

PROJECTION OF THE USE OF PRIMARY HEALTH CARE SERVICES IN A GREEK PRIMARY HEALTH CENTRE: A PILOT STUDY

Noula M, Gesouli E, Vobiris G, Raftopoulos V.

Nursing Department, High Technological Education Institute of Lamia, Greece

ABSTRACT

Background: Primary health care services are the cornerstone of many health care systems in Europe. The systematic analysis of annual consultation rates in the primary care centres is important for the evaluation of the performance and the adequacy of care provided.

Sample and methods: To assess the current and future visitation rates in a large health centre in North West Greece we conducted a retrospective research, by analyzing the outpatient office visits to the health centre during 2005-2006. Based on these data we developed a projection model in order to predict the future use of these services and the use of laboratory tests.

Results: T-test revealed to a statistical significant difference ($p=0.020$) between the year and the mean number of visits. More precisely the year 2006 the mean number of visits in the Health Centre was bigger ($595,552\pm 171,921$) than that of the year 2005 ($411,483\pm 118,785$). The analysis did not show a similar statistical difference between the year and the mean number of diagnostic tests performed the same period of time. There was an increase in the total number of primary care visits during 2006 (17.5%) compared with the year 2005 and is projected to increase 60% (range from 0% to 60%) during 2007. General internal medicine services were mainly provided to the users.

Conclusions: Better management of persistent primary care use may better address the patients' underlying problems, reduce unnecessary demand, and relieve some of the pressure on the capacity of primary care providers to deliver care to all patients. This study demonstrates the importance of augmenting primary health care centers with qualified nursing and medical staff and supplies in residential areas during the summer to cope

with the situation and of providing proper and adequate primary care services.

Keywords: Health care centre, primary health care, demand, use of care services.

Corresponding Author:

Noula Maria
3, Pellis str, Kifisia, 14561
Tel: 210 8087573
Email: mnoula@teilam.gr

INTRODUCTION

Health care systems become increasingly complex and are called to adapt their current policies according to the new requirements as medical technologies allow the provision of services at different levels of care; chronic patients require treatment, health promotion and rehabilitation services need to be developed in multiple settings and economic factors pressure for the cost-efficient provision of services. All these developments call for a careful coordination of services, collaboration of service providers and active involvement of the patients [1,2].

The provision of primary health care services is crucial for health promotion, illness and injury prevention, and the diagnosis and treatment of illness and injury [3-9]. In Greece Primary health care sector services are provided through various settings such as the hospital ambulatory (outpatient) clinics, the urban, the rural and the municipal health care centres, the health multcentres and the private physicians. The Greek health care system has a strong hospital orientation [11]. The weaknesses of primary health care services is partially attributed to the excess use of hospital out-patient services as a first point of contact, as well as secondary care in the form of specialized ambulatory medical

services. Because of the absence of a referral system, the patient is totally free to refer himself/herself to virtually any type of care. Furthermore there is a multiplicity of provider settings offering both primary and secondary care.

The analysis of annual consultation rates in the primary care practices is important for the reengineering of these settings. Furthermore the results could be used in feasibility reports. Our aim was to analyse the annual visitation rates in a health care centre cited in North-West Greece and to estimate the variability of the visitations across the two years of analysis.

Sample and method

In order to assess the utilization of primary health care services from the citizens of North West Greece we conducted a retrospective research, by analyzing the outpatient office visits to the health centre during 2005-2006. Based on these data we developed a projection model in order to predict the future use of these services. The information obtained is very important for the formulation of the strategy. The categorization of the primary care visits was the following: emergency visits, internal medicine, pediatric, obstetric, orthopedics, dentistry and ENT visits. The subsequent categorization of the laboratory diagnostic test was: blood test, urine test, biochemical, microbiological, Pap test and pregnancy test,

Data analysis

Statistical Package for Social Sciences 13 computer software was used for the statistical analysis of the data obtained. The *t*-test assessed whether the means of two groups were statistically different from each other. Values less than 0.05 were considered statistically significant, unless otherwise stated. For the prediction of future utilization rates we used the Brown method. For the prediction of the laboratory test utilization we used the method based on time series decomposition based on a multiplicative model because we found a seasonal and not canonical distribution of the use of laboratory tests.

Results

As seen in Table 1, the total number of visits in the primary care setting was 35,616 for the year 2005 and 41,952 for the year 2006. The vast majority of the visits in the biennium were mainly internal medicine consultations. More precisely the percentage was 67.7% for the year 2005 and 59.7% for the year 2006.

As we see in Table 2, complete blood count analyses accounted for the 8.95% of the total number of laboratory tests performed in 2005 and for the 17.50% in 2006. A further exploration of the above tables revealed to a strong correlation between the month and the total number of visits ($r=0.566$, $p=0.004$). In Diagram 1 it is obvious that there is a peak in the total number of visits in March (3,575) and in August (3,562) in 2005 and during April (4,083) and August (4,349) in 2006. In the meantime there was a peak in the total number of diagnostic tests performed in May (7,290) and June (7,299) of the year 2005 and in March (7,727) and in August (7,007) of the year 2006.

There was not a statistically significant correlation ($r=-0.136$, $p=0.683$) between the number of patients' visits per month and the subsequent number of diagnostic tests performed.

T-test revealed to a statistical significant difference ($p=0.020$) between the year and the mean number of visits. More precisely the year 2006 the mean number of visits in the Health Centre was bigger (595.552 ± 171.921) than that of the year 2005 (411.483 ± 118.785). The analysis did not show a similar statistical difference between the year and the mean number of diagnostic tests performed the same period of time.

Projection of future use of primary care services and subsequent use of diagnostic tests

For the prediction of future use of primary health care services we used the Brown method. The analysis showed that the mean standard deviation of the predicted values from the real values was 370 and RMSE=484 visits. The mean error was 11.30% between 361 and 474 visits.

$$\hat{Y}_{t+h} = T_{t+h} S_{t+h} C_{t+h} I_{t+h} \Rightarrow \hat{Y}_{t+h} = [\hat{a} + b(t + \hat{h})] SA_i * 1 * 1 \Rightarrow \hat{Y}_{t+h} = [6298 + 1.74(t + 24)] SA_i$$

This means that the total number of patients' visits for the year 2007 will range between 28,578 to 35,859. Diagram 3 shows the distribution of the visits for each month.

In order to predict the total number of projected diagnostic tests we have used the mathematical type:

Whereas SA is the seasonal index. Table 3 presents the total number of projected diagnostic test to be performed in the year 2007. According to our estimation the total number of diagnostic test will be 76,207 with a monthly range from 7,600 tests on March to 7,145 on August.

To predict the future use of health care services on the basis of a medical specialty our analysis followed the t student distribution because we had few observations ($n < 30$). We concluded that the predicted number of visits in the paediatric department will range from 6% to 22% as opposed to the ENT that will range from 0% to 2%. The prediction for the internal medicine department has a wide deviation.

Discussion

This study provides information regarding visitation in a large urban primary health care centre. Before assessing and interpreting the findings of the present study, there are concerns that should be discussed. The sample of the present study is a convenient one and the selection of the data was made within a period of two years and therefore the prediction model may not reflect changes in the demographic characteristics of the sample. On the other hand we assumed no systematic variation in disease prevalence associated with utilization rates. Factors usually associated with high utilization include patient demographics, previous use of health care, patient diagnosis, and severity of illness [14]. Therefore we are not raising any claims that the sample is representative of the use of primary care services. Nevertheless, the results are representative of the use of services on North West Greece as the specific health care covers the major geographic regions of North West Greece.

According to the results there was an increase in the total number of primary care visits during 2006 (17.5%) compared with the year 2005. This could possibly reflect the increased preference of primary care services

from the citizens, instead of outpatient hospital services. On the other hand it could be attributed to the large number of patients migrated outside of their service areas for care. According to our results a significant excess of utilization of curative and preventive public health care services was observed during summer months compared to the other months. This is a common finding in the literature [13] and is partially attributed to the increase of population in the summer period as many people visit their place of birth during their summer vacancies. Furthermore the health care centre was cited in a Greek region familiar to the tourists. In addition visits in the emergency department during 2006 for acute care and injury were more frequent and is attributed to the increase population who live in the rural areas of the North West Greece [15].

Better management of persistent primary care use may better address the patients' underlying problems, reduce unnecessary demand, and relieve some of the pressure on the capacity of primary care providers to deliver care to all patients. This study demonstrates the importance of augmenting primary health care centers with qualified nursing and medical staff and supplies in residential areas during the summer to cope with the situation and of providing proper and adequate primary care services. More health education is needed to inform people about importance of preventive primary care services for better utilization of the available services (13). Family practice training programs that prepare nurses and physicians for rural areas need to provide greater emphasis on care of infants and children than do urban-focused programs [15].

General internal medicine services were mainly provided to the users. In a similar research in a Greek health centre in Koropi these cases were the second cause of visitation with the accidents were the first cause [10]. In another research in the Velestine Greek health centre a large number of internal medicine services were provided [11].

The low visitation rates to the gynecology department shows that women prefer to visit their private gynecologist. A similar research that tried to interpret this finding explained that women select their gynecologist after consultation from a relative or a friend [14].

Our estimates for the visitation rates during 2007 show an increase during the brumal season (January, February and March). This projection could be possibly attributed to the climatic conditions during this season and to the geographic distinctiveness given the massifs [15].

Table 1: number of consultation visits in the primary care setting per month and total

Visits	1/05	2/05	3/05	4/05	5/05	6/05	7/05	8/05	9/05	10/05	11/05	12/05	2005
Emergency	730	600	582	0	0	0	0	0	0	0	0	0	1912
Pediatric	516	400	542	550	405	450	465	456	500	500	410	500	5,694
Internal medicine	1,551	1,560	1,919	1,921	1,491	1,560	2,167	2,867	2,441	2,208	2,448	1,992	24,125
Gynecologic	165	145	161	14	26	29	24	19	16	19	15	10	643
ENT	38	39	28	30	12	47	1	13	13	21	8	11	261
Orthopedics	79	65	144	95	111	99	0	0	0	122	97	28	840
Dentistry	130	166	199	103	172	195	225	207	157	171	177	239	2141
Total	3,209	2,975	3,575	2,713	2,217	2,380	2,882	3,562	3,127	3,041	3,155	2,780	35,616
Visits	1/06	2/06	3/06	4/06	5/06	6/06	7/06	8/06	9/06	10/06	11/06	12/06	2006
Emergency	0	0	0	0	0	0	3,198	2,771	2,566	0	0	0	8,535
Pediatric	408	450	550	410	350	380	310	350	450	495	350	350	4,853
Internal medicine	1,872	1,926	1,655	3,367	2,527	3,030	0	1,084	682	3,087	2,877	2,971	25,078
Gynecologic	12	16	21	20	16	17	18	17	16	23	26	12	214
ENT	18	28	36	33	26	33	34	0	19	22	39	15	303
Orthopedics	66	54	91	61	90	53	0	0	0	70	117	16	618
Dentistry	138	97	472	192	166	191	166	127	188	164	301	149	2,351
Total	2,514	2,571	2,825	4,083	3,175	3,704	3,726	4,349	3,921	3,861	3,710	3,513	41,952

Table 2: number of consultation visits in the primary care setting per month and total

Tests performed	1/05	2/05	3/05	4/05	5/05	6/05	7/05	8/05	9/05	10/05	11/05	12/05	2005
Compete blood count	1,160	900	1,350	980	1,201	1,115	1,120	1,170	1,100	0	940	887	11,923
Other	80	70	70	80	108	120	130	70	80	100	70	55	1,033
Blood chemistry test	3,850	3,100	4,450	3,584	4,830	5,125	4,558	5,093	4,811	3,920	3,750	3,300	50,371
Microbiological	65	40	75	65	85	90	102	80	91	105	60	50	908
x-rays	566	584	192	570	673	512	584	372	67	645	586	490	5,841
Urine test	280	270	200	290	380	320	280	290	25	380	180	240	3,135
Pregnancy test	15	25	20	10	12	15	20	10	1	23	10	10	171
Pap test	0	0	0	7	1	2	3	0	0	2	3	2	20
Total	6,016	4,989	6,357	5,586	7,290	7,299	6,797	7,085	6,175	5,175	5,599	5,034	133,139
Visits	1/06	2/06	3/06	4/06	5/06	6/06	7/06	8/06	9/06	10/06	11/06	12/06	2006
Compete blood count	1,080	1,160	1,355	1,235	1,195	1,290	1,213	1,225	1,200	1,120	900	736	13,709
Other	95	110	115	121	115	104	93	62	80	0	35	37	967
Blood chemistry test	4,800	4,760	5,062	4,021	4,310	4,335	3,932	4,720	4,275	4,200	3,800	3,152	51,367
Microbiological	80	100	120	98	90	126	78	75	90	68	60	0	985
x-rays	567	513	711	604	685	565	559	619	729	556	657	591	7,356
Urine test	230	290	340	340	325	375	323	295	357	320	260	230	3,685
Pregnancy test	15	15	20	24	20	20	11	10	8	16	12	10	181
Pap test	5	5	4	1	1	2	2	1	3	1	2	1	28
Total	6,872	6,953	7,727	6,444	6,741	6,817	6,211	7,007	6,742	6,281	5,726	4,757	78,278

Diagram 1 Frequency of visits and diagnostic tests performed during 2005-2006

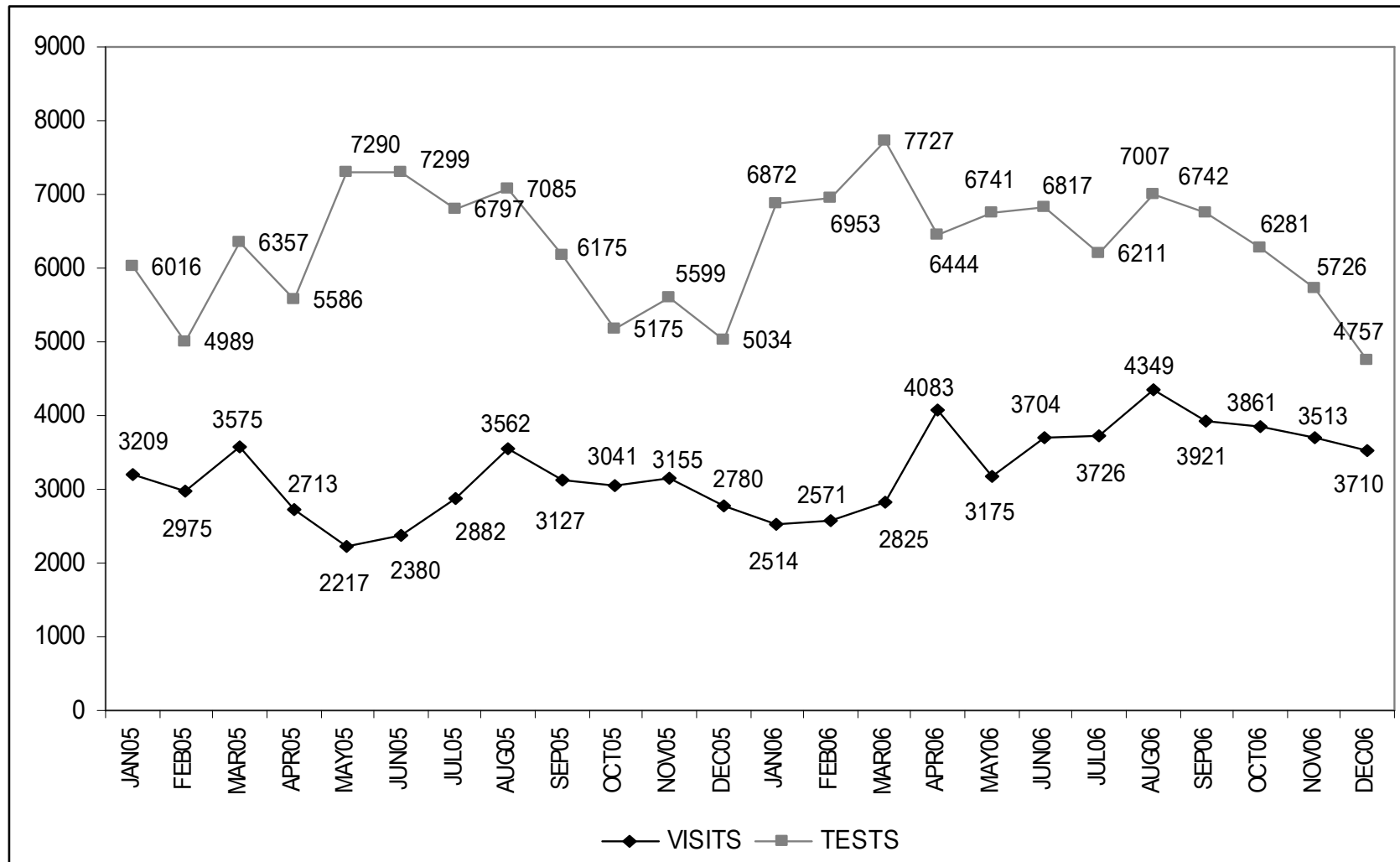


Diagram 2: Total number of projected visits per month

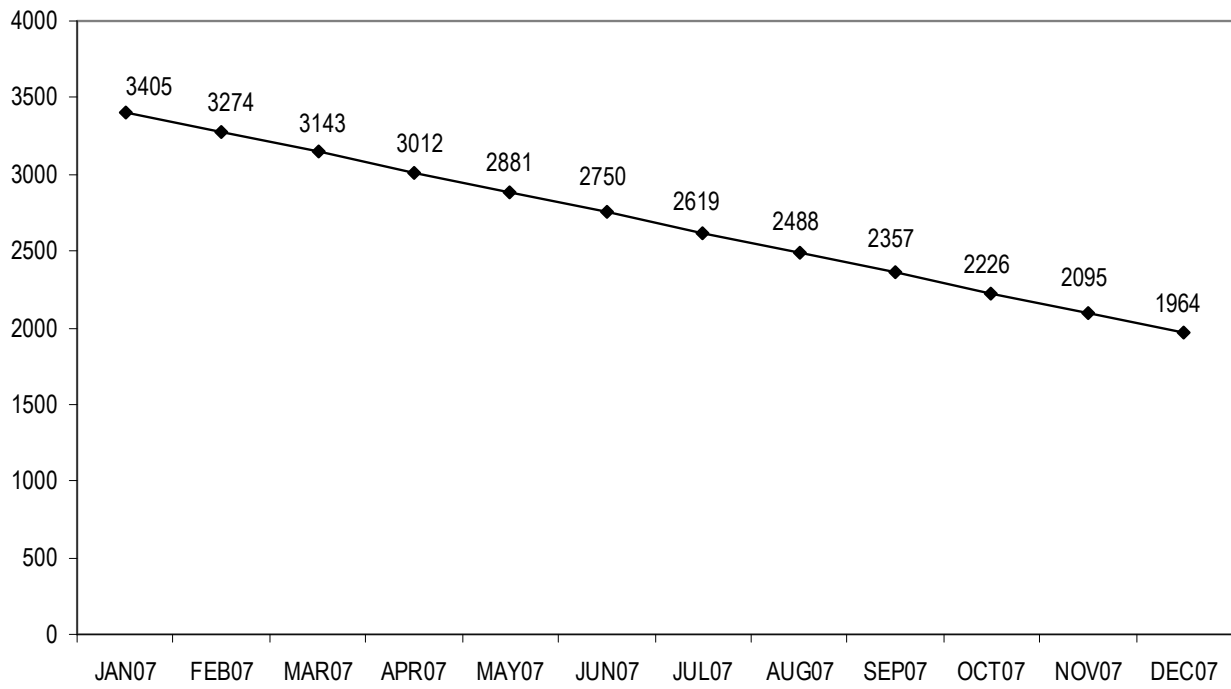


Table 3: Projection of the total number of projected visits during 2007

Month	Seasonal index	Projection
JAN 07	1.064068423	6,748
FEB 07	1.081265018	6,859
MAR 07	1.197816543	7,600
APR 07	0.988199625	6,272
MAY 07	1.025625738	6,511
JUN 07	1.038180942	6,593
JUL 07	1.099440204	6,984
AUG 07	1.124548732	7,145
SEP 07	0.958866849	6,094
OCT 07	0.792111018	5,036
NOV 07	0.85531682	5,439
DEC 07	0.774110641	4,924
Total		76,207

Table 4: Projection of the total number of projected visits in the departments

Departments	From	To
Emergency	0%	63%
Pediatric	6%	22%
Internal medicine	18%	100%
Gynecologic	0%	4%
ENT	0%	2%
Orthopedics	0%	5%
Dentistry	0%	12%

Table 5: Projection of the total number of projected laboratory tests

Diagnostic tests	From	To
Compete blood count	4%	28%
Other	0%	3%
Blood chemistry test	55%	82%
Microbiological	0%	2%
x-rays	0%	66%
Urine test	0%	53%
Pregnancy test	0%	12%
Pap test	0%	6%

REFERENCES

1. *Primary health care: a framework for future strategic directions*. Geneva, World Health Organization, 2003 (WHO/MNC/OSD/03.01)
2. Filalithis T. Health for all 2000 and Primary Health Care: utopia, trap or a feasible shot? *Iatriki* 1982; 42(4): 257-264
3. Dean SC, Harper CE, Cappuccio FP, Rink E, Dirckx C, Arnout J, Zito F and Iacoviello L on behalf of the European Collaborative Group of the IMMIDIET Project. The challenges of cross-national research in primary health care across Europe. *Family Practice* 2005; 22: 341-346
4. Raftopoulos V. Beliefs, knowledge and attitudes of community-dwelling Greek elders towards influenza and pneumococcal vaccination. *The Internet Journal of Epidemiology* 2007 (under publication)
5. Thom D, Kravitz R, Kelly-Reif S, Sprinkle R, Hopkins J, Rubenstein L. A new instrument to measure appropriateness of services in primary care. *International Journal for Quality in Health Care* 2004; 16:133-140
6. WHO: *Health services in Europe* WHO Regional office for Europe Copenhagen, 1981
7. Venedictou DD. Lesson from Alma-Ata *World Health Forum* 1981; 2:332,
8. Bucuniene I, Blazeviciene A, Bliudziute E. Health care reform and job satisfaction of primary health care physicians in Lithuania. *BMC Family Practice* 2005, 6:10
9. WHO Regional office for Europe: *Health 21: The health for all policy framework for the WHO European Region* Copenhagen 1996
10. Tsatsaris A, Filioussi K, Bonovas S, Mariolis A, Bellos G. Use of health services at the emergency departments of Health Centre of Koropi. *Medical Annual* 2003; 26(9):433-437 (in Greek)
11. Chatzikiriakos A, Vardoulis A, Filalithis A. Health promotion, use of health care services and satisfaction with health care services provided from the health centre of Velestino. *Medical Annual* 2003; 26(3): 170 -179 (in Greek)
12. Raftopoulos V. Pain, satisfaction with quality of pain management and depressive symptoms in elderly hospitalized patients. *ICU Nursing Web Journal*. 2005;20
13. Mahfouz AA, Hamid AM. An epidemiologic study of primary health care service utilization of summer visitors to Abha, Asir, Saudi Arabia. *Journal of Community Health* 1993; 18(2):121-125
14. Naessens J, Baird M, Van Houten H, Vanness D, Campbell C. Predicting Persistently High Primary Care Use. *Annals of Family Medicine* 2005;3(4):324-330
15. Probst J, Moore C, Baxley E, Lammie J. Rural-Urban Differences in Visits to Primary Care Physicians. *Family Medicine* 2002; 34(8):609-15.