ECOLOGIC ANALYSIS OF TURKISH PROVINCES

Ebru KER• MO• LU (teaching and research assistant-PhD student)
Istanbul Technical University Urban and Regional Planning Department
Istanbul/TURKEY
Fax: +90-212-251 48 95
e-mail: ebrukerimoglu@hotmail.com

Vedia DÖKMEC• (Prof. Dr.)
Istanbul Technical University Urban and Regional Planning Department
Istanbul/TURKEY
Fax: +90-212-251 48 95
e-mail: sstu52@hotmail.com

ABSTRACT

Recently, more and more attention has being given to environmental problems, especially in industrialized countries. While the industrialization has brought prosperity to people, it has detoriated man's physical environment and created many environmental problems. At the same time, high population increase resulted in large cities which are also related associated with environmental problems. This study investigated the relationships between the duration of lives of people and the amount of health facilities, and personnel, industrial employment, density of population, and income per capita in the Turkish provinces by the use of multiple regression analysis. It is expected that high population density, high industrial employment, low income and few health facilities and health personnel can have an impact on the duration of people's lives. The quality of the local environment also is expected to be an important determinants of people's health. We take our results to indicate two further aspects for future research on the relationship between health, health care and environment. First, an attempt should be made to map variables by means of indicators more accurately. Second, special emphasis should be given to the influence of environmental pollution on both health and health care demand.

1-INTRODUCTION

Although urbanization is associated with higher income and modernity, it is also considered as a source of environmental problems and overpopulation which are found hazardous for human health.

It is possible to give several examples from the history. During the nineteenth century, the mortality rates in the rapidly growing English industrial towns were higher than the average mortality of rural areas. Especially, tuberculosis has been considered the archetypal disease of the industrialization process.(Rosen, G.,1968)

However, the differences between the mortality rates in towns and those in rural areas diminished and excessive urban mortality rates decreased or even disappeared completely in some European and North-American regions towards the end of the nineteenth century and the beginning of the twentieth century. (Vögele 2000) During this period it is possible that development of a comprehensive municipal administration which covered important aspects of public health had the influence on the decline of urban mortality (Kearns 1989).

There are also studies which investigate the causes of socio-economic inequalities in mortality as the possible contributions of behavioral and material factors. Both types of factors fit within the framework of the causation theory, in which socio-economic inequalities in mortality are explained by a differential distribution of determinants of health across socio-economic groups. The behavioral explanation of socio-economic inequalities in mortality focuses on the behavior and lifestyle adopted by people from different socioeconomic groups. Behavioral factors that might be distributed unequally across socioeconomic groups include smoking, dietary habits and physical activity. The material explanation of socioeconomic inequalities in mortality emphases the role of material factors, such as housing conditions and employment status, that differ among socioeconomic groups (Whitwhead 1988, Schrüven, Strongs, van de Mheen and Mackenbach 1999).

Educational level of people is taken as an another factor to influence the mortality rate in some studies. Schrijvers et. al.(1999) showed the association between educational level and all-cause mortality by using 5 year mortality from a large longitudinal study on socioeconomic inequalities in health in the Netherlands. They followed the framework of the causation theory to study behavioral and material factors as possible explanations of the association between educational level and mortality. Both their

independent effect on the association between educational level and mortality and their overlap are presented. The results show that there is a higher relative hazard of mortality in each of the lower educational groups as compared with the highest educational group. Another study by Senior, Williams and Higgs 2000, investigates the relationship between premature mortality and material deprivation and the differences in this relationship between urban and rural areas. They examine, given comparable measures of affluence or deprivation, whether residual differences exist between urban and rural areas for all-causes of death and, separately, for cancers, circulatory and respiratory diseases. Contrasts are sought between six urban and rural categories defined in terms of settlement sizes and the employment structure of rural areas. Inequalities in all-cause premature mortality are widest in the cities, narrowest in the deeper rural areas, and of intermediate and comparable value in other areas of Wales. This is largely a reflection of the different distributions of material deprivation in these areas. After controlling for differences in socio- economic characteristics, using deprivation measures, the tendency for lower mortality in deeper rural areas is substantially reduced.

In a similar subject, a comprehensive research was carried out by Uccelli, Mastrontonio and Di Paola (2000). They compare mortality data during 1980-94(24 causes of death for males and 25 for females) in populations living in municipalities with different urbanization levels of seven Italian regions. A quite uniform configuration of causes of death with characteristic excesses in the urban environment was evident. The only exception was presented by the male population in Lombardia, probably due to the prevalence of occupational exposure. The urban excesses included = all tumors. Concerning some non tumoral pathologies a more dyshomogeneous situation was observed, with a prevalence of urban defects in Premonte and Lombardia, of urban excesses in the Southern regions and of both excesses and defects in Emilia Romagna and the central regions. The ‘semi-rural’ and ‘rural’ types municipalities resulted quite similar, with the exception of Campania and Lazio. In fact, in these two regions a greater association with stomach cancer and lower mortality for all other tumors compared to the urban and, at a lesser extent, to the semi-urban municipalities was found. On the basis of the causes of death comparisons, the semi-urban municipalities seem to represent a transition type between the urban and the rural ones.

In recent years, investigators have shown that daily air pollution concentrations are associated with daily deaths in dozens of cities in North America(Schwartz and Dockery

(1992); Pope, Dockery and Schwartz(1995)), Europe (APHEA Project (1996), and Latin America (Saldiva (1995); Ostro (1996); Borjo-Aburto (1995)).

A comprehensive study by Rossi et. al. (1999) illustrated air pollution and cause-specific mortality in Milan, Italy 1980-1989. They used a robust poisson regression in a generalized additive model to investigete the association between air pollution and daily mortality. All three primary air pollutants examined were associated with all-cause mortality in this study. The results of this study were also supported by the research done in other countries (Xu, Yu, Jing and Xu(2000); Hales, Salmond, Town, Kjellstrom and Woodward (2000).

The present study investigation the relationships between number of death and the city population and their socio-economic characteristics. Number of death is taken as the dependent variable and population, number of beds, number of doctors, income, percentage of literate, particulate matter are independent variables. The organization of this paper is as follows. The characteristics of the cities are given in the following section. The method and research results are explained in section 3. Final section is devoted to a conclusion and suggestion for further research.

2- CHARACTERISTICS OF THE PROVINCES

In this study, city population is taken as one of the variables which are expected to be related to number of death. Since the 1950's Turkey has been rapidly urbanization like the other developing countries. Urbanization is a natural step in the process of development and one followed by all the presently developed country. However, third world urbanization involves greater numbers of people than it did in the West. In Turkey, the great differences among the regions, high population growth rate, shortage of land in rural areas partial mechanization of agriculture, socio-economic attractions of cities, and, especially, construction of roads after the 1950's encouraged the rural-urban migration. That urban population increase was higher than natural growth, and migration from the rural areas was the most important element that effected the growth of the urban areas. The result is that not only have the existing cities grown larger, but also many new cities have sprung up. Mutlu (1988) analyzed the Turkish urban hierarchy in terms of Central Place Theory.

Between 1965-1990, the total population increased from 31.391.421 to 56.473.035; the urban population increased from 10.805.817 to 33.326.351 and the proportion of urban

to total population rose from 34.42 percent to 59.01 percent, and the total number of cities went from 178 to 450. The death rate of Turkey is 2.67 per thousand, average of income per capita is 3021 USD, ratio of population by literacy is %80.46, 10.000 persons per doctor is 10,87, 10.000 persons per hospital bed is 21,9 in Turkey.

In looking at growth, urban centers are classed by size at the beginning of the decade, and are followed over the interval. Different classes of cities have shown different growth patterns. The large cities have grown more rapidly than those with only quasi-urban settlements.

There are important regional differences in the urbanization patterns. The Marmara Region, which is in the North-West of the country, is the most developed and urbanized area in Turkey. The largest city of Turkey, Istanbul is located in this region and this region has the highest share of the total urban population. (%.76.26)

In 1990, urbanization rates of the provinces ranged from • stanbul (%92.40) to Çanakkale(%39.99). Two important industrial provinces are also located in this region, Bursa with an urbanization ratio %72.22 and Kocaeli %62.23. Hospital bed ratios, doctor ratios and income per capita ratios of almost all the provinces of this region are higher than the national average.

The Central Anatolian Region comes second in the urbanization rank. Urban population increase from % 15 in 1945 to % 64.53 in 1990. Ankara, the second largest city and also capital city of Turkey, is located in this region and plays an important role on its urbanization rate. Ankara has the highest urbanization rate (%87.64) and Ni• de has the lowest (%31.81).One third of the province's has higher income per capita ratio than the national average, % 50 of them has higher hospital bed ratios and one third of them has higher doctor ratios than the national average.

The Mediterranean Region, which is in the South of Turkey, comes third in terms of urbanization. The east part of this region is an agriculturally and industrially developing area. A rich agricultural hinterland play an important role for the industrial and economic development of this region. The urban population ratio increased from 22 percent in 1945 to 57.46 percent in 1990. Adana has the highest urbanization ratio(69.79 %) and Mara• has the lowest (45.60 %) in east part of this region. Hospital bed, doctor and income per capita ratios of most of the provinces of this region are higher than the national averages. The West Mediterranean Region is one of the least urbanized areas in the country. In this region there are large tourism establishments due to its climate and historical remnants and this increases urbanization ratio. Antalya is

also a strong magnet for retirees and is one of the fastest growing provinces in Turkey. The urban ratio increase from % 10 to %53.19 between 1945-1990.Antalya has the highest urbanization ratio and Burdur has the lowest urbanization ratio(%50.65) in the west part of this region. These provinces have higher hospital bed ratios and doctor ratios than the national average but lower income per capita ratios except Antalya.

The Aegean Region is in the west of Turkey and is the fourth urbanized area. The Aegean Region is the second highest with respect to industrial sector. Agricultural products of the rich hinterland are used as an input for the development of industry. The urban population ratio of this region increase from % 25 in 1945 to % 57.00 in 1990. Izmir has the major exportation port of the country and its industrial sector ratio is almost double of the national average.Izmir has the highest urbanization ratio(%79.22) and Mu• la has the lowest urbanization ratio (%33.12)Most of the provinces have the higher hospital bed, doctor and income per capita ratios than the national averages.

The South-East Anatolian Region is the fifth urbanized area in Turkey. The largely rural South-Eastern Anatolian area is undergoing progressive urbanization in large part due to the GAP Development Project which is a complex of dams for the economic development of the region. The urban population ratio rose from % 9 in 1945 to %55.65 in 1990.G.Antep has the highest urbanization rate (%71.99) and Diyarbak• r has the lowest urbanization rate (%54.85).Most of the provinces of this region have lower income Per capita, hospital beds and doctor ratio than the national average.

The East Anatolian Region is the sixth urbanized area in Turkey. This Region is the nation's least industrialized region and it is predominantly agricultural. Some of the reasons for this slow development can be explained by the regions rugged topography, isolation from major market areas and harsh climate. Despite the government's support to invest in this region, private sector prefer to invest in the Western part of Turkey. The urban population ratio rose from % 9 in 1945 to %42.57 in 1990.Batman has the highest urbanization rate (%56.18) and Kars has the lowest urbanization rate (%31.63). % 50 of these provinces have higher hospital bed ratios and doctors ratio than the national average. All of them have lower income per capita than the national average.

The East and West Black Sea Regions are the least urbanized areas. The Black Sea area is another predominantly agricultural region of Turkey, despite the growth of a modest steal industry in its Western fringes. Narrow hinterlands of the cities between the Black Sea and the mountains ranges prevent the growth of the cities. Thus, this region has the

highest out migration rate in the country. The urban ratio of the Black Sea Region increased from %9 in 1945 to %40.20 in 1990. Almost all the provinces have higher hospital bed and doctor ratios than national average. However, they have all lower income per capita ratios than the national average except two.

Figure-1: number of death rate by regions of Turkey

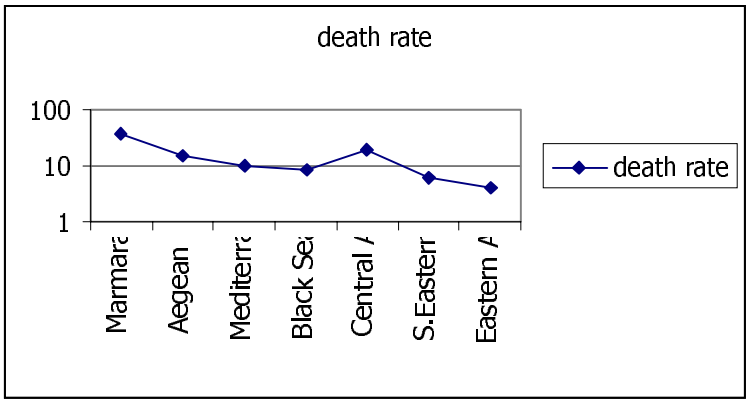


Figure-2: number of hospital beds by regions of Turkey

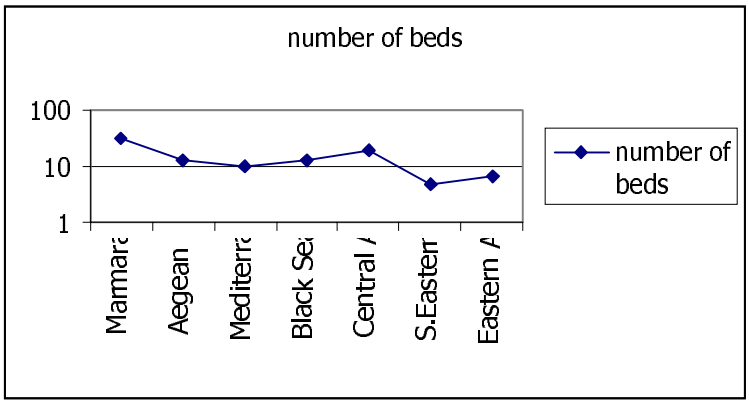


Figure-3: number of doctors by regions of Turkey

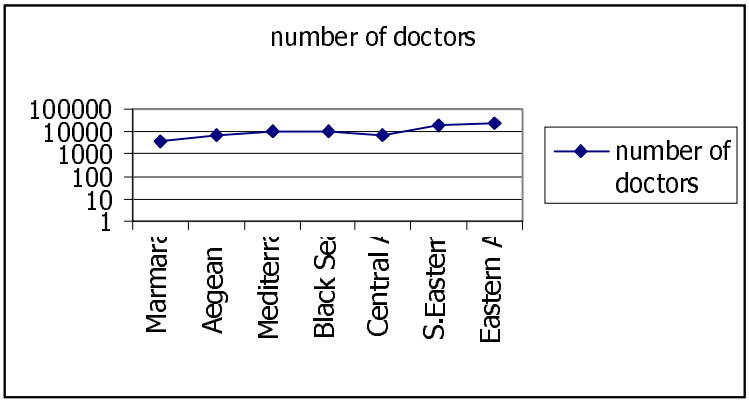
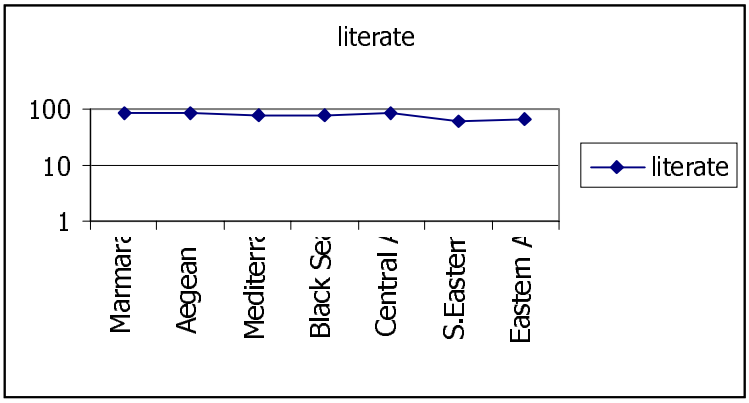


Figure-4: percentage of literate by regions of Turkey



3-METHOD AND RESULTS

In this study , statistical analyses were done by the use of step-wise multiple regression analysis. To apply the regression procedure, number of deaths by province was selected as a dependent variable (Y). The following 6 variables were included as independent variables:

X1: city population by province

X2: number of hospital beds by province

X3: number of doctors by province

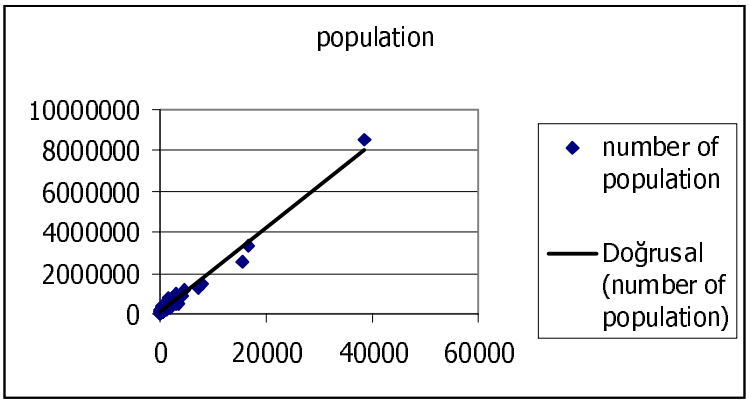
X4: income (per capita gross domestic product by provinces)

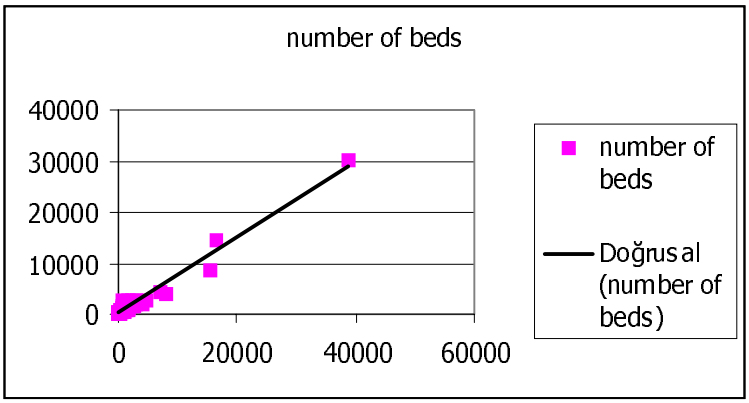
X5: percentage of literate

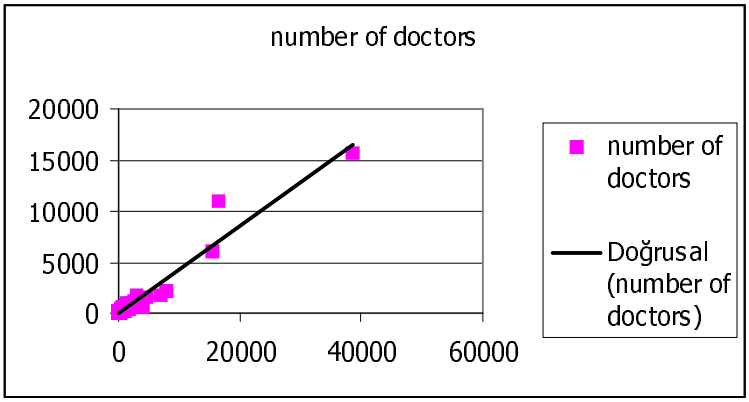
X6: particulate matter concentrations by province

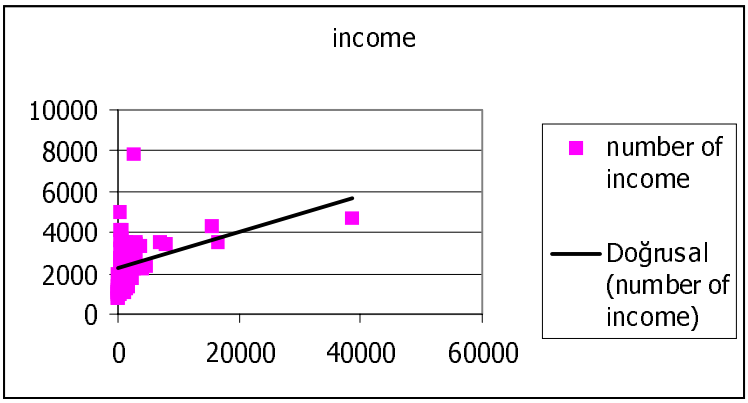
This study investigated the relationships between number of deaths and 6 independent variables which were explained. These variables are taken from the previous studies.

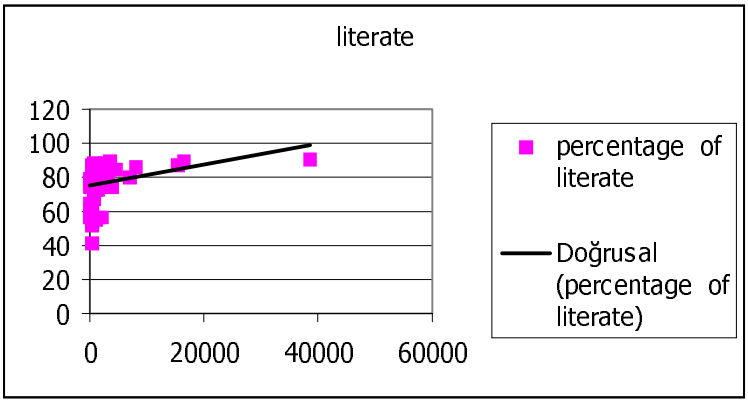
Scattered charts of the groups are seen in figures:

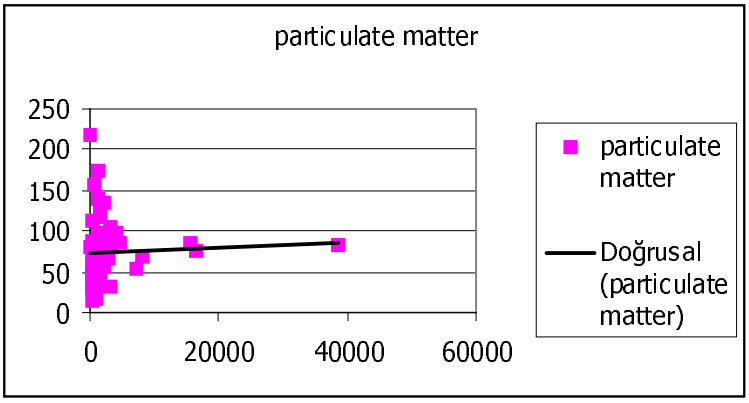












Scatter plots of the individual variables did not indicate any nonlinear relationships between the dependent variable and independent variable.

First, the correlations between these variables were calculated and then the stepwise multiple regression analysis was run.

Table-1 displays the correlations among the 6 independent variables and their correlations with the dependent variable(Y).

Correlation Matrix (SIS,1994,1995,1996,1997)

Correlation Matrix

(DIE)

	Predictors					
Variables	x1	x2	x3	x4	x5	x6
Predictors						
x1 population	1.00					
x2 number of beds	.99	1.00				
x3 number of doctors	.96	.98	1.00			
x4 income	.37	.35	.38	1.00		
x5 literate	.28	.29	.32	.66	1.00	
x6 particulate matter	.07	.07	.04	-.15	-.26	1.00
Dependent						
(Y) number of death	**.99**	**.98**	**.97**	**.40**	**.32**	**.04**

Examination of the correlation matrix indicates that population(x1)(.99), number of beds(x2)(.98), number of doctors(x3)(.97) are most closely correlated with the dependent variable.

Probability of F to enter was set to 0.05 and the probability of F to remove was set to 0.1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	Df2	Sig. F Change
1	,992	,983	,983	768,6817	,983	3079,803	1	53	,000
1	,992	,983	,983	768,6817	,983	3079,803	1	53	,000
2	,993	,986	,986	703,5269	,003	11,271	1	52	,001
2	,993	,986	,986	703,5269	,003	11,271	1	52	,001
3	,994	,987	,987	677,8812	,001	5,009	1	51	,030
3	,994	,987	,987	677,8812	,001	5,009	1	51	,030

a Predictors: (Constant), population

b Predictors: (Constant), population, number of doctors

c Predictors: (Constant), population, number of doctors, income

The highest correlation was found in population group. (r=0.992) F=3079,803 p(0.01) Since the second highest correlated group (x2:number of beds) showed statistically significant correlation with the population, it is discarded from the multiple regression analysis step. Third highest correlated group was number of doctors (r=0.993) F=11,271 p(0.001). Income also showed statistically significant correlation with the number of death (r=0.994) F=5,009 p(0.05)

Literate and particulate matter concentrations did not show and statistically significant correlation with the number of death.

The end of the statistical study we wanted to formulate these relations between the variables by using the results of multiple regression analysis. It was formulated as follows:

Number of death(Y) = -682,860+0,003801x1+0,434x3+0,196x4

CONCLUSION

While cities are considered as the cradle of civilization, as a symbol of progress and modernity, if fact, they are associated with environmental problems and over population which all have negative impact on health. In this study, the relationships between number of death and city population, number of beds, number of doctors, particulate matter concentrations and income per capita are investigated by the use of stepwise multiple regression analysis.

According to the results, there is a high correlation between the number of death and city population and thus death rate is higher in larger cities than small cities. The results of the study are similar to the foundings of other studies in other countries.

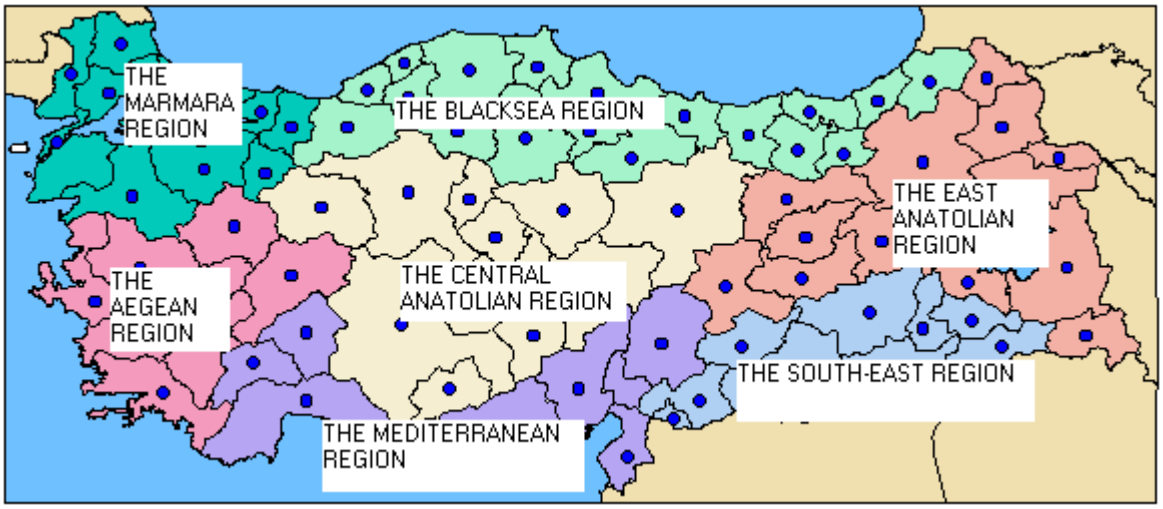
Reasons expecting on the variables, on number of death is left for further research.

REFERENCES

1. Schwartz,J., Dockery, D.W. (1992) 'Increased mortality in Philadelphia associated with daily air pollution concentration' An. Rev. Respir. Dis. 145, 600-04
2. Pope,C.A., Dockery, D.W. and Schwartz,J., (1995) 'Rewiev of Epidemiologic evidence of health effects of particulate air pollution' Inhal. Toxical, 7,1-18
3. The APHEA Project Short term effects of air pollution on health : a European approach using epidemiological time-series data, (1996) J.Epidemiol Commun.Health, Vol.50
4. Saldiva, P.H.(1995) Air Pollution and Mortality in elderly people: A time-series study in Sao Paulo, Brazil, Arch.Environ. Health., 50,2,159-63
5. Ostro, B., 'Air Pollution and mortality: results from a study of Santiago, Chile' J. Expo.Anal. Environ. Epidemiol. 6,1,97-114
6. Borja-Aburto, V.H., Loomis,D.P., Shrinkant, I.B. et al, (1997)' Ozone, suspended particles, and daily mortality in Mexico City'
7. Rosen, G. History of.Public Health,1968
8. Rossi,G. Et. al.(1999) 'Air pollution and Cause-Specific Mortality in Milan, Italy 1980-1989', Archives of Environmental Health, 54,3,158-164
9. Vögele, J. (2000) 'Urbanization and the urban mortality change in Imperial Germany', Health & Place, 6,41-45

10. Keanus,G, Lee,W.R., Rogers,J. (1989)'The interactions of political and economic factors in the manegement of urban public health', In: Nelson, M.C., Rogers J.,(ets.), Urbanization and the Epidemiologic Transition, Uppsala University, Uppsala, pp. 9-81
11. Whitehead,M. (1988)'The health divide' In: Townsend, P., Davidson,N., Whitehead, M., (eds) Inequalities in Health, London, England: Penguin Books, 286-305
12. Schrijvers,C.T.M., Stronks, K., Van de Mheen, H.D., Mackenbach,J.P. (1999) 'Explaining educational differences in mortality: The role of behavioral and material factors', American Journal of Public Health, 89,4, 535-540
13. Senior, M., Williams, H.,and Higgs, C.(2000)'Urbantural mortality differentials. Controlling for material deprivation', Soc. Sci. Med. 51,2,289-305
14. Uccelli,R. , Mastrantonio,M. and Di Paola, M.(2000), 'Distribution of causes of death in communities with different urbanization levels', Epidemiol. Prev. , 24,1,28-37
15. Hales,S., Salmond,C., Town,G.I.,Kjellstrom, T.,and Woodward, A.(2000), 'Daily mortality in relation to weather and air pollution in Christchurch, New Zealand', Aust NZ J Public Health
16. Xu,Z.,Yu, D., Jing, L. And Xu, X. (2000), 'Air pollution and daily mortality in Shenyang, China', Arch. Envron.Health,55,2,115-20
17. Mutlu,S, (1988), 'The Spatial Urban Hierarchy in Turkey: Its structure and some of • ts determinants', Growth and Change, pp. 53-74
18. Dökmeci, V., (1988), 'Urbanization pattern in Turkey and its future development' in L. Chatterjee and P. Nijkamp (eds.), Urban Problems and Economic Development, Nijhoff, Amsterdam.
19. Public of Turkey, Prime Ministry State Institute of Statistics(SIS) 1990 ,1991 ,1992 1993, 1994, 1995, 1996, 1997

APPENDIX-1: The map of regions of Turkey



APPENDIX-2: The data which were used in this research

the marmara region	number of death	population	number of beds	number of doctors	income per capita	percentage of literate	Particulate Matter
istanbul	38676	8506026	30369	15763	4749	90,23	83
edirne	1215	225266	742	618	3437	84,3	55
k• rklareli	746	176270	545	286	3358	87,92	42
yalova	432	110106	100	134	4980	,	,
tekirda•	1423	358878	816	588	3562	87,07	49
kocaeli	2591	629333	1503	1019	7882	88,08	95
bursa	8072	1484838	3851	2068	3442	86,28	69
çanakkale	936	198566	852	365	3533	84,18	16
bal• kesir	3006	538222	2314	819	2722	82,53	105
bilecik	357	116004	255	156	4089	86,87	31
sakarya	1759	331431	1077	479	2719	84,76	68

east mediterrean	number of death	population	number of beds	Number of doctors	income per capita	percentage of literate	Particulate Matter
adana	7054	1272982	4337	1767	3553	79,43	53
içel	2893	955563	2529	782	3495	83,74	,
mara•	1405	551853	1036	426	1796	73,98	94
hatay	1641	591485	1334	673	2562	78,57	66
osmaniye	,	,	,	157	1712	,	,

east anatolian	number of death	population	number of beds	Number of doctors	income per capita	percentage of literate	Particulate Matter
a• r•	96	217919	235	136	744	56,3	
elaz• •	1285	334155	2105	633	2329	73,43	33
erzincan	393	158902	571	210	2022	80,79	89
erzurum	1338	511901	2318	789	1323	73,85	173
malatya	1534	509693	1022	622	1905	78,21	56
bingöl	116	127518	310	107	1032	61,26	80
bitlis	230	198348	310	122	1019	59,99	73
kars	305	149117	365	168	1031	75,34	
mu•	117	153019	360	120	763	56,79	219
kilis	329	66776	190	58	2339		
hakkari	193	128804	135	87	1050	52,28	
ardahan	80	33759	165	74	1020	76,4	
• • d• r	92	68836	100	79	1149	64,54	
van	1040	381060	765	324	1053	55,41	
tunceli	86	55405	165	74	1946	74,37	

black sea	number of death	population	number of beds	Number of doctors	income per capita	percentage of literate	particulate matter
karabük	554	159967	560	176	2714	,	,
sinop	416	87485	615	192	2026	75,02	14
zonguldak	539	239186	1734	495	3695	83,3	156
bolu	593	265052	1305	376	3078	83,23	58
kastamonu	921	157616	1498	341	2537	72,36	70
çorum	1234	289629	,	386	2366	75,26	59
samsun	3088	590339	2621	1231	2353	78,51	31
amasya	747	182978	790	251	2274	80,4	62
artvin	215	80286	550	171	2727	80,93	,
tokat	1278	335060	1207	387	1985	76,31	97
ordu	860	393963	1227	410	1543	75,55	53
rize	413	172662	768	219	2296	80,02	113
giresun	522	239006	1110	242	2355	75,41	71
gümü• hane	67	63169	225	102	1324	78,52	,
trabzon	1383	419867	2457	929	2149	81,08	63
bayburt	108	47007	50	67	1081	78,01	,
bart• n	123	45434	297	134	1294	78,78	,

central anatolian	number of death	population	number of beds	number of doctors	income per capita	percentage of literate	particulate matter
ankara	16574	3294220	14342	10883	3521	89,51	77
yozgat	438	266013	850	309	1276	75,96	47
çank• r•	393	117744	405	157	1585	79,9	37
eski• ehir	3473	518643	2218	975	3314	89,16	81
k• r• ehir	383	140060	450	164	2119	81,48	62
konya	4565	1140016	2733	1538	2373	84,15	87
nev• ehir	365	123813	439	216	3238	82,53	44
ni• de	353	119297	420	231	2551	77,71	29
kayseri	2664	,	,	1061	2298	82,52	75
sivas	1596	395461	2918	662	1692	77,97	125
karaman	434	131556	190	143	3606	84,01	,
k• r• kkale	986	270523	520	175	3358	83,93	71
aksaray	556	169078	320	221	1829	76,66	56

soth east anatolian	number of death	population	number of beds	number of doctors	income per capita	percentage of literate	particulate matter
ad• yaman	540	394268	585	220	1245	67,36	,
gaziantep	3968	866567	1865	673	2283	73,9	99
urfa	1556	784901	855	395	1374	56,2	,
diyarbak• r	2225	832605	2855	798	1734	56,26	135
mardin	366	362434	475	203	1346	54,12	,
batman	304	273095	180	125	1634	57,62	,
• • rnak	349	125264	185	65	1092	40,8	,
siirt	261	158831	255	111	1346	53,97	50

west mediterranean	number of death	population	Number of beds	number of doctors	income per capita	percentage of literate	particulate matter
burdur	460	132642	715	207	2734	85,54	58
• sparta	744	266934	2580	550	2104	86,02	56
antalya	2881	866529	2034	1820	3422	84,23	80

Aegean region	number of death	population	number of beds	Number Of doctors	income per capita	percentage of literate	particulate matter
kütahya	1184	309201	1178	422	2347	81,95	88
manisa	2726	696026	2014	1106	3337	80,2	65
izmir	15392	2544363	8461	6064	4358	87,13	87
u• ak	710	171190	520	232	2162	80,2	66
ayd• n	2244	465087	1523	940	3042	81,53	56
denizli	1401	381848	1359	755	2972	82,81	118
mu• la	801	240605	1270	616	4071	86,03	,
afyon	1141	370883	1368	403	1774	82,46	140

APPENDIX-3: output of coefficients and excluded variables of multiple reg. Analy.

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	-275,420	116,872		-2,357	,022
1	(Constant)	-275,420	116,872		-2,357	,022
	population	4,753E-03	,000	,992	55,496	,000
	population	4,753E-03	,000	,992	55,496	,000
2	(Constant)	-204,695	109,020		-1,878	,066
2	(Constant)	-204,695	109,020		-1,878	,066
	population	3,808E-03	,000	,794	13,027	,000
	population	3,808E-03	,000	,794	13,027	,000

	Number of doctors	,464	,138	,205	3,357	,001
3	(Constant)	-682,860	238,078		-2,868	,006
3	(Constant)	-682,860	238,078		-2,868	,006
	population	3,801E-03	,000	,793	13,497	,000
	population	3,801E-03	,000	,793	13,497	,000
	number of doctors	,434	,134	,192	3,243	,002
	number of doctors	,434	,134	,192	3,243	,002
	income	,196	,088	,038	2,238	,030
	income	,196	,088	,038	2,238	,030

a Dependent Variable: number of death

Excluded Variables

Model	Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance	Tolerance
1		Number of beds	,087	,775	,442	,107	2,533E-02	
1		Number of beds	,087	,775	,442	,107	2,533E-02	
		Number of doctors	,205	3,357	,001	,422	7,192E-02	
		Number of doctors	,205	3,357	,001	,422	7,192E-02	
		income	,044	2,367	,022	,312	,864	
		income	,044	2,367	,022	,312	,864	
		Percentage of literate	,047	2,661	,010	,346	,922	
		Percentage of literate	,047	2,661	,010	,346	,922	
		Particulate matter concentrations	-,025	-1,422	,161	-,193	,995	
		Particulate matter concentrations	-,025	-1,422	,161	-,193	,995	
2		Number of beds	-,191	-1,497	,141	-,205	1,609E-02	
2		Number of beds	-,191	-1,497	,141	-,205	1,609E-02	
		income	,038	2,238	,030	,299	,856	
		income	,038	2,238	,030	,299	,856	
		Percentage of literate	,036	2,153	,036	,289	,879	
		Percentage of literate	,036	2,153	,036	,289	,879	
		Particulate matter concentrations	-,021	-1,272	,209	-,175	,988	
		Particulate matter concentrations	-,021	-1,272	,209	-,175	,988	
3		Number of beds	-,133	-1,039	,304	-,145	1,520E-02	
3		Number of beds	-,133	-1,039	,304	-,145	1,520E-02	
		Percentage of	,021	,983	,330	,138	,541	

literate					
Particulate matter concentrations	-,015	-,909	,368	-,127	,954
Particulate matter concentrations	-,015	-,909	,368	-,127	,954

a Predictors in the Model: (Constant), population
b Predictors in the Model: (Constant), population, number of doctors
c Predictors in the Model: (Constant), population, number of doctors, income
d Dependent Variable: number of death