Out of Pocket Payment for Obstetrical Complications: A Cost Analysis Study in Iran

Mahnaz Yavangi, Mohammad Reza Sohrabi[1], Sahand Riazi[2]

Infertility and Reproductive Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran, and Department of Gynecology, Hamedan University of Medical Sciences, Hamedan, Iran, [1]Department of Community Medicine, Social Determinants of Health Research Center, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran, [2]Department of Community Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Correspondence to:
Dr. Mohammad Reza Sohrabi, Department of Community Medicine, Social Determinants of Health Research Center, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, P.O. Box 193954719, Evin, Tehran, Iran.
E-mail: m.sohrabi@sbmu.ac.ir

Date of Submission: Dec 30, 2012

Date of Acceptance: May 14, 2013

How to cite this article: Yavangi M, Sohrabi MR, Riazi S. Out of pocket payment for obstetrical complications: A cost analysis study in Iran. Int J Prev Med 2013;4:1296-03.

Original Article

ABSTRACT

Background: This study was conducted to determine the total expenditure and out of pocket payment on pregnancy complications in Tehran, the capital of Iran.

Methods: A cross-sectional study conducted on 1172 patients who admitted in two general teaching referral Hospitals in Tehran. In this study, we calculated total and out of pocket inpatient costs for seven pregnancy complications including preeclampsia, intrauterine growth restriction (IUGR), abortion, ante-partum hemorrhage, preterm delivery, premature rupture of membranes and post-dated pregnancy. We used descriptive analysis and analysis of variance test to compare these pregnancy complications.

Results: The average duration of hospitalization was 3.28 days and the number of visits by physicians for a patient was 9.79 on average. The average total cost for these pregnancy complications was 735.22 Unites States Dollars (USD) (standard deviation [SD] = 650.53). The average out of packet share was 277.08 USD (SD = 350.74), which was 37.69% of total expenditure. IUGR with payment of 398.76 USD (SD = 418.54) (52.06% of total expenditure) had the greatest amount of out of pocket expenditure in all complications. While, abortion had the minimum out of pocket amount that was 148.77 USD (SD = 244.05).

Conclusions: Obstetrics complications had no catastrophic effect on families, but IUGR cost was about 30% of monthly household non-food costs in Tehran so more financial protection plans and insurances are recommended for these patients.

Keywords: Cost and cost analysis, inpatients, Iran, pregnancy complications, Tehran

INTRODUCTION

Improving maternal health is an important development index for each country and it is one of the eight millennium development goals that should be achieved in all countries by 2015. Two targets for assessing progress in improving maternal health are reducing the maternal mortality rate by three quarters between 1990 and 2015 and achieving universal access to reproductive health. With only 4 years left until the 2015

deadline, in order to conduct better planning and policy making for achieving these targets, closer assessment of maternal morbidity and mortality levels is required. Despite proven interventions that could prevent disability or death during pregnancy and childbirth, maternal mortality and morbidity due to pregnancy complications remains a major burden in many developing countries. The presence of a trained health-care worker during delivery is a crucial factor in reducing maternal deaths and morbidities. Generally in developing countries, the proportion of deliveries attended by the skilled health personnel rose from 55% in 1990 to 65% in 2009.[1]

Complications during pregnancy are among major reasons of hospital admission for expectant women in the United States. During the years 1987-1992, there were 833,264 hospitalizations for pregnancy complications in California (25 complications per 100 deliveries), which included admissions for preterm labor (33%), genitourinary infection (16%) and pregnancy-induced hypertension (15%). In 1987, Medicaid insurance charges were $118 million for 33% of the number of total hospitalizations for complications. In 1992, such Medicaid insurance hospitalizations accounted for 356 million Unites States Dollars (USD) (49%) of the 734 million USD in total charges and for 183,295 (45%) of the 409,000 total hospital days.[2]

During the period 1997-2009, ratio of hospital births in Iran has increased from 78.7% to 97% due to increased access to health-care centers.[3] During these years share of hospitals in the total number of maternal deaths has also increased, rising from 43% of reported deaths in 1997 to 82% in 2005.[4] According to results published by the National Maternal Mortality Surveillance System in Iran, from 2001 to 2003 failures in secondary prevention of complications of pregnancy have resulted in 90% of the main obstetric complications leading to maternal deaths; with 73% of these being related to low quality of care, 25% to lack of service availability and 2% due to sudden deaths.[2] However, increase in using hospitals and specialize health-care services also means paying more. In Iran, the largest component of out of pocket health spending is inpatient hospital care, followed by physician visits and medications.[5]

According to World Health Organization (WHO) reports, in Iran in year 2000 total expenditure on health was 4.6% of gross domestic product and increased to 5.5% in 2008.[3] It is also estimated that the out of pocket share of total expenditure on health was also decreased from about 60% in 2000 to 50% in 2007.[4] In today's world financial burden of diseases is as important as the mortality and disability burden of diseases and should be considered.[6] The financing of health systems also is a key determinant of health and well-being of people.[7]

In many low-income countries in the world, poor people often fail to avail of necessary health-care services due to financial constraints and often face catastrophic financial burden to meet their health-care expenditure.[8,9] Therefore, discussion on the composition and financing of health services was always one of the major challenges facing the health system planners and policy makers especially in developing countries.[10]

The WHO now emphasizes on the necessity of raising and allocating more resources for health services more than before to achieve a universal coverage and decreasing the share of out of pocket spending on health-care.[11] Studies in Iran showed that health-care expenses not only affect people,[12] but also it has a great influence on the country social and financial development.[13,14]

So far, there is not enough data about expenses on each pregnancy complication in the country; therefore, this study was conducted to determine the expenditure on pregnancy complications in two referral teaching hospitals in year 2009. By knowing the expenditures and out of pocket percent of it, we can make better planning to allocate resources and thus reduce the out of pocket expenditures on health and avoiding catastrophic expenses on health-care in the future.

METHODS

This study was a cross-sectional study conducted in gynecologic wards of two referral teaching hospitals in Tehran, the capital of Iran. These hospitals were under the supervision of Shahid Beheshti University of Medical Sciences covering Northern part of Tehran, the capital of Iran.

In this study, we targeted pregnant women admitted in these hospitals who developed complications during the pregnancy including preeclampsia, intrauterine growth

restriction (IUGR), abortion, ante-partum hemorrhage, preterm delivery, premature rupture of membranes (PROM) and postdated pregnancy during 2009. The patients who died before reaching hospital and patients who left the hospital with personal satisfaction without receiving treatment were excluded from the study.

After gathering all available cases during that period of time that matched our criteria and a total of 1172 cases were selected for this study. Special data collecting form was designed for this study. The forms contained background information such as age, and type of insurance as well as information on patients' health such as the diagnosis, the number of inpatient days, number of visits and performed treatments. The forms also covered detailed information about frequency and cost of each therapeutic procedure including hoteling, physician's visit and drug costs, laboratory exams, radiologic imaging, ultrasound, biophysical profile, delivery, operating room, surgeon's fee, assistant surgeon's fee, anesthesiologist's fee and materials. Data gathering was performed by some gynecology residents. In order to prevent biases, these residents have attended in briefing sessions on how to fill the data collecting forms.

Background variables (name, age, age at first pregnancy, admission days) and the diagnosis (preeclampsia, IUGR, abortion, ante-partum hemorrhage, preterm delivery, PROM and postdated pregnancy) were collected by reviewing patient records in wards and operating rooms and interview with patients by gynecology residents. The data were written in no-name questionnaires to ensure confidentiality. The financial data regarding detailed expenditures were acquired from accounting and archive units in hospitals and added to questionnaires. The questionnaires then rechecked for any probable errors.

The definition of preeclampsia in this study was high blood pressure (BP) (>140/90) or more than 30-mmHg increase in systolic BP comparing to before pregnancy along with proteinuria and/or pathologic edema occurring after 20 weeks of gestational age. Abortion referred to the termination of pregnancy before 20 weeks of gestational age. Preterm delivery was considered when mothers delivered a baby at 28 weeks of gestational age (or above 1000 g) up to 37 weeks (295 days from last menstrual period) of gestational age. Any delivery that occurred at 42 weeks (294 days) of gestational age or more was considered post-term delivery. Ante-partum hemorrhage defined as vaginal bleeding during the second trimester of pregnancy. PROM was defined as rupture of fetal membranes before parturition at any gestational age. IUGR was defined as those infants whose weights were below the 5th percentile for their gestational age.

To convert expenditure units from Iranian Rials to USD, we used purchasing power parity (PPP) conversion rate in 2009 according to the International Monetary Fund. Therefore, in this study 1 USD was equal to 3940.30 Rials. Undoubtedly, households paying for health services greater than a proportion of their total expenditure are at risk of suffering economic hardship. There are some controversies on the exact definition of catastrophic health-care cost. The definition may vary between 5% and 25% of total expenditure or 15% and 40% of non-food expenditure.[15] The WHO defines the term "catastrophic" health-care cost as spending more than 40% of non-food expenditure on health-care costs.[16]

The Data was inserted to the computer and analyzed using the computer program Statistical Package for the Social Sciences (SPSS) version 14 (SPSS Inc, Chicago, Il, USA). We used descriptive analysis and analysis of variance (ANOVA) test and *post-hoc* to compare costs of pregnancy complications with each other.

RESULTS

Basic and non-financial characteristics of all 1172 cases are summarized in Table 1. There was no statistically significant difference between these pregnancy complications according to maternal age (P = 0.35) and age during the first pregnancy (P = 0.93). In this study, 78.8% of patients were under coverage of insurance companies.

The average duration of hospitalization was 3.28 days (standard deviation [SD] = 2.15) and the number of visits by physicians for a patient was 9.79 on average (SD = 5.65). Ante-partum hemorrhage had the longest duration of hospitalization days with the average of 3.78 days while abortion had the shortest inpatient duration,

Table 1: Background characteristics of the cases of teaching hospitals of Tehran according to pregnancy complication in 2009

Statistics	Preeclampsia	IUGR	Abortion	Antepartum hemorrhage	Preterm delivery	PROM	Postdate	Total mean (SD)	df	*F*	*P* value
Number of cases	182	91	179	180	181	179	180	1172			
Percentage of cases	15.53	7.76	15.27	15.36	15.44	15.27	15.36	100			
Mean age (SD)	27.96 (5.58)	27.88 (6.33)	27.94 (5.81)	28.09 (5.59)	27.65 (5.43)	27.74 (5.58)	26.75 (5.63)	27.27 (5.67)	6,1165	1.120	0.345
Mean age at first pregnancy (SD)	22.69 (4.61)	22.91 (5)	22.87 (4)	23.21 (4.58)	22.86 (4.28)	23.15 (4.55)	22.82 (4.50)	22.93 (4.46)	6,1165	0.310	0.932
Mean inpatient days (SD)	3.54 (1.92)	2.99 (1.67)	2.77 (1.19)	3.78 (3.84)	3.45 (2.14)	3.06 (1.06)	3.19 (1.59)	3.28 (2.15)	6,1165	4.646	0.000
Mean number of visits (SD)	13.56 (7.35)	9.90 (3.53)	4.99 (2.63)	11.57 (5.88)	9.31 (4.53)	10.15 (5)	9.07 (4.40)	9.79 (5.65)	6,1165	48.244	0.000

SD=Standard deviation, IUGR=Intrauterine growth restriction, PROM=Premature rupture of membranes, df=Degree of freedom

which was 2.77 days on average. Considering *post-hoc* results, duration of hospitalization in ante-partum hemorrhage was significantly more than abortion (P = 0.003). Number of visits in ante-partum hemorrhage was also significantly less than postdate pregnancy (P = 0.001) and higher than preterm delivery (P = 0.007). Preeclampsia had the maximum number of visits by the physician, which was 13.56 times on average and abortion with the average visits of 4.99 times had the minimum number of visits in all complications.

The average total cost for all pregnancy complications was 735.22 USD (SD = 650.53) and the average out of packet share was 277.08 USD (SD = 350.74), which was 37.69% of total expenditure. Table 2 shows detailed expenditures on each pregnancy complication. As noticed using *post-hoc* test, pre-eclampsia was the most costly complication overall with the mean expenditure of 908.89 USD (P > 0.05). It also had the greatest number of physician visits with the average visits of 13.56 and expenditure on visits (28.45 USD [P > 0.05]), drugs (85.53 USD [P > 0.05]), laboratory exams (32.50 USD [P = 0.026]) and ultrasound imaging (10.25 USD [P > 0.05]) in all complications. The maximum expenditures in preeclampsia were on hoteling, which was 161.91 USD.

Post-hoc tests also showed that abortion had the lowest cost in all complications with the mean expenditure of 370.52 USD (P = 0.057). With payment of 398.76 USD, IUGR had the greatest amount of out of pocket expenditure in all complications (P > 0.05). It also has the greatest out of packet percentage (52.06%). While abortion had the smallest out of pocket amount, which was 148.77 USD (P > 0.05) and pre-eclampsia had the smallest percentage (30.94%). Ante-partum hemorrhage had the greatest expenditure on hoteling (146.20USD [P > 0.05]), materials (105.03 USD [P > 0.05]), operating room (91.91 USD [P > 0.05]), Anesthesiologist (97.21 USD [P > 0.05]), surgeon (197.17 USD [P > 0.05]) and assistant surgeon (36.46 USD [P > 0.05]) in all complications. The maximum expenditures in ante-partum hemorrhage were on surgeon. PROM was the most expensive complication generally with mean expenditure of 868.71 USD (P > 0.05). It also had the greatest expenditure on radiologic imaging (6.86 USD [P > 0.05]) among all complications. Postdated pregnancies had the greatest expenditure on biophysical profile (7.26 USD [P > 0.05]) and delivery (94.44 USD [P > 0.05]) among all complications.

Considering statistical significance, abortion

Table 2: Expenditures on pregnancy complications in USD at teaching hospitals of Tehran in 2009

Services	Preeclampsia	IUGR	Abortion	Antepartum hemorrhage	Preterm delivery	PROM	Postdate	Mean	df	F	*P* value
Hoteling (SD)	161.19 (210.79)	93.38 (39.29)	61.12 (325.60)	146.20 (52.05)	105.01 (77.19)	123.38 (77.05)	104.13 (56.21)	115.13 (116.93)	6,1165	15.414	0.000
Visit (SD)	28.45 (41.64)	9.98 (8.33)	17.99 (19.71)	20.74 (52.76)	20.94 (23.22)	24.48 (72.63)	13.77 (13.17)	20.21 (41.21)	6,1165	3.348	0.003
Medicine (SD)	85.53 (74.66)	26.98 (37.76)	30.10 (28.10)	69.54 (53.27)	62.31 (128.63)	73.15 (49.84)	65.15 (42.51)	62.32 (75.70)	6,1165	11.311	0.000
Lab (SD)	32.50 (343.33)	1.49 (14.34)	13.71 (15.38)	22.30 (34.30)	19.74 (21.24)	20.63 (19.72)	21.33 (26.33)	21.04 (26.13)	6,1165	10.273	0.000
Radiology (SD)	4.08 (17.71)	0 (0)	0.34 (4.11)	0.68 (6.67)	0.93 (5.65)	6.86 (6.84)	0.64 (0.86)	1.05 (8.47)	6,1164	4.949	0.000
Ultrasound (SD)	10.25 (29.94)	2.35 (6.29)	3.63 (7.12)	3.35 (7.70)	5.37 (15.43)	6.63 (43.71)	4.74 (10.82)	5.42 (22.58)	6,1163	2.232	0.038
Biophysical profile (SD)	4.21 (9.15)	0.73 (6.45)	0.53 (2.73)	1.67 (5.23)	2.90 (9.43)	3.22 (11.45)	7.26 (64.21)	3.20 (26.18)	6,1160	1.206	0.301
Operating room (SD)	68.26 (45.58)	83.47 (3.94)	3.00 (22.64)	91.91 (29.04)	43.45 (47.34)	78.92 (39.39)	71.98 (36.96)	65.57 (43.29)	6,1163	20.604	0.000
Delivery (SD)	57.97 (103.36)	45.85 (109)	4.26 (31.71)	17.57 (61.22)	73.92 (109.10)	61.66 (95.27)	94.44 (114.50)	51.26 (97)	6,1165	59.149	0.000
Assistant surgeon (SD)	25.37 (29.08)	33.38 (15.76)	11.47 (7.17)	36.46 (13.54)	16.26 (19.20)	30.72 (41.85)	21.41 (19.63)	24.38 (25.29)	6,1165	24.663	0.000
Surgeon (SD)	136.22 (136.44)	177.66 (104.76)	5.90 (40.25)	197.17 (97.89)	82.37 (105.67)	156.81 (171)	141.86 (217.53)	132.81 (144.68)	6,1165	21.707	0.000
Anesthesia (SD)	59.33 (61.88)	89.51 (61.92)	48.09 (27.25)	97.21 (84.75)	37.22 (51.32)	68.04 (83.21)	57.79 (105.52)	63.45 (75.09)	6,1165	14.080	0.000
Materials (SD)	70.74 (60.53)	68.68 (41.90)	36.61 (38.88)	105.03 (103.25)	61.34 (133.60)	82.09 (74.48)	66.60 (73.26)	70.25 (85.80)	6,1164	10.976	0.000
Other costs (SD)	164.78 (136.22)	132.54 (66.23)	133.75 (25.90)	59.82 (104.65)	69.72 (414.32)	132.10 (118.32)	107.29 (149.11)	99.14 (195.75)	6,1165	9.614	0.000
Total Mean (SD)	908.89 (1006.35)	765.99 (343.53)	370.52 (325.60)	869.65 (371.78)	601.47 (550.92)	868.71 (751.62)	778.40 (598.20)	735.22 (650.53)	6,1162	16.742	0.000
Out of pocket (SD)	281.20 (347.47)	398.76 (418.54)	148.77 (244.05)	354.71 (38.92)	202.58 (192.05)	314.58 (379.46)	299.02 (404.52)	277.08 (350.74)	6,1165	9.508	0.000
Out of pocket percentage	30.94	52.06	40.15	40.79	33.68	36.21	38.41	37.69	6,1165		

SD=Standard deviation, IUGR=Intrauterine growth restriction, Lab=Laboratory examination, PROM=Premature rupture of membranes, df=Degree of freedom, USD=Unites states dollars

was significantly cheaper than the other complications except preterm delivery (P = 0.001) although it was almost significantly cheaper than preterm delivery (P = 0.057). Preterm delivery was significantly cheaper than ante-partum hemorrhage (P = 0.012), pre-eclampsia (P = 0.001) and PROM (P = 0.012). Abortion had significantly lesser out of pocket expenditure than ante-partum hemorrhage (P < 0.001), IUGR (P < 0.001), postdate pregnancy (P = 0.009), pre-eclampsia (P = 0.037) and PROM (P = 0.002).

DISCUSSION

In this study, the average total out of packet share for all pregnancy complications was about 38% of total expenditure. We calculated the mean cost for seven different complications related to pregnancy. After using ANOVA test to compare basic characteristics of theses complications, there was no significant difference according to maternal age and age during the first pregnancy. This shows that the sample of seven complications were homogeneous according to these two basic characteristics.

As mentioned above, in our study 78.8% of patients had insurances; therefore, they only paid the franchise for the services. With regard to patients' insurance, the mean out of pocket expenditure was 37.69% and the average disbursement for these pregnancy complications was 277.08 USD (SD = 350.74). According to the results obtained from the first round of Urban HEART study in 2008, the mean of total non-food annual costs of households in Tehran city was 63515407 Iranian Rials or 5292950.58 Iranian Rials monthly (1357.17 USD monthly according to PPP conversion rate). Therefore, the average pregnancy complication cost was about 20.42% of household non-food costs. The percentage of these pregnancy complications from total non-food costs for preeclampsia, IUGR, abortion, ante-partum hemorrhage, Preterm delivery, PROM and postdated pregnancy was 20.72, 29.38, 10.96, 26.14, 14.93, 23.18 and 22.03% respectively.

In a study conducted in India on a total of 73, 868 households, Bonu *et al*. showed that generally, the average expenditure on maternal health was about 51% of household non-food costs. Thus, the researchers concluded that the prevalence of "catastrophic" maternal health-care expenditure is high in India. In this study, mean delivery expenditure was 24.7 USD and 104.3 USD for birth in a public facility and in a private facility, respectively. The comparison of our study with Bonu *et al*. showed that there was much difference in percentages that pregnancy cost made of total non-food costs of households (51% vs. 20.42%). Although, these differences in percentages in two studies might be because we only consider pregnancy complications while Bonu *et al*. calculated all maternal health related costs including antenatal care, delivery care and postnatal care.[17]

In another study conducted by Sarowar *et al*. for inpatient cost assessment in obstetric and labor ward of a general hospital in Dhaka, Bangladesh in 2007, they analyzed hospital records of 162 patients having 11 different clinical diagnoses. In this study, the mean hospital stay for all patients was 8.25 days, which is greater than our study with 3.28 days (SD = 2.15). They reported the mean cost for a pregnant woman with maternal complication 93.19 USD (SD = 43.54) that is lower than our finding, which was 735.22 USD (SD = 650.53). That's maybe partially because they considered different complications in their study and moreover they used market exchange rate to convert costs from Bangladeshi Taka to USD and we used PPP. The mean cost per patient for items including drugs and physician cost in their study was also lower than ours.[18]

The expenditures and out of pocket shares deduced in this study might be lower than average expenditures in Tehran city because these two hospitals are government public hospitals and they receive a subsidy from the government so drugs and materials could be more expensive in private hospitals. Moreover, these hospitals are educational and therefore expenditures in private hospitals in Tehran tend to be somewhat more than results observed in this study.

In this study, we only calculated the direct expenses occurring inside the hospitals while there are still other indirect and intangible expenditures outside the hospital that did not count in this study, including transportation, missing work and pain and suffering from diseases. Therefore, when calculating capital burden for pregnancy complications, these expenditures should also be considered.

This study is of interest because in Iran so far there was not enough data about expenses on each

pregnancy complications; therefore, this study can be used as a pilot study for more studies in the future. Moreover, these two referral hospitals received patients from beyond their area of coverage and the data gathered in these hospitals can be generalized to the city of Tehran. However, there are some difficulties in generalizing data gathered in this study to the whole country because socioeconomic inequities exist in health status and the use of health-care services in Iran.[19] There are also gaps between out of pocket spending on health-care among urban and rural areas. People in rural areas pay about 6.1% of their household income on health-care whereas people in cities pay 4.9%.[5] Catastrophic expenditures are also tending to be more likely to occur in rural areas.[13] Focusing on direct payments from households or out of pocket payments on health-care and subsequent occurrence of catastrophic costs are two important factors that should always be considered in health-care planning and policymaking.[20] Although, in Iran the government has pursued a number of measures during the past two decades that have managed to narrow such socio-economic and geographic inequities. Policies such as the expansion of government subsidized health insurance, the strengthening of primary health-care through local staffing and more regular nationwide monitoring have contributed to expanding the insurance coverage to reach 80%.[21-23] In our study, we observed that 78.8% of patients had insurances, which are in consistent with the current statistics on insurance coverage.

The other issue in analyzing inpatient costs is that some physicians especially surgeons sometimes demand for informal payments known as "under the table" payments.[24,25] So far, there is not any official or confirmed data on the magnitude of such demands in the country. We did not consider these payments in our study, but these informal payments should be kept in mind when dealing with health-care expenditures. The actual out of pocket share for patients in this study might be lower than the results obtained from patient records because some poor patients did not pay for services they received as much as they should and their expenses are paid by social helper "Madadkari" units in these hospitals.

CONCLUSIONS

There was no obvious catastrophic effect for obstetrics complications in this study. However, IUGR cost was about 30% of monthly household non-food costs. It was border line and was alarming for policy makers to consider more financial support and insurance coverage for these patients. It is recommended to monitor this cost annually.

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Source of Support: Nil, **Conflict of Interest:** None declared.