

This paper deals with administrative issues in the preparation of medical centers for extreme and different weather conditions. We have tried to answer several questions, mostly concerning the impact of abnormal weather conditions on the work of the ED and other departments, in terms of number of admissions, reasons for admissions, and rate of hospitalizations. Another goal was to understand the required manpowerchanges and other preparations needed in the hospital for extreme weather conditions, in order to optimize the work of the staff.

Emergency departments have to be prepared for different scenarios that happen in the community and provide medical support to each of them. Weather conditions, especially extreme changes, are a big challenge to the ED, which needs preparation and adaptation of the staff and other facilities in order to provide the best medical services in these circumstances. (Wang *et al*., 2013)

Table 6 Distribution of ED admission reasons according to the three periods examined

		Heat wave		Snowstorm		Haze storm	
ED admission reason	**Admission time**	**Total admitted to ED**	**Hospitalized %**	**Total admitted to ED**	**Hospitalized %**	**Total admitted to ED**	**Hospitalized %**
Disease	Before the event	581	33.7	519	32.5	620	32.3
	During the event	583	31.7	387	38.5	894	30.4
Fall, cut, bruise	Before the event	131	13.7	100	8.0	204	12.3
	During the event	151	15.2	58	10.3	244	7.4
Foreign body penetration	Before the event	21	0	22	9.1	34	2.9
	During the event	26	3.8	8	0.0	35	2.9
Work accident	Before the event	25	8.0	13	0.0	32	12.5
	During the event	26	7.7	12	33.3	29	0
Traffic accident	Before the event	31	3.2	23	26.1	52	13.5
	During the event	40	10.0	25	4.0	56	16.1
Childbirth	Before the event	87	48.3	73	47.9	108	53.7
	During the event	83	50.6	73	50.7	122	52.5
Animal injury (mainly bites)	Before the event	5	40.0	5	0.0	28	7.1
	During the event	12	0	2	0.0	21	9.5
Burn	Before the event	0	0	1	0.0	5	60.0
	During the event	1	0	1	0.0	2	50.0
Poisoning	Before the event	0	0	0	0	3	33.3
	During the event	1	0	1	0	5	40.0
Psychiatry	Before the event	1	0	2	100	-	-
	During the event	1	0	3	66.7	-	-

In all three periods, no significant relations were found between the reasons of ED admissions and the extreme weather periods. In summary, there was a decline in ED admissionsduring the snowstorm and an increaseduring the haze and hot waves. During the snowstorm, on average, 142 patients arrived daily to our ED, 234 and 231 in the haze and the heat waves, respectively. In all these events, there were no differences between Jews and Arabs.

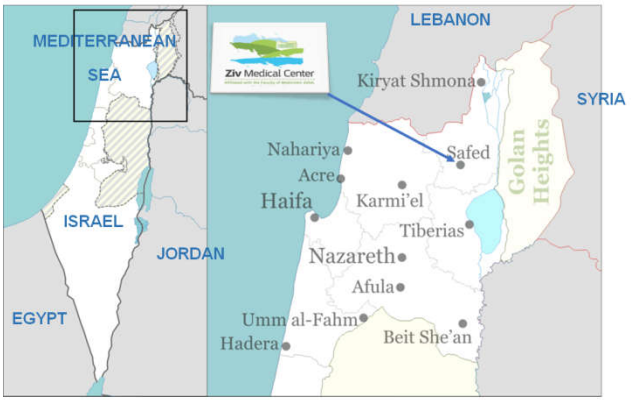

Figure 1 Israel map and Ziv Medical Center location.

Situations such as these may hurt the system's ability to provide appropriate aid to those who come asking for medical help. In this research, we learned about the different characteristics of three cases of extreme weather (snowstorm, heat wave, and haze storm) and compared them to three control periods. We investigated the situation in the ED by the admission numbers, hospitalization rate, and hospitalization department.

First, the findings concerning snow storms. Although acute cold effects were found in previous researches to increase the ED admissions, (Basu *et al*., 2012) in contrast our findings show a drastic decline (25%) in the number of emergency department admissions over the course of a snowstorm. These differences are evident in the age range of 50-69, especially men. The reasons for attendance are mostly internal diseases and injuries/traumas, unlike published articles (Guo *et al*., 2017; Lee *et al*., 2017) noting an increase in both ED attendance and hospitalizations of urological and neurological patients. Our data supports a study carried out in Beijing that

found that diurnal temperature range is an independent risk factor for emergency room admissions for digestive diseases among elderly persons. (Wang *et al*., 2013) These differences could be explained by the short period of snowing in our area (a few days a year) in which the schools are closed and mostly people remain at home. Due to the snow, usually the roads are less available for hours or a day and that could impact the ED visits.In fact, we have noted that most hospitalization cases were in the internal medicine, maternity, pediatric, and surgery departments. The obtained data suggests that the medical and pre-medical staff in the aforementioned departments should be increased and not change ED procedures in times of snowstorms and extreme cold.

Regarding the heat wave period that was examined, we found a small difference in the number of ED visits and hospitalizations when compared to control periods. It is also reported that there are no changes in the cause of admission for patients during these two periods. Contrary to the published reports (increase of 11%), (Semenza *et al*., 1999) we have noted an increase of 4% in ED visits. The causes of the visits were alsodifferent than those reported, (Basu *et al*., 2012) as we haven't noted a significant change in cardiology or other chronic patients. Cardiovascular diseases are well-known to be sensitive to extreme temperatures. (Basu, 2009) However, other studies also show the lack of increase in cardiovascular diseases during acute hot weather. (Basu *et al*., 2012)On the other hand, we have seen an increase in the number of ED admissions as a result of traffic accidents ending in hospitalization: 10% during heatwaves as opposed to 3.2% during control periods. During this time, most hospitalization cases were once again in the internal medicine, maternity, pediatric, and surgery departments, but we also noticed a not insignificant number of patients in the orthopedic department. With this information, we advise that an increase in resources to the surgical departments (including orthopedic) with a change in ED procedures should help a hospital prepare for severe heatwaves.

Lastly, the findings concerning haze storm. In accordance with research by Yang *et al*., we noted a larger number of ED visits, an increase of 29.6% when compared to the control period. This data is also supported by Isezuo (2003). This change did not carry over into hospital admissions, as there was no change in the number of hospitalizations when compared to the control period. Surprisingly, there was no change in the number of admissions related to respiratory diseases, asthma, etc. All of these require the hospital administration to be prepared with more resources dedicated to the ED staff, including representatives of various medical professions that can provide emergency advice. Special emphasis needs to be put into resuscitation ability and equipment in the ED. There is no need to put more resources into the departments, since most of the pressure falls on the ED.

In conclusion, it should be noted that preparation of hospitals for severe changes in weather necessitates an understanding of the changes weather brings to the way patients arrive at the ED, the number and state of patients admitted, causes of death, and more. This is all supported by information gained from previous studies,[8] but calls for more extensive research. However, it is already possible to base administrative decisions in hospitals and clinics on the data seen in various studies.

We summarize our recommendations based on the study results in the next table:

Recommendations	Extreme hot weather	Snowstorm	Haze storm
ED manpower	+	-	+
Hospitalization Wards	+	+	-
Physicians available for ED consultations (different specialties)	-	+	_

Following our findings, community health services may expand their service availability and diversity in order to meet the changing demandfor medical aid following extreme weather changes and fluctuations, thus preventing unnecessary visits to the emergency wards for well-known health and economic reasons.

We are aware that our findings depend on several factors related to the population characteristics and the community medical services, and could be different in other areas and countries, and for that our external validation is limited unless it is adapted to the factors existing at other places.

References

Anderson HR, Limb ES, Bland JM, Ponce de Leon A Strachan DP, and Bower JS. 1995. Health effects of an air pollution episode in London, December 1991. Thorax., 50(11): 1188-1193.

Basu R. 2009. High ambient temperature and mortality: a review of epidemiologic studies from 2001 to 2008. *Environ Health*., 8: 40.

Basu R, Pearson D, Malig B, Broadwin R, and Green R. 2012. The effect of high ambient temperature on emergency room visits. *Epidemiology*., 23(6): 813-820.

Crimmins A, Balbus J, Gamble JL, *et al*., Eds.; USGCRP. 2016. Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Washington, DC:U.S. Global Change Research Program.

Frumkin H, Hess J, Luber G, Malilay J, and McGeehin M. 2008. Climate change: the public health response. *Am. J. Public Health*., 98(3):435-445.

Guo P, Zheng M, Feng W, Wu J, Deng C, Luo G, Wang L, Pan B, and Liu H. 2017. Effects of ambient temperature on stroke hospital admissions: Results from a time-series analysis of 104,432 strokes in Guangzhou, China. *Sci. Total Environ.,* 580: 307-315.

Intergovernmental Panel on Climate Change (IPCC). 2013.Climate change 2013: The physical science basis. Working group 1 contribution to the fifth assessment report of the intergovernmental panel on climate change. Cambridge, UK and New York, NY, USA: Cambridge University Press.

Isezuo SA. 2003. Seasonal variation in hospitalisation for hypertension-related morbidities in Sokoto, north-western Nigeria. *Int. J. Circumpolar. Health*., 62(4): 397-409.

Israel Meterological Service. 2017. Available at: http://www.ims.gov.il/IMSENG/All_Tahazit/homepage.htm.

Lee KS, Koo KC, Lee SH, Cho KS, Hong C-H, and Chung BH. 2017. Effect of Climatic Parameters on Acute Urinary Retention Incidence. Low Urin. *Tract Symptoms.*, Jul 13. doi: 10.111/luts.12184

Ma W, Xu X, Peng L, and Kan H. 2011. Impact of extreme temperature on hospital admission in Shanghai, China. *Sci. Total Environ*., 409(19): 3634-3637.

Semenza JC, McCullough JE, Flanders WD, McGeehin MA, and Lumpkin JR. 1999. Excess hospital admissions during the July 1995 heat wave in Chicago. *Am. J. Prev. Med.*, 16(4): 269-277.

Wang M-Z, Zheng S, He S-L, Li B, Teng H-J, Wang S-G, Yin L, Shang K-Z, and Li T-S. 2013. The association between diurnal temperature range and emergency room admissions for cardiovascular, respiratory, digestive and genitourinary disease among the elderly: a time series study. *Sci. Total Environ*., 456-457: 370-375.

Willox C, Harper SL, Ford JD, Landman K, Houle K, Edge VL; Rigolet Inuit Community Government. 2012. "From this place and of this place": climate change, sense of place, and health in Nunatsiavut, *Canada. Soc. Sci. Med.,* 75(3):538-547.

Yang J, Zhou M, Yin P, Li M, Qu C-Q, Gu S, and Liu Q. 2016. Mortality as a function of dust-haze in China: a multi-city time-series study. *Lancet*., 388(Suppl 1):S19.

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