

The ecology model and influencing factors in Adana province

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Abstract

Aim: The relationship between the individuals and their health care attitudes is known as 'The Ecology of Medical Care'. The present study aims at revealing the ecology of medical care in our province.

Material and Methods: A questionnaire form was applied to 685 individuals from 396 houses between May 1st, 2009 and June 15th, 2009.

Results: Mean age of 685 subjects was 36.6±13.8 years (18-83). Of them, 504 (73.57%) were females, 520(75.91%) were married; 212 (42.06%) of the females and 61 (33.70%) of the males were graduates of elementary school; 479 (69.92%) were migrated to Adana from another region; 577 (84.23%) had social insurance. When the participants had a health problem, 262 (38.24%) preferred primary care. Of the subjects, 540 (78.83%) reported a health problem and 296 (39.30%) admitted to the physician, received 333 diagnoses during the recent 30 days. Of 333 diagnoses, 133 (39.93%) were made at primary care. 264 (38.54%) subjectshad a chronic disease and 192 (49.70%) preferred secondary care for follow up.

Conclusion: While individuals prefer primary care worldwide when they have a health problem, this was found to be secondary care in our study. Comprehensive and patient-centered services may increase the sense of trust and interest toward primary care.

Keywords: Ecology model; patient centeredness; primary care

INTRODUCTION

Ecology is the science which investigates the interaction of the living with each other and with environment. The relationship between the individuals and their health care attitudes is known as 'The Ecology of Medical Care' which is the mainstay of medical care, education and research. Ecology model contributes to improve the quality of health care used by the community (1).

The most famous figure in healthcare research was the diagram of White which clearly indicates 'the place of primary care' (2,3). White reported that of 1,000 risky adult population above 16 years of age, 750 reported one or more illnesses or injuries, 250 consulted to a physician one or more times, 9 admitted to a hospital, 5 were referred to another physician, only 1 patient was referred to a university medical during one month period (2).

In another study of White, published in 2001, he reported more recent data on the monthly prevalence of illness in the community and the types of healthcare sought. He detected that of 1,000 persons in a typical US population (of

all ages), 800 would report symptoms; 327 would consider seeking medical care; 217 would visit a physician's office; 65 would visit a complementary or alternative medical care provider; 21 would visit a hospital outpatient clinic; 14 would receive home health care; 13 would visit an emergency department; 8 would be hospitalized; and less than 1 would hospitalized in an academic medical center (3).

Vast majority of the studies about the ecology model were conducted with adults as children's medical care attitudes are made by their parents. The study of Dovey et al. was the first application to children of the classic ecology of medical care model. In that study conducted with 1,000 adults, each month 235 visited a physician in the office setting, 73 visited a dentist, 13 received care in an emergency department, 26 visited a hospital-based outpatient clinic, 10 spent time as an inpatient in hospital, and 18 received professional health services in their home (1). The authors also described the medical ecology for children in the United States. Of 1,000 children aged between 0 and 17 years, each month 167 visited

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a physician in the office setting, 82 visited a dentist, 13 received care in an emergency department, 8 visited a hospital-based outpatient clinic, 3 spent time as an inpatient in hospital, and 2 received professional health services in their home (1).

The researches were conducted also in USA (1), UK (2), Japan (4,5), Hong Kong (6) and Norway (7) by using similar ecology models in order to better understand the distribution of the sources in different geo-ethnic and socio-economic environments and health care consumption models, to define disease types and health care seeking attitudes and utilization of health services.

The aim of the present study is to investigate health and disease perception of the community, health care seeking attitudes of the individuals and distribution of health care utilization in different socio-cultural environments. In other words, we aimed to reveal the ecology of medical care in our province.

MATERIAL and METHODS

Study population

A total of 114 neighborhoods (74 in the county of the Metropolitan Municipality and 40 in another municipality) were listed. These neighborhoods were categorized as "good", "moderate" and "poor" according to socio-economic status. Sample size was estimated to be 687 based on PEPI statistical program and it was concluded that 229 subjects should be selected for data collection (Confidence interval 95%, expected accuracy rate 5%, design effect 1.5, required sample size 685).

Study design

A questionnaire form was applied to a total of 687 individuals between May 1st, 2009 and June 15th, 2009 with face-to-face interviews. The individuals above 18

years, who had been living in Adana for at least one year, who had been residing the house where the researchers had visited, who had no mental or communication problem were included in the study.

Ethics Committee approval was obtained from Cukurova University (03.06.2008/no: 7).

Written informed consent was obtained from the participants prior to the study.

While a total of 755 houses were visited, residents of 249 could not be found at home and 82 out of 506 did not agree for participation, the questionnaire could not be applied in 28 as they could not speak Turkish. So the study was completed with 685 individuals from 396 houses.

Statistical analysis

Statistical analysis was performed using SPSS (Version 17.0; SPSS Inc., Chicago, IL, USA). Continuous variables with a normal distribution are presented as the means \pm standard deviation ($P < 0.05$ in Kolmogorov–Smirnov test or Shapiro–Wilk test, $n < 30$). Continuous variables without a normal distribution are presented as medians. Pre-post measures data were analyzed using the paired t-test or Wilcoxon's test.

Correlations were examined by Spearman's correlation test. Spearman's correlation coefficients were interpreted as excellent: $r \geq 0.91$; good: $0.90 \geq r \geq 0.71$; fair $0.70 \geq r \geq 0.51$; weak: $0.50 \geq r \geq 0.31$; or little or none: $r \leq 0.3$. In all analyses, $P < 0.05$ was taken to indicate statistical significance.

RESULTS

Socio-demographic characteristics of the participants are shown in Table 1.

Table 1. Socio-demographic characteristics of the participants

Socio-demographic characteristics	Gender				Total (n=685)		p* value	
	Female (n=504)		Male (n=181)		n	% ⁺		
Level of education	Illiterate	161	31.94	26	14.36	187	27.29	$\chi^2 = 47.59$ SD= 3 0.0001
	Elementary-intermediate school	212	42.06	61	33.70	273	39.85	
	High school	72	14.28	42	23.20	114	16.64	
	University	59	11.70	52	28.72	111	16.20	
Age groups (year)	18-24	121	24.00	37	20.44	158	23.06	$\chi^2 = 16.31$ SD= 5 0.006
	25-34	156	31.95	49	27.07	205	29.92	
	35-44	94	18.65	28	15.46	122	17.81	
	45-54	87	17.26	30	16.57	117	17.08	
	55-64	34	6.74	28	15.46	62	9.05	
Marital status	65+	12	2.38	9	4.97	21	3.06	$\chi^2 = 7.97$ SD=2 0.020
	Married	394	78.17	126	69.61	520	75.91	
	Single	88	17.46	49	27.07	137	20.00	
	Widowed	22	4.36	6	3.31	28	4.08	
Social insurance	Yes	84	16.66	24	13.25	108	15.76	$\chi^2 = 14.48$ SD=4 0.006
	No	420	83.33	157	86.74	577	84.23	
Socio-economic status	Good	60	11.90	38	20.99	98	14.30	$\chi^2 = 11.58$ SD= 2 0.003
	Moderate	270	53.57	98	54.14	368	53.72	
	Poor	174	34.52	45	24.86	219	31.97	

⁺percent of the Column; *PearsonChi-Square Test

Assessment of health service utilization behavior

When the participants had a health problem, 262 (38.24%) preferred primary care, 304 (44.37%) preferred secondary care, 103 (15.03%) preferred tertiary care and 16 (2.33%) did not admit to a health institution. A statistically significant association was found between health care steps and all socio-demographic characteristics ($p < 0.005$) (Table 2).

Assessment of causes for health institution preference is shown in Table 3. A statistically significant association was found between the causes for preferring the health institution according to health service steps ($p < 0.005$) (Table 3).

Table 2. Comparison of health care services steps and socio-demographic characteristics

Socio-demographic characteristics		Health Care Services Steps								Total (n=685)		p* value
		No institution (n=16)		Primary care (n=262)		Secondary care (n=304)		Tertiary care (n=103)				
		n	%**	n	%**	n	%**	n	%**			
Gender	Female	2	12.50	215	82.06	219	72.03	68	66.01	504	73.57	$x^2=43.79$ SD= 3 0.0001
	Male	14	87.50	47	17.93	85	27.96	35	33.98	181	26.42	
Level of education	Illiterate	3	18.75	73	27.86	97	31.90	14	13.59	187	27.29	$x^2=35.27$ SD= 9 0.0001
	Elementary-intermediate school	8	50.0	96	36.64	134	44.07	35	33.98	273	39.85	
	High school	3	18.75	46	17.55	41	13.48	24	23.30	114	16.64	
Age groups (year)	University	2	12.50	47	17.93	32	10.52	30	29.12	111	16.20	$x^2=34.72$ SD= 15 0.003
	18-24	7	43.75	54	20.61	77	25.32	20	19.41	158	23.06	
	25-34	6	37.50	84	32.06	92	30.26	23	22.33	205	29.92	
	35-44	2	12.50	42	16.03	60	19.73	18	17.47	122	17.81	
	45-54	0	0.00	56	21.37	45	14.80	16	15.53	117	17.08	
Social insurance	55-64	0	0.00	20	7.63	23	7.56	19	18.44	62	9.11	$x^2=163.21$ SD= 12 0.0001
	65+	1	6.25	6	2.29	7	2.30	7	6.79	21	3.06	
	No	8	50.0	42	16.03	54	17.76	4	3.88	108	15.76	
	Yes	1	6.25	44	16.79	13	4.27	50	48.54	108	15.76	
		3	18.75	98	37.40	108	35.52	23	22.33	232	33.86	
		1	6.25	30	11.45	19	6.25	16	15.53	66	9.63	
		3	18.75	48	18.32	110	36.18	10	9.70	171	24.96	

* PearsonChi-Square Test; **Percent of the Column

Table 3. Distribution of the causes for preferring health care services according to health care service steps (only the subjects who responded as "Yes" were included)

Causes for preference	Health Care Services Steps						p* value
	Primary care (n=262)		Secondary care (n=304)		Tertiary care (n=103)		
	n	% ⁺	n	% ⁺	n	% ⁺	
Easy to reach, close to my home	143	54.58	143	47.03	31	30.09	$x^2= 17.80$ SD= 2 0.0001
I don't wait for the examination	50	19.08	9	2.96	19	18.44	$x^2= 40.96$ SD=2 0.0001
Physicians have good interest	106	40.45	50	16.44	25	24.27	$x^2= 41.58$ SD=2 0.0001
All tests can be performed	19	7.25	69	22.69	51	49.51	$x^2= 81.47$ SD= 2 0.0001
Expenditures are met by the health insurance	38	14.50	121	39.80	41	39.80	$x^2= 48.68$ SD= 2 0.0001
My family physician work there / I am registered to that institution	77	29.38	2	0.65	2	1.94	$x^2= 120.98$ SD= 2 0.0001

*Percentages are obtained from the total number of the patients who preferred that step ; **PearsonChi-Square test
16 subjects who admitted to no institutions are not included; Subjects reported more than one cause for preference

Assessment of the health problems which were experienced during the recent 30 days

Of the subjects, 540 (78.83%) reported a health problem and 145 (21.16%) did not report a health problem during the recent 30 days. Mean number of complaints was found to be 1.6 ± 1.1 in the whole study population. The most common complaints were reported as headache (n:166; 14.90%), low back pain (n:94; 8.50%), fatigue (n:49; 4.40%), cough (n:41; 3.70%), abdominal pain and arthralgia (n:39; 3.50%).

We have detected that 433 (38%) patients preferred self-care, vast majority (55.50%) of the admissions were done to primary care and secondary care institutions and small number of admissions (6.50%) were done to tertiary care. A statistically significant difference was found between socio-economic status and health care attitudes ($p < 0.005$) (Figure 1).

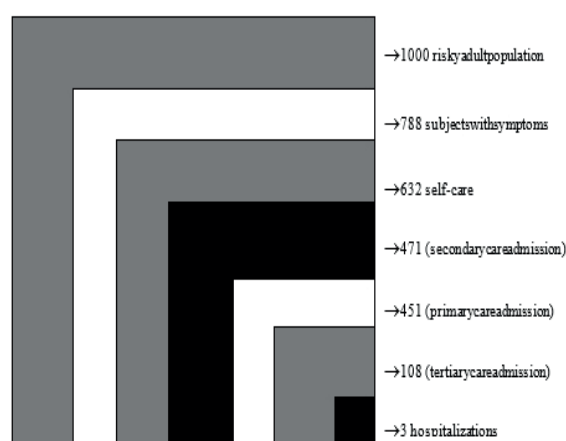


Figure 1. Ecology model representing health care behaviors of the individuals living in Adana province during the recent 30 days

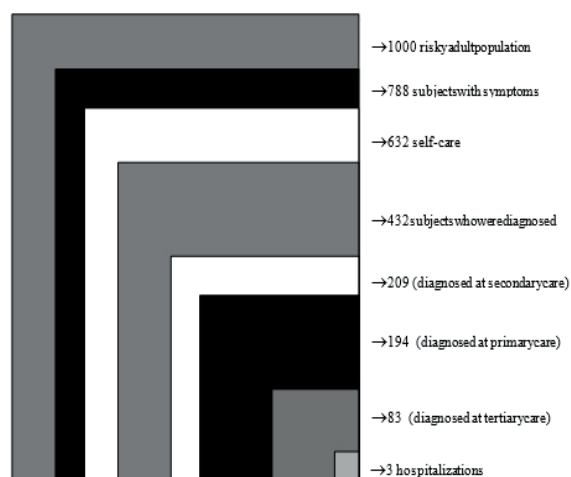


Figure 2. Ecology model representing admissions to health care services in Adana province during the recent 30 days

Number of the subjects who were admitted to the physician during the recent 30 days was 296 (39.30%). These subjects were made a total of 333 diagnoses including peptic ulcer (n:21; 6.30%), hypertension

(n:20; 6%), sinusitis (n:16; 4.80%), urinary tract infection (n:14; 4.20%), lumbar disc hernia (n:13; 3.90%). Of these 333 diagnoses, 133 (40%) were made at primary care, 143 (43%) at secondary care and 57 (17%) were made at tertiary care.

No treatment was recommended in 24 (7.20%) of total diagnoses, 233 (67.70%) patients were recommended medications and 85 (25.52%) different treatments. Only 2 (0.50%) were hospitalized. When the obtained data are adjusted to a population of 1000 subjects, the results in Figure 2 are obtained.

Assessment of chronic diseases

Of the subjects, 264 (38.54%) were detected to have a chronic disease, 390 diagnoses included hypertension (n:90; 23.07%), dyslipidemia (n:49; 12.56%), diabetes mellitus (n:36; 9.23%), asthma (n:25; 6.41%), lumbar disc hernia (n:25; 6.41%), anemia (n:15; 3.84%) and goiter (n:15; 3.84%).

While 8 (2%) subjects were being followed up in no institutions, 192 (49.23%) preferred secondary care, 95 (24.35%) preferred primary care and 90 (23.07%) preferred tertiary care for chronic diseases. Secondary care institutions were preferred in the first order for chronic diseases while they were the second for acute diseases.

DISCUSSION

Ecology model was first defined by White et al. in 1961 (2,8) and the model which was also used by policy makers and educationalists was updated in time (1,9-11). The model was updated for medical care of children in 2003 (1), for chronic diseases in 2005 (12) and for initiating the utilization of health services in different populations (4-7,13,14).

About 80% of the individuals experience at least one health problem and thereby seek medical care. While one third of these individuals consider to receive medical aid, one tenth admit to family physicians, very small part of the population admit to hospitals (outpatient clinic or emergency room) and less than one is hospitalized. This condition shows the iceberg of 'disorder' and 'disease'. Chris van Weel defined ecology model as 'the morbidity of the population' (15). Undifferentiated problems are encountered and solved in primary care. Primary care also enables to manage the patient among medical care steps through serving as a bridge. Individuals may be evaluated with bio-psycho-social approach and existential approach, morbidity may be measured at primary care.

Family medicine has been applied for primary care services in many countries for many years and practices may vary among countries. Family physicians are located at an easily accessed location (16). The primary level of the health care sector is the component in which the vast majority of patients should receive treatment, particularly those with complex bio-psycho-social health needs (14).

Gordon et al. have revealed that 720 out of 1000 individuals admitted to a clinician, 100 out of 1000 admitted to a hospital and 10 admitted to a university hospital for at least once (3).

The common diseases, more data about them and more detailed health care attitudes have been revealed in a study of Green et al. which has cited the paradigm of White (3,17). It is interesting to obtain similar results 40 years after the study of White.

Assessment of causes of health service utilization

General health control of the adults followed by cough, sore throat, health control of the healthy child and control for a previously diagnosed disorder were found to be the most common causes of outpatient clinic admissions in national Ambulatory Medical Care Surveys held between 1995 and 1999 (17). These causes were reported as general health control, cough, headache, fatigue, dyspepsia by Unalan et al. (18) and cough, fever and general health examination in a study conducted at Cukurova University in 2007 (19). These causes were found to be cough, respiratory disorders, headache, abdominal and pelvic pain, itching at Cukurova University in 2003 (20). In our study, we have found the most common causes as headache, low back pain, fatigue, cough and abdominal pain.

More individuals were detected to report symptoms in the study of Green et al. in 2001 when compared to the study of White et al. and also the number of the patients who used self-care was also found to be higher. This may have resulted from improving educational status of the community, reaching information more easily through internet use and the contribution of developing technology. We have detected the ratio of self-care as 38%. This low ratio may be due to cultural differences besides individual differences.

Assessment of the health problems which were experienced during the recent 30 days

The most common acute problems were found to be respiratory tract infections, neck/shoulder/arm pain, functional complaints, minor traumas and vaginitis at primary care between 1998 and 2003 (21,22). While the first leading cause for primary care admissions was found to be general examination of the healthy child, it was followed by hypertension, acute urinary tract infections, otitis media, type II diabetes mellitus in UK (17).

In a study conducted in our country, upper respiratory tract infections, hypertension, general examination, dyslipidemia and anemia were detected to be the most common diagnoses made at primary care (18). Upper respiratory tract infections, urinary tract infections, hypertension, iron deficiency anemia and arthropathy were found the most common diagnoses in a study conducted at Family Medicine Outpatient Clinic of Cukurova University (20). We have found peptic ulcer, hypertension, sinusitis, vaginitis, urinary tract infection and lumbar disc hernia as the most common diagnoses in our study. It is not possible to state that the correct patient has admitted to the correct place and received the correct diagnosis.

Assessment of chronic diseases

Chronic diseases are known to alter health care attitudes (12). The patients with asthma were observed to prefer emergency rooms and hospitals rather than primary care. Patients with chronic diseases were detected to admit to health institutions and hospitalized more commonly than the patients who do not have chronic diseases (12). In our study, 264 out of 685 subjects (38.54%) had a chronic disease. Of them, 74.60% preferred hospitals but only 25.40% preferred primary care for follow up. Hone et al suggested that improvements in primary health care and a new model of family physician may be conducive to changes in provider preference (23).

In our study, secondary care institutions were detected to be most preferred when the patients had a health problem and there was a significant relationship between the preferred health institution and gender, age group, social insurance and socio-economic status ($p < 0.001$). While primary care was detected to be the first admission institution in three different community-based studies conducted with the elderly (5,7,14) primary care was found to be the first admission institution also in a study conducted with women in 15-49 age group in our country (24). Hone et al. showed that the predominant source of healthcare was public secondary care institutions in Turkey, but this began to change after 2009 (23,25). In the study of Hoffman et al., Austria has high utilization of health care services in each of the assessed categories and also demonstrates the highest utilization of specialists working in the outpatient sector, specialists with their own practices and in hospital outpatient departments. Austria showed the highest hospitalization rates, taking into account hospitalizations in secondary care hospitals and in academic medical centers (14).

In literature, primary care is seen to be the most commonly preferred for first admissions, as expected. However we detected that secondary care institutions were most commonly preferred both for acute and chronic diseases, differently from the previous ecology model studies. One reason for preferring primary care less may be patients' feeling less confident. Data from international literature show that well established health systems in which well-educated general practitioners work provide more cost-effective health care (26), so improving knowledge level of the primary care staff may increase the ratio of primary care admissions. We may state that this ratio is estimated to increase from the date of the study to this as establishment of primary care services has been completed in December 2010 in the whole country and has been developing since then. On the other hand, open access to all levels of care, including self-referral by patients, is an intrinsic problem of Turkish health care system. It is only a recommended option for patients to visit primary care first, and then be referred to a specialist.

Family medicine system was in effect in Adana at that time and this was considered by the subjects. In the study of Thomas Hone which was conducted in Turkey underlined that necessity (meaning no other choice or requirement

to do so) was the reason for choice of health service. Necessity as the reason for choice, declined from 42.6% to 12.9% of respondents for public from 2005 to 2012 (23).

Assessment of socio-demographic characteristics

Living in urban areas, presence of a chronic disease, presence of health insurance, level of income, gender and occupational status were found to be the variables which influence health service utilization in different studies conducted in our country (23,24). We have also detected a significant relationship between the factors influencing health institutions and socio-demographic data ($p < 0.01$).

Educational status leads to differences between individuals with regard to reaching knowledge and utilization of health services. National and international studies indicate that low socio-economic groups are more disadvantageous. Utilization of health services was found lower in low educational and low income groups in Canada, among females and non-Swedish subjects in Sweden. Ethnic origin, occupational status, educational statuses were found to be the variables which influence utilization of health services. Health status is impaired as poverty and inequality in income distribution increase. Loss of job and income occur as health status is impaired and the subjects cannot meet their health care requirements, and a vicious cycle occurs (27). In our study, 398 (58.10%) subjects were illiterate and graduates of elementary school. Low educational status may be considered as a factor which increases the utilization of health services.

In the present study, 386 (56.35%) subjects reported family income as "moderate" and 219 (31.97%) as "poor". Their opinions about socio-economic level of their neighborhood were also similar, 334 (48.75%) reported it as "moderate" and 214 (31.24%) as "poor". Health service utilization was found more among the subjects who reported the socio-economic status of them and their neighborhood as moderate" and "poor". This may have resulted from the fact that vast majority of the subjects (85.70%) reported their socio-economic status as "moderate" and "poor" and each subject can easily admit to the health institution where they wish. Females were found to exhibit more symptoms and admitted to hospitals more frequently in the study of Fukui et al.(4). Annual number of health institution admissions was found higher among females and the patients with chronic diseases in a study conducted in our country (23,25). Similar results were obtained also in our study as vast majority of our participants were females (73.60%). This may be due to performing the study at daytime and mostly interviewing with housewives. Females form the larger group with regard to primary care admissions. This may have resulted from their receiving reproductive health service at the primary care clinic.

In the present study, 479 (69.92%) of the subjects were immigrants and they had been living in Adana for mean 16.8 ± 12.4 years (1-67). Migration rate of Adana is -8.51 according to 2018 census results of Turkish Statistical Institute (28).

In our country, having a health insurance and thereby health care services are easy to reach. As a result, we have found a different ecology model in our study and had difficulty to apply the ecology model as secondary care institutions were found to be used more both for acute and chronic problems. Applying to secondary and tertiary care institutions for the health problems which could be solved at primary care may increase workload, decrease cost-effectiveness and lead to negative effects on the individuals and health care workers due to unnecessary tests and time-consuming interventions. This may be overcome through supporting primary care.

CONCLUSION

In conclusion, while individuals prefer primary care when they have a health problem and when they need follow up for chronic problems worldwide, this was found to be secondary care institutions in our study, so we have obtained a different ecology model. We may consider that primary care should be developed and strengthened. Providing a comprehensive, coordinated, continuous, patient-centered and protective health services for the individuals and their families may increase the sense of trust and interest toward primary care.

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