

Results of Simulation Program for Pathological Index relating the Climate Factors

Javzmaa Tsend¹, Bat-Enkh Oyunbileg², Ajnai Luvsan¹, S. Battulga¹

¹Mongolian National University of Medical Science, Ulaanbaatar, Mongolia

²School of Information and Telecommunication Technology, the Mongolian University of Science and Technology, Ulaanbaatar, Mongolia

Email address:

javzmaa.ts@mnums.edu.mn (J. Tsend), o_bat_enkh@yahoo.com (Bat-Enkh O.)

To cite this article:

Javzmaa Tsend, Bat-Enkh Oyunbileg, Ajnai Luvsan, S. Battulga. Results of Simulation Program for Pathological Index relating the Climate Factors. *American Journal of Networks and Communications*. Special Issue: Traffic and Performance Engineering for Networks. Vol. 5, No. 1-1, 2016, pp. 10-13. doi: 10.11648/j.sjbm.s.2016050101.13

Abstract: To protect and prevent human health, this study calculated pathological index using weather factors such as air average temperature, average wind speed, average relative humidity and air pressure at days between 2004 and 2014 in Ulaanbaatar city of Mongolia. Then, we developed software program that calculates above mentioned pathology index, statistic parameters, and correlation.

Keywords: Change of Climate Factor, Pathological Index, Program, Health, Prevent

1. Introduction

In medical Bio Climate sector that treats various diseases, and prevents it, programming discovery is very important to execute it [1-2].

2. Method and Material

2.1. Pathological total Index

Pathological total index is join of weather and helio-geo physics index [2].

$$I_{\text{total}} = I_{\text{weather}} + I_{\text{helio}} \quad (1)$$

2.2. Weather Pathogenicity Index

When information of helio-geophysics is meagre, evaluate it to represent by below describing general index of weather factors. The formula (2) is shown below.

$$I_{\text{weather}} = I_t + I_r + I_v + I_{\Delta t} + I_{\Delta p} \quad (2)$$

So, each index of weather factor is shown in formula from (3) and to (7) [2].

I_t – Pathological index of temperature

$$I_t = 0.02 * (18 - t)^2 \quad (3)$$

t - medium air temperature in a day

I_r – Pathological index of relative humidity

$$I_r = 10^{(r-70)/20} \quad (4)$$

r - medium relative humidity in a day

I_v – Index of wind speed

$$I_v = 0.2 * v^2 \quad (5)$$

v - medium wind speed in a day

$I_{\Delta p}$ – Index of pressure change

$$I_{\Delta p} = 0.06 * \Delta p^2 \quad (6)$$

Δp - change of air pressure in a day

$I_{\Delta t}$ – Index of Temperature change

$$I_{\Delta t} = 0.3 * \Delta t^2 \quad (7)$$

Δt - change of air temperature in a day

Depending on the value I_{weather} the conditions are assessed as [2]:

$I = 0 - 9$ – optimal

$I = 10 - 24$ – irritant

$I > 24$ – critical

So, in this study, we calculated general index of weather factors and developed simulation software program using C# programming language for ASP.NET web developer. Also had built weather factor database by the factors at days between 2004 and 2014 in Ulaanbaatar of Mongolia [3,5, 7-9].

Also estimated correlation between the index and infection disease at days between 2013 and 2014 and non infection disease such as diseases of the circulatory system (I00-I99), Diseases of the nervous system (G00-G99) at day between 2009 and 2013.

3. Result

Our simulation program calculated above mentioned pathology index, and automatically displayed (presented) below mentioned statistic specification, and estimated correlation between the weather index and these diseases.

3.1. Statistics

Some parameters such as mean index, temperature, humidity, wind speed of each month in last ten year are shown in below table. Indexing parameters are very important parameters to protect and prevent human health [4-5, 10]. These are results that automatically displayed by our simulation program.

Table 1. Mean index, temperature, humidity, wind speed of each month in last ten year.

Month	Mean	Range	t	r	v	Δp	Δt
1	38	52.7	-21.7	74.4	1.2	2.8	2.1
2	32.5	78.5	-17.9	69.5	0.7	2.9	2.4
3	20.3	98.1	-7.6	57.9	2.2	3.4	2.6
4	12.9	91.6	3.1	42.8	2.8	3.4	3.1
5	11.7	82.8	10.1	42.2	3.1	2.8	3.7
6	2.8	37.6	16.8	50.2	2.9	1.7	2.7
7	4.1	89.8	19.3	56.6	2.5	1.4	2
8	2.7	43.9	17	57.3	2.5	1.7	2.3
9	3.2	64	10.5	52.2	2.5	2.4	2.8
10	3.3	36.3	1.8	56.1	2.1	2.8	2.3
11	21.7	86.6	-9.5	65.9	1.7	2.9	2.4
12	34.4	69.9	-18.7	73.4	1.3	3	2.5

In “Fig. 1”, when weather pathogenic mean index was placed by descending order, it is high and climate state is impressive at winter. Next, there are month of autumn and spring. Then there is summer. The climate state is optimal which give positive effect to human health. Horizontal axis is month.

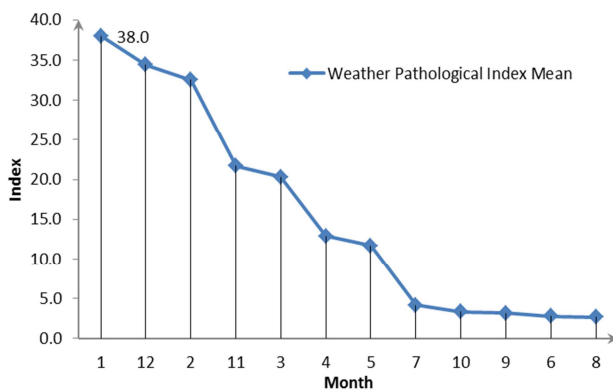


Figure 1. Weather Pathological mean index was placed by descending order.

Looking at the “Fig. 2”, when difference of the maximum and minimum values of pathological index was placed by ascending order in horizontal axis, there is high fluctuation at autumn and spring. Next, in winter, it is more little fluctuation than spring and autumn. In summer, the fluctuation is lowest.

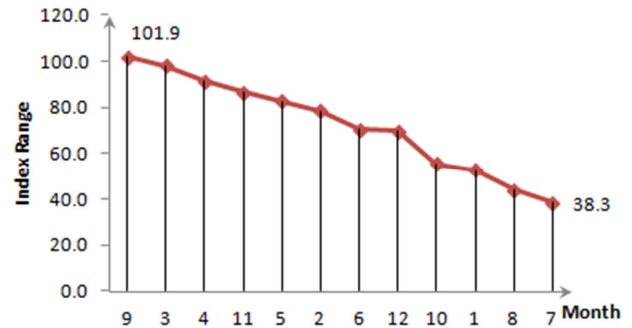


Figure 2. Weather Pathological index's range was placed by descending order.

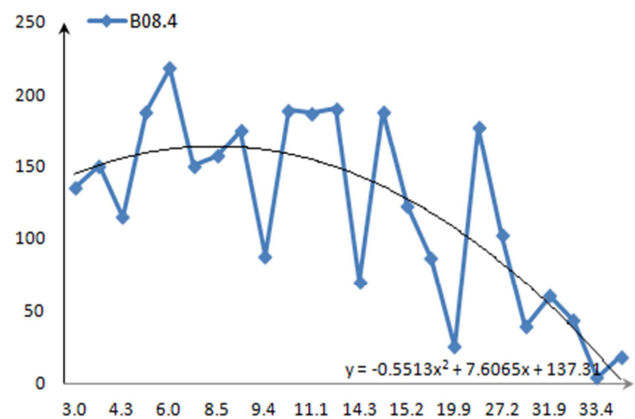


Figure 3. Weather Pathological index's skewness coefficient was placed.

We had organized weather pathological index's maximum value from to 2011 and to 2013 by showed “Fig.3”.

Looking at “Fig. 3” picture, 2011, 2012 and 2013, Pathological index maximum value is in May of 2011, next November of 2013. Then, in April of 2012, the value was the highest.

3.2. Correlation of Index and Climate Factor

In table 2, correlation between the index and climate factor are shown.

Table 2. Mean index, temperature, humidity, wind speed of each month in last ten year.

	T	R	v	Δp	Δt	Pato
T	1	-0.8	0.9	-0.7	0.2	-0.9
R	-0.8	1	-0.9	0.1	-0.7*	0.8
v	0.9	-0.9	1	-0.3	0.6	-0.8
Δp	-0.7*	0.1	-0.3	1	0.3	0.6*
Δt	0.2	-0.7*	0.6	0.3	1	-0.2
Pato	-0.9	0.8	-0.8	0.6	-0.2	1

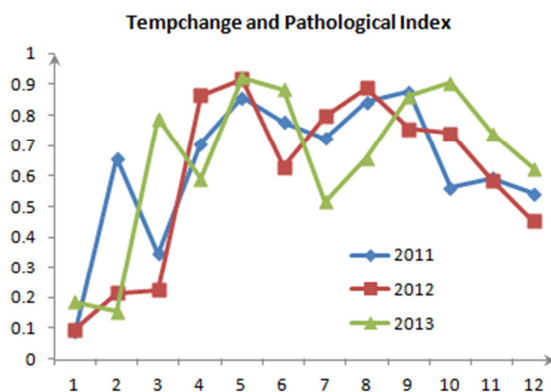


Figure 4. Weather Pathological index and Temp of change.

We have also organized correlation between temperature change and weather pathological index from 2011 to 2013 by showing "Fig.3".

From the figure, in January and February of winter, first month of spring, correlation between medium change of air temperature in a day and pathological index is weak and doesn't affect to disease. Sometime, for example, February of 2011, March of 2013, it is negative, strong. But it is affected to pathological index in most month of year.

3.4. Correlation Between the Index and the Factor and Infection Diseases

We have estimated correlation between the index and infection diseases at days between 2013 and 2014. In "Fig. 3", "Fig.4" it describes hand, foot and mouth disease and Shigellos's type and while sort ascending order to the index.

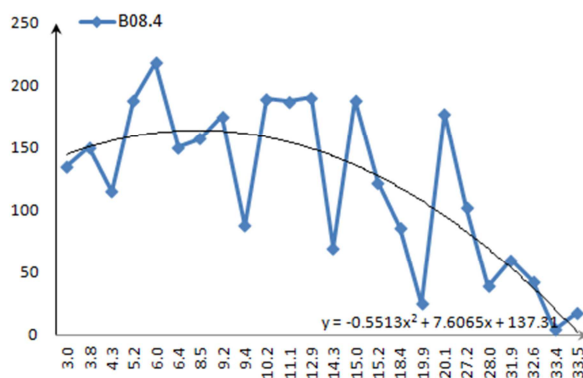


Figure 5. B08.4 Hand, foot and mouth disease.

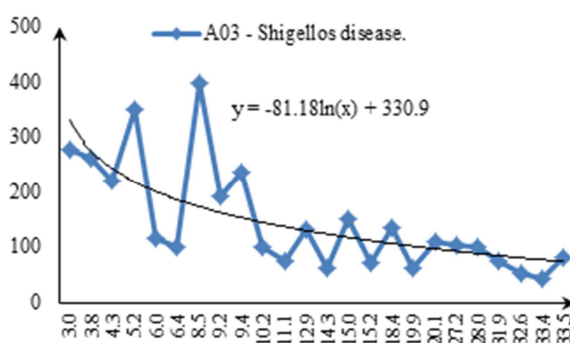


Figure 6. Shigellos disease.

Also we have estimated correlation between the index and disinfection disease at days between 2009 and 2013.

In "Fig. 7", it shows transient cerebral ischaemic attacks and related syndromes disease's type while sort decreasing order to the index.

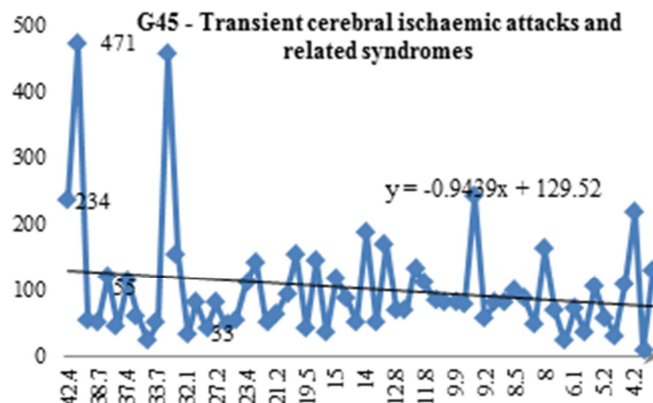


Figure 7. Transient cerebral ischaemic attacks and related syndromes.

In "Fig. 8", it also shows hypertensive heart and renal disease's type while sort decreasing order to the index.

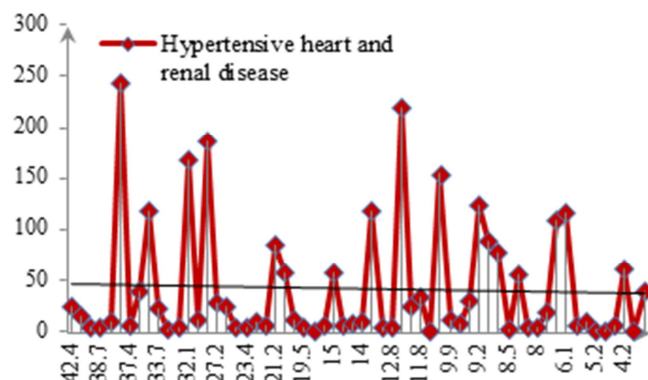


Figure 8. Hypertensive heart and renal disease.

4. Conclusion

We determined pathological index that connects climate factors. To show result of the research, Weather Pathological index was high in winter and then decreased in spring. It was the lowest level in summer and then again increased in autumn.

In correlation of climate factors, in most month of year, it is increased pathological index due to medium change of air temperature in a day. Specially in spring and autumn, the correlation is the highest. Seen here, in any season of year, when medium change of air temperature in a day grows, disease will increase.

Seen the pattern of fluctuation specification, range is the highest in spring, autumn and that means there are all climate state. In summer, it was more decreased. Also in winter, it was low than spring and autumn.

Generally, weather pathological index maximum value like as difference of minimum and maximum pathological index

value.

Intestinal infectious diseases probably occur in thermal season. And we will more learn about diseases of the nervous system further.

In the further, we will estimate to add pathological index of geo magnetic field and then we will determine total pathological index. And also we will determine how much climatic state that gets pathology in which season in Mongolian country. So it is possible to protect and prevent human health.

References

- [1] Mongolia-Korea Conference on Biomedical Applied Science and Engineering, The Issue to organize Information Technology based Pathological Index relating the Climate Factors, 2014/07/09-2014/07/10
- [2] Бокша В.Г, Богуцкий Б.В. Медицинская климатология и климатотерапия, Киев Здоровья, 1980, 47-82
- [3] Нарантуяа Л., Купул Ж. Монголын хүн амын эрүүл мэнд, экологийн зарим хүчин зүйлийн харилцан хамаарал, эрүүл ахуйн үнэлгээ, УБ, 1999
- [4] Андреев, С.С. Экология человека / С.С. Андреев.- Ростов: н/д: Изд-во. Е.А. Турова, 2007.- 248с.
- [5] <http://webcasting.mn/mn/news/>, 2014.04.16
- [6] <https://mn.wikipedia.org/wiki/%D3%A8%D0%B2%D1%87%D0%B8%D0%BD> 2015.03.16
- [7] С. Баттулга. “Монгол улсад эмнэлгийн мэдээллийн системийг хөгжүүлэх зарим асуудал”, 2009, диссертаци
- [8] Ч. Наранчимэг, “Эконометрикс”, 2003 он
- [9] Удирдлагын ерөнхий онол, Д. Нарангэрэл, Улаанбаатар, 2005
- [10] Study of Factors Influencing Mortality from the Cerebral Stroke in Patients of Different Ages, Vazgen Martirosyan and Krupskaya, British Journal of Medicine Research 3(4):1530-1557, 2013