

Determinants of Healthcare Utilization and Cost among Privately Insured Families in Saudi Arabia

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ABSTRACT Background: The kingdom of Saudi Arabia is currently restructuring its healthcare system through implementing a number of strategies among which the introduction of insurance coverage for both foreign workers and citizens. **Objectives:** The aim of the present study is to assess factors that affect utilization and cost of health services among a group of privately insured families in Saudi Arabia **Methods:** A six month administrative claims database of employees and their dependents from three different companies covered by a major insurance company was utilized to collect demographic enrollment characteristics, service utilization and services costs. The unit of analysis of the present study was families rather than individuals with a total of 131 families included in the analysis. **Results:** The study revealed that those covered by the highest class of coverage provided by the insurance company (class VIP and A) had more utilization and higher mean charges per family compared to those covered by class B or C. The study also found that middle aged and older families had more utilization and average charges per family compared to younger families. Families in which women were the primary insured had both lower use and lower average charges. Finally, family size seemed not related to any pattern of medical care use. **Conclusions:** Families with lower insurance class coverage, and families in which women are the primary insured showed lower utilization pattern, but families with older individuals had more utilization. Additional studies are need for a more comprehensive understanding of utilization pattern by the insured population in Saudi Arabia.

INTRODUCTION

Traditionally, the healthcare system in Saudi Arabia can be classified as a national health care system in which the government provides health care services through a number of government agencies. Public spending on health is financed from the government budget. An estimated 11 percent of the government budget is

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devoted to public spending on health. Public spending accounts for 80 percent of all health spending. As some 75 percent of government revenues are from sales of natural resources, the health sector financing for Saudi nationals and public sector expats is largely based on oil and gas revenues.^(1,2) Even though the percentage of government outlays allocated to health care has been increasing, the actual amount per capita has been decreasing; a result of the effect of several factors including a fast-growing population, 40% of the population is under the age of 15 years and only 3.5% of the population over the age of 65, and a declining government revenue. Moreover, about 25% of the population, or about 6.1 million people, are considered foreign nationals.⁽³⁻⁵⁾

In order to improve the performance of the current health care system in the kingdom, the country is currently restructuring its healthcare system to

privatize public hospitals and introduce insurance coverage for both foreign workers and citizens.^(4,6) In 2002, the Health Insurance Council was formed, with the charge of guiding the introduction of mandatory health insurance that was to be implemented in gradual phases. The first phase required employers of more than 500 employees to pay for insurance coverage for foreign workers and their dependent family members. The second phase was applied to companies with more than 100 employees. The third phase included coverage of all employers and their employees. The government now plans to implement insurance coverage for all Saudi citizens, before privatizing state-owned hospitals.^(4,7)

A governmental subsidy will be provided to cover the cost of the insurance premium for all Saudis not working for private companies. Although, it was planned that in 2005, expatriates making up about 25% of the population, will be

required to have health insurance coverage, this target has not yet been achieved. However, during the past 5 years the number of private health insurance companies has proliferated. The first medical insurance policy was introduced by the National Company for Cooperative Insurance (NCCI) in 2004. By early 2007, 13 other insurance companies received approval to operate in Saudi Arabia and 18 more were waiting for approval.⁽⁴⁾

Health services research shows an undeniable association between health insurance coverage and increased access to primary and preventive care as well as access to care for acute and chronic medical illness. Health insurance enables access to medical care through both covering families and individuals against the high and sometimes unexpected cost as well as by connecting them to a network of health care providers.⁽⁸⁾ Abundance of studies investigated factors influencing utilization of health insurance plans in

countries covered mainly with private health insurance such as the US and Brazil.^(9,10) Several determinants of utilization were investigated using one of the most frequently used models for analyzing patients utilization of healthcare services which is the behavioral model developed by Anderson and Aday.⁽¹¹⁾ The model classifies predictor variables into the following categories: predisposing that include factors such as age, sex, and health beliefs; enabling variables that include personal and family resources, e.g., income, education, insurance coverage, and social support; and need variables that include measures of physical and mental health status.^(11,12)

As Saudi Arabia is moving rapidly towards cooperative insurance that covers employers and their employees, and eventually the whole population, it becomes necessary to explore the utilization and cost of currently enrolled members in order to identify factors that

influence their utilization behavior. This information is highly important for planning and restructuring the country evolving health service system.

METHODOLOGY

This cross-sectional analytical study was based on administrative claims database of employees and their dependents from three different companies selected randomly among those covered by a major insurance company in the Eastern Province. The electronic database was also used to collect demographic enrollment characteristics. All patient identifiers in the database have been fully encrypted. The claims data for the 6 months period from July first 2007 till December 31 2007 of all employees and their dependants in the 3 selected companies and who were enrolled for at least 1 year before the study and continued to be covered during the study period were included. The reason that the study included only 6 months of coverage was

the fact that the computer system was in the process of updating which made earlier data inaccessible.

The insurance company claims database made available to us were categorized as follows: (1) Medical claims: that included all charges paid for medical services including hospitalizations, outpatient visits, emergency department services, laboratory, and diagnostic radiology; (2) OB/GY claims: which covered all obstetrics and gynecology services; (3) dental services claims and (4) vision services claims.

The electronic database of the company was used to extract information such as age, sex, nationality. Service type and the cost for each medical encounter were collected from claims database. Families were classified by gender depending on the gender of the primary insured (employee). Also, family maturity was categorized according to the age of the parents as follows: young family, where

both parents were under the age of 45; a middle-aged family, where one parent was over the age of 45; and an old family, where both parents were over the age of 45. Insurance coverage of the study population varied from class VIP, A, B, to C. Although all policy holders had the basic coverage as determined by the Health Cooperative Insurance Council (HCIC) there were higher amenities to class VIP and A as compared to B and C. Because of the small sample size we combined both class VIP and class A.

During the analysis phase, due to the limited data available to us on the individual level, we opted to aggregate the individual demographic and utilization data to the family level, and the unit of analysis became the family not single members. Our 131 family study sample resulted from the following process. After aggregating the data, 2244 families were eligible for the study. Of these families the insurance company agreed to provide the

researchers with information on a randomly selected sample of 400 families. Of the 400 families 53 families had incomplete information and were excluded. Of the remaining 347 families, 216 single individual families were also excluded to fulfill our definition of a family unit for this study as a family with at least 2 members.

Utilization and cost:

The total number of contacts with medical care provider and cost of health services utilized during the six months covered by the study were determined for each covered family. The number of contacts was used as a proxy of utilization. Medical costs included total payments by the insurance company to health care providers for inpatient, outpatient, physician, and other ancillary services (e.g., laboratory tests, and procedures). Patient copayments were not included in the cost calculation.

Statistical analysis:

All analysis and data management

were performed with STATA 10.0 (Stata Corp., College Station, Texas). Our approach started with descriptive analysis of the overall study population. Categorical data were described in the form of frequencies and percentages. Continuous data were described as means and standard deviations.

a. Utilization pattern by insured families:

Number of health care encounters per family was used as our measure of health services utilization. To study the independent predictors of total services utilization paid for by the insurance company, univariate and multivariate negative binomial regression was utilized instead of poisson regression due to evident over dispersion. The outcome variable for these models was the number of health care encounters for each family. Independent variables included: the nationality of the family, maturity of the family, family size, gender of the family head, class of insurance, and company of

employment. For these models incidence rate ratio and 95% confidence intervals were reported.

b. Cost of services received by insured families:

To examine the independent predictors of the total cost of overall services utilized paid for by the insurance company, univariate and multivariate linear regression was utilized. Linear regression with raw cost data was preferred over log transformation for easy interpretation even with the presence of the right skewed data. In addition, we bootstrapped our models to provide more accurate estimate of SD and 95% confidence intervals.⁽¹³⁾ The outcome variable for these models was the total cost of medical services received by the family. Independent variables included: the nationality of the family, maturity of the family, family size, gender of the family head, class of insurance, and company of employment. For these models β coefficient and 95% confidence intervals

were reported.

RESULTS

Characteristics of this study population are presented in table 1. Of the 131 families included in the study, 59% were non-Saudi. The majority of families were covered by class B (73%). Close to 40% of the families were of a size of 2 individuals. Men were the head for 84% of the families and 69% were of young families. The mean number of visits and mean cost by family characteristics are shown in table 2.

Factors correlated to the amount of health services utilization as measured by the number of medical encounters per family are presented in tables 3 and 4. Utilizing univariate negative binomial regression, families covered by class C had almost 70% less medical encounters than those covered by class VIP and A which was statistically significant. On the other hand, families with 4 members or more had 39% more medical encounters compared to families with 2 members

which was also statistically significant.

Families in which the primary insured were women had 65% less medical encounter compared to families in which men were the primary insured. After controlling for confounding factors by multivariate modeling, some of the family characteristics continued to be statistically associated with the amount of health care use. Families covered by class B or class C continued to show as less users of medical services compared to those covered by class VIP and A. Families in class B had 20% less encounter with medical care compared to those covered by Class VIP and A (IRR 0.80; 95% CI 0.68-0.94). Families covered by class C had an even lower encounter (58%) compared to those covered by class VIP and A (IRR 0.42, 95% CI 0.26-0.67). Mature families with at least 1 of the parents above 45 had 47% more medical encounter than younger families (IRR 1.47; 95% CI 1.17-1.84). Families with a woman

as the primary insured continued to show lower medical encounter compared to families where the primary insured was man (50%), that relationship was not statistically significant. Also with adjustment there were no differences in level of utilization of medical services by family size.

Tables 5 and 6 display the unadjusted and adjusted differences in mean charges for medical services by family characteristics using linear regression. Unadjusted analysis demonstrated that lower class of coverage was associated with lower average cost per family compared with the average cost per family covered in the class VIP and A. Mature families with middle aged or old individuals had on average of cost of about SR 11677 more than families with younger individuals. Families in which the primary insured was a woman had an average cost of SR 1113 less than that of families in which the primary insured was a man. After

adjustment, all of these associations continued to be the same. Class of insurance, nationality, and family maturity were found to be statistically associated with variation in mean family cost of care. Families covered by class B or C were found to cost on average less than those families covered by class VIP and A (SR 471 and SR 1389 , respectively). Families with older individuals had a mean of SR 1616 of greater charge compared with families of younger individuals. Being a family with a woman as a primary insured was associated with SR 567 less charges compared to being a family with a male as the primary insured. Nationality continued to be not statistically associated with difference in average charge per family.

Discussion

With the increased interest in Saudi Arabia in establishing health insurance as an important provider of health care, it is of paramount importance to better understand the different factors affecting utilization and

cost of health care services. Despite the importance of this topic, to our knowledge no other study looked at these factors in the kingdom.

Our study focused on the determinants of utilization and cost (from the insurance company perspective) by families covered by employer sponsored insurance (ESI) through a major insurance company in the Eastern Province. Unfortunately because of limitations in the data collection process by the insurance company, we did not have access to many of the variables needed to fully address the issue of health care utilization. After controlling for available confounding factors, this study found that those covered by the highest class of coverage provided by the insurance company (class VIP and A) had more utilization and higher mean charges per family compared to those covered by class B or C. The study also found that middle aged and older families had more utilization and average charges per family

compared to younger families. Families in which women were the primary insured had both lower use and lower average charges. Finally family size seemed not related to any pattern of medical care use.

It is probably true that families covered by class VIP and A are of higher income category compared to families covered by class B and C which are probably of middle- and lower income category. Family income was reported to be an important factor associated with health care utilization. Out of pocket copayment may have been a barrier to the families in class B or C. Other studies have suggested that insurance coverage particularly coverage with higher options to the insured, as expected in class VIP and A in our study, is a main incentive for physicians to see more patients, order more investigations, or see patients more times.⁽¹⁴⁾

Several studies⁽¹⁵⁻¹⁷⁾ have demonstrated barriers to health care utilization to immigrants and expatriates.

These populations have to face multiple barriers, unfamiliar environment, language difference, and sometimes socio-economic and cultural obstacles to receive medical care. This was not the case in our study as there were no differences in the amount of use or cost between Saudi and non-Saudi families. That could be explained by the fact that a high percentage (42%) of the non- Saudi families in this study were of Arab origin with no language barrier and reasonable familiarity with the Saudi culture. Added to that, an overwhelming percentage of health care providers are of Arab origin.

As expected families with older age members utilize more services and cost more on average per family than younger families, a pattern seen in several other studies. (18,19) On the other hand our study, against what would be expected, found that larger family size is not associated with higher amount of utilization or higher mean charges per family in comparison to small

sized families. Several other studies⁽²⁰⁻²²⁾ came to the same conclusion. Probable explanation is lack of time by multiple responsibilities by the parents that also could be associated with greater experience in health care matters.⁽²³⁻²⁴⁾

Our study also demonstrated that families in which the primary insured was a woman had both lower amount of utilization and lower mean charge for services compared to families in which a man was the primary insured. However, that relation became not significant when we controlled for other family characteristics. This is consistent with other studies that examined the role of family structure in predicting medical utilization and particularly for children.^(25,26) These studies like ours demonstrated that families headed by women had lower use of health care on univariate analysis, and that deficits in use of health care became not statistically significant after controlling for other family characteristics such as demographic and

socio-economic status.⁽²⁷⁾

As the government continues to encourage ESI, it is prudent to support concurrently public insurance coverage. That is particularly critical to both low- and middle income workers. The public insurance coverage could provide the protection needed by this group of workers, as both are probably underinsured as evidenced in our study by their lower utilization. They may also could get under prohibitive financial stress if they drop coverage if they lose their job for example, or change the status of their ESI if they change to a different job.

This study has several limitations that must be briefly outlined. First, because the claims and insurance databases had only limited variables, we were unable to report on different family characteristics correlated with utilization such as socio-economic status, education level, income, and health status, and length of time of residence for non-Saudi families. Second,

the study reflected utilization of services incurred in six months only, which does not describe the pattern or utilization over the whole year. Third, this study addressed utilization of families in three companies covered by ESI through one insurance company in the Eastern Province. As result our population does not necessarily represent all families covered under the ESI in Saudi Arabia.

Conclusion and recommendations

The present study revealed that families with lower insurance class coverage, and families in which women are the primary insured showed lower utilization pattern, but families with older individuals had more utilization. Although our study lacked important variables to address the issue of utilization fully, it is yet the first to examine utilization of insured families in the kingdom. As such our study should encourage and be an eye opener to policy makers, the insurance industry, and researches to the need to support further

research in the area of private health insurance as a way to define the best policies and regulations to assure equitable, accessible and high quality of the evolving health care system in Saudi Arabia. Moreover, the study pointed out to the weakness of the current information systems supporting private insurers. With the widespread implementation of private insurance plans in Saudi Arabia, capital investment in improving information infrastructure is highly recommended.

Table 1. Characteristics of Insured Families

Variable	n (%) n=131
Company:	
A	48 (36.6)
B	68 (51.9)
C	15 (11.5)
Class of insurance:	
VIP + A	19 (14.5)
B	95 (72.5)
C	17 (13.0)
Nationality:	
Saudi	54 (41.2)
Non-Saudi	77 (58.8)
Family size:	
2	50 (38.2)
3	37 (28.2)
≥ 4	44 (33.6)
Family maturity:	
Young	90 (68.7)
Middle	41 (31.3)
Gender of family head:	
Male	110 (84.0)
Female	21 (16.0)

Table 2. Mean number of visits and mean cost by family characteristics

	Visit		Cost	
	Mean	SD	Mean	SD
Class of insurance:				
VIP + A	6.79	5.26	1950.95	2100.44
B	5.01	4.73	1195.28	2554.33
C	2.18	1.78	331.83	390.39
Nationality:				
Saudi	4.81	5.05	1037.39	2064.87
Non-Saudi	4.96	4.43	1301.83	2540.44
Family size:				
2	3.98	4.33	1098.10	2875.12
3	5.41	5.57	1243.86	1968.97
≥ 4	5.52	4.15	1257.56	2007.79
Family Maturity:				
Young	4.12	4.27	667.72	1252.69
Middle + Old	6.61	5.11	2345.5	3534.60
Gender of the family head:				
Male	5.47	4.86	1371.34	2525.80
Female	1.90	1.51	257.78	268.37

Table 3. Univariate Negative Binomial Regression of the number of medical encounters by the insured family characteristics

Variable	Negative Binomial Regression		
	IRR	Std. Err.	P value (95% CI)
Class of insurance:			
VIP + A	1		
B	0.74	0.17	0.19 (0.47 - 1.16)
C	0.32	0.12	0.00 (0.15 - 0.66)
Nationality:			
Saudi	1		
Non-Saudi	1.03	0.19	0.87 (0.71 - 1.49)
Family size:			
2	1		
3	1.36	0.31	0.18 (0.87 - 2.12)
≥ 4	1.39	0.11	0.00 (1.19 - 1.62)
Family maturity:			
Young	1		
Middle + Old	1.60	0.42	0.07 (0.97 - 2.66)
Gender of the family head:			
Male	1		
Female	0.35	0.12	0.00 (0.18 - 0.68)

Table 4. Multivariate Negative Binomial Multiple Regression of the number of medical encounters by insured family characteristics

Variable	Negative Binomial Regression		
	IRR	Std. Err.	P value (95% CI)
Class of insurance:			
VIP + A	1		
B	0.80	0.06	0.01 (0.68 - 0.94)
C	0.42	0.10	0.00 (0.26 - 0.67)
Nationality:			
Saudi	1		
Non-Saudi	0.93	0.13	0.60 (0.70 - 1.23)
Family size:			
2	1		
3	1.35	0.22	0.07 (0.97 - 1.86)
≥ 4	1.19	0.13	0.11 (0.96 - 1.47)
Family maturity:			
Young	1		
Middle + Old	1.47	0.17	0.00 (1.17 - 1.84)
Gender of the family head:			
Male	1		
Female	0.48	0.25	0.15 (0.18 - 1.31)

Table 5. Univariate Linear Regression of total charges by insured family characteristics

Variable	Linear Multivariate Regression		
	Coef.	Std. Err.	P value (95% CI)
Class of insurance:			
B	-755.7	252.6	0.00 (-1250.8 - -260.5)
C	-1619.1	576.4	0.01 (-2748.9 - -489.3)
Nationality:			
Non-Saudi	264.4	216.2	0.22 (-159.4 - 688.3)
Family size:			
3	145.8	627.7	0.82 (-1084.6 - 1376.1)
≥ 4	159.5	99.3	0.11 (-35.2 - 354.1)
Family maturity:			
Middle + Old	1677.8	717.7	0.02 (271.1 - 3084.5)
Gender of the family head:			
Female	-1113.6	399.7	0.01 (-1897.0 - 330.1)

Reference groups: Classes VIP & A, Saudi families, Family size= 1, Young families, and Male family heads.

Table 6. Multivariate Linear Regression of total charges by insured family characteristics

Linear Multivariate Regression			
Variables	Coef.	Std. Err.	P value (95% CI)
Class of insurance:			
B	-471.8	147.4	0.00 (-760 - -182.8)
C	-1389.1	346.8	0.00 (-2068.7 - -709.5)
Nationality:			
Non-Saudi	-190.6	177.2	0.28 (-537.9 - 156.7)
Family size:			
3	134.8	477.3	0.78 (-800.7 - 1070.3)
≥ 4	-152.8	86.4	0.08 (-322.2 - 16.5)
Family maturity:			
Middle + Old	1616.3	620.3	0.01 (400.5 - 2832.1)
Gender of the family head:			
Female	-567.6	245.4	0.02 (-1048.6 - -86.7)

Reference groups: Classes VIP & A, Saudi families, Family size= 1, Young families, and Male family heads.

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