

Prevalence and Determinants of Cesarean Section among Women: Secondary Analysis of the Survey of Young People in Egypt (SYPE) Data, 2014

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Abstract

Background: Caesarean section (C.S) rates are high and continue to rise in developed and developing countries. World Health Organization (WHO) stated that C-section is a vital treatment in pregnancy. However, the potential risk of C-section may outweigh the benefits when it is used inappropriately as Cesarean section has a higher risk of complications than a vaginal birth. Cesarean section deliveries have been steadily increasing in Egypt from 4.6% in 1992, 6.7% in 1995, 10.3 % in 2000, to about 52% in 2014. **Objectives:** to determine the prevalence rate of cesarean section among a sample of women and to identify its determinants. **Method:** The data and information used for this research are based on secondary analysis of the questionnaires of Survey of Young People in Egypt (SYPE) 2014. The research includes all women who had ever given birth. **Results:** A total 2796 of ever given birth women were included. 906 of the studied women had cesarean section with a prevalence rate of 32.4 %. The results revealed that the C.S was higher in the age group (18 - 24 years) and in higher educational level. Cesarean section was higher among women from urban areas than those from rural areas. Cesarean section was increased with increasing the socioeconomic status. Cesarean section rate increased with parity. It was also higher among women receiving antenatal care compared with women who did not receive antenatal care. As regards the number of living children, C.S was higher among women with a smaller number of live children than those with more live children. Cesarean section rate was increased among women who experienced abortion and still birth. Women using contraception showed higher rate of C.S. There was a higher rate of cesarean section among smokers. Cesarean section rate increased with increasing weight and obesity. More than half of women who was complaining of bronchial asthma had cesarean section. **Conclusion:** there was a higher prevalence rate of CS than recommended by the WHO in Egypt. Age, higher educational level, urban residence, higher socioeconomic status. receiving antenatal care, smoking, overweight and obesity and bronchial asthma are the main contributing factors for using cesarean section as a mode of delivery.

Key words: *Prevalence, determinants, Cesarean, SYPE*

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Introduction

Recently, the number of Cesarean section deliveries is increased in developed and developing countries. This increase was not clinically justified. This worldwide increase in C-section has become a major public health issue due to potential maternal and prenatal risks, and cost

involved. Cesarean section rate is found to be high during the last decade. The main causes for this increase in caesarean delivery rate are that the caesarean delivery reduces the risks occurred due to complications during

childbirth to both mother and child health.²

Caesarean section is a safe method of delivery, but if the adoption rate is above 5-15%, the risk of manifestation of a major public health problem for mothers and children will increase.³

World Health Organization (WHO) stated that C-section is a vital treatment in pregnancy.⁴ However, the potential risk of C-section may outweigh the benefits when it is used inappropriately. Cesarean section has a higher risk of complications than a vaginal birth.⁵

The most common complications that could occur during and after a caesarean delivery to the mother are infections, blood loss, thrombus formation in the legs or lungs, nausea, vomiting, and severe headache after the delivery, injury to another organ as the bladder, also complications to children like injury during the delivery, immature lungs and breathing problems. Another drawback is high cost for operation and hospital stay.⁶

The global average of Cesarean section rate between 1990 and 2014 increased from 12.4 to 18.6%.⁷ While the cesarean sections rate was from 12 to 86% in developed countries⁸ and in developing countries ranges between 2 and 39%.⁹

Data from two Egyptian Demographic and Health Surveys (EDHS) showed that the institutional-based proportion of c-sections increased from 13.9% in 1988 to 22% in 2000. A study assessed the trend of c-section deliveries and examined factors associated with a rise in c-section deliveries among the Egyptian mothers, from 2005 to 2014, by place of delivery. Utilizing the 2005, 2008, and 2014 Egypt Demographic and Health Surveys (EDHS), showed that Institutional-based c-sections increased by 40.7 points from EDHS-2005 to EDHS-2014. Compared to mothers with low socioeconomic status (SES), mothers with high SES had higher odds for c-section, but only in EDHS-2005. The adjusted trend of c-

sections was found to be 4.19-time higher in private sector while that in public sector it was 2.67-time higher, in EDHS-2014 relative to EDHS-2005. This increase in the private sector is explained by significant increases among mothers who are potentially at low risk for C-sections; mothers aged 19-24 years vs. ≥ 35 years; primigravida mothers vs. mothers with ≥ 4 children; and among normal compared to high risk birth weight babies. Cesarean section deliveries have been steadily increasing in Egypt from 4.6% in 1992, 6.7% in 1995, 10.3% in 2000, to about 52% in 2014.¹⁰

The prevalence of C-section worldwide including 155 countries published from 1990 to 2014 that estimated the rate of C-section worldwide as 18.6% with a range from 6% to 27.2%. The rate was higher in developed countries and lower in developing countries. Latin America and the Caribbean region have the highest C-section rate (40.5%), followed by Northern America (32.3%), Oceania (31.1%), Europe (25%), Asia (19.2%), and Africa (7.3%).¹¹

The determinants that lead to the increase in C-sections are multiple factors ranging from the characters of health facility, socio-economic characteristics of maternal health of women.¹²⁻¹³ Such as maternal age¹⁴ birth order¹⁵ birth weight, place of residence¹⁶ socioeconomic status, maternal educational level^{17,18}, former C-section, obstetric complications, and women request.¹⁹ Maternal age, education of mother, choice of medical institution for delivery and birth order were found to have significantly associated with caesarean delivery. The variable size of the newborn found that had a significant effect on the prevalence of caesarean delivery. The women with higher educational level are more probable to undergo caesarean delivery than those with lower level of education. The women opted private institutions for

childbirth, compared to government medical institutions counterparts, are more likely to deliver through caesarean sections. Birth order showed a consistent decrease in caesarean section.²⁰

Overweight and Obesity had been associated with a higher risk of Caesarean section. A steady increase in the occurrence of Caesarean section had been associated with increased BMI or degree of obesity.²¹

This study aims to determine the prevalence rate of cesarean section among a sample of women and to identify its determinants.

Method

The data and information used for this research based on secondary analysis of the questionnaires of Survey of Young People in Egypt (SYPE) 2014. The current research includes all women aged from 10 to 29 years old areas in Egypt who had ever given birth only (N=2796)

Data processing: Obtaining data files then selection of ever give birth women and separate them in a new SPSS data file. Recoding of some variables and making scores. Population weights (expansion) were not applied prior to the analysis.

Data Analysis: Based on the questionnaire, using Statistical Package for Social Science(SPSS, version 16), Data was analyzed using univariate analysis (frequency tables), bivariate analysis (cross tabulations) using chi-square test and T-test with a level of significance <0.05. For bivariate analysis the dependent variable was women's with cesarean section and the independent variables were socio-demographic variables, parity, chronic diseases, disability ... etc.

Results

A total 2796 of ever given birth women were included in the analysis as shown in table 1 which includes the socio-demographic characteristics of the study

population. 906 of the studied women had cesarean section and the prevalence of cesarean section among them was 32.4 %.

The results revealed that the C.S was higher (36.4%) in the age group (18 - 24 years) than those with younger or older age and the difference was statistically significant (P = 0.032). As regard the education C.S was increased in higher educational level (34.9%) with high significant difference (P= <0.001). Housewives women had more C.S (32.1%) than working women (28.6%) but no significant difference was found (P=0.294). Cesarean section was higher among women from urban areas (42.5%) than those from rural areas (27.4%) with a statistically significant difference (p<0.001).

Cesarean section was increased with increasing the wealth quintile from the lowest level (23.9%) to the richest level (39.1%) with a significant difference (P<0.001).

The results revealed that cesarean section rate increased with parity; it was higher (38.4%) among primigravida than multiparous women with more than 5 births (22.9%) with statistically significant difference (P=0.001). Cesarean section rate was higher among women received antenatal care (35.9%) compared with women not received antenatal care (15.9%). As regards the number of living children, C.S was higher among women with a smaller number of live children (2.23±1.09) than those with more live children (2.56±2.52) with significant difference (P=0.044). Cesarean section rate was increased among women who experienced abortion and still birth (39.9 % & 46.4% respectively) with statistically significant difference (P=0.002 & 0.003 respectively). Women used contraception showed higher rate of C.S (34.3%) with significant difference (P=0.002).

There was a higher rate (33.6) of cesarean section with significant

statistical differences between respondents who had cesarean section and those who did not have C.S regarding smoking ($P=0.031$). Cesarean section rate increased with increasing weight (42.9%) for very overweight compared with (16.7%) for those of very underweight. with statistically significant difference ($P=0.010$). Our results show that cesarean section increased among non-circumcised women (41.1%) with significant difference ($P=0.006$).

Women with no live birth had more C.S (36.4%) with no statistically significant difference ($P=0.788$).

The results of this study revealed that more than half of women (57.1%) who complained of bronchial asthma had cesarean section with statistically significant difference ($P=0.049$). One quarter of women (25.0%) that suffered from cancers about half (44.4%) of those with cardiac diseases, had C.S with no significant difference ($P=0.746, 0.447$). regarding hypertension and anemia, 47.1% & 39.4% respectively had C.S. with no significant difference ($P=0.070$ & 0.153). More than one third (39.8%) of women complained of menstrual problems and the majority of obese women (70.6%) underwent C.S. with significant difference ($P=0.001$).

Table (1): Socio-demographic characteristics of the studied women and its relation to caesarian sections - SYPE, 2014.

Variable	C.S (N=906)		No C.S (N=1875)		Odds ratio	P. Value
	N	%	N	%		
Age groups:						
• 13-17	1	12.5	7	87.5	8.789	0.032
• 18-24	221	36.4	386	63.6		
• 25-29	361	33.1	730	66.9		
• 30-35	323	30.0	752	70.0		
Current mean age	27.58 ±4.060		27.91±4.167		0.953	0.051
Mean of Age at marriage	20.26±3.14		19.56±3.002		5.698	<0.001
Education						
• Illiterate	126	21.2	469	78.8	82.295	<0.001
• Primary	11	16.7	55	83.3		
• Preparatory	73	29.9	171	70.1		
• Secondary	545	31.9	220	68.1		
• University & above	201	34.9	1051	65.1		
Occupation						
• Working	32	28.6	102	71.4	11.861	0.294
• Not working	812	32.1	1680	67.9		
Residence						
• Urban	407	42.5	551	57.5	65.292	<0.001
• Rural	499	27.4	1324	72.6		
Wealth quintile:						
• Lowest	131	23.9	418	76.1	30.762	<0.001
• Second	190	31.7	409	68.3		
• Middle	188	34.6	356	65.4		
• Fourth	193	34.0	374	66.0		
• Highest	204	39.1	318	60.9		

Table (2): Determinants of cesarean section among the studied women- SYPE, 2014.

Variable	C. S		No C. S		Odds ratio	P. Value
	N	%	N	%		
Parity						
• One	261	38.4	419	61.6	14.644	0.001
• 2-5	637	30.8	1429	69.2		
• More than 5	8	22.9	27	77.1		
Antenatal care:						
• Yes	832	35.9	1485	64.1	70.121	<0.001
• No	74	15.9	390	84.1		
No. of living children	2.23±1.092		2.56±2.519		3.967	0.044
Occurrence of abortions						
• Yes	137	39.9	206	60.1	9.658	0.002
• No	769	31.5	1669	68.5		
Number of stillbirths						
• Yes	45	46.4	52	53.6	8.731	0.003
• No	861	32.1	1823	67.9		
Use of contraception						
• Yes	207	28.0	533	72.0	9.758	0.002
• No	657	34.3	1258	65.7		
Smoking						
• Yes	435	33.6	859	66.4	1.210	0.031
• No	455	31.6	983	68.4		
Are you circumcised?						
• Yes	762	32.1	1611	67.9	10.379	0.006
• No	83	41.1	119	58.9		
• Refuse	46	26.0	131	74.0		
Have you ever had live births?						
• Yes	902	32.6	1868	67.4	0.072	0.0788
• No	4	36.4	7	63.6		

Discussion

A total 2796 of ever given birth women were included in the analysis of our study. The study revealed that about one third (32.4%) of the studied women had cesarean section. The world Health Organization recommended that the C-section rate must be within 10%–15%; so, this study revealed a higher rate of C.S.²² In Egypt, The rate of cesarean section was 60% in 2014 which is highly exceeds the threshold recommended by WHO .This over time increase places Egypt as a country with the highest c-sections performed worldwide, after Brazil (45.9%).²³ Our results showed a greater rate of C.S than that recently recorded in Jordan (30.3%) and in Saudi

Arabia (25%).^{24,25} Also, a study in Derna- Lybia showed that The overall rate of C-section was 23.5%.²⁶

The results revealed that the C. S was higher (36.4%).in the age group (18 - 24 years) than those with younger or older age. This may be as this the age of marriage and give birth of first infant and this was in accordance with the other results showed that cesarean section rate decreased with increased parity , it was higher (38.4%) among primigravida than multiparous women with more than 5 births (22.9%) with statistically significant difference These results was in agreement with a study in Pakistan showed that The caesarean section rate was significantly higher among

Table (3): Association between Chronic diseases and cesarean section among the studied women- SYPE, 2014.

Variable	CS		No CS		Odds Ratio	P. Value
	N	%	N	%		
Bronchial asthma						
• Yes	8	57.1	6	42.9	3.866	0.049
• No	898	32.5	1869	67.5		
Cancer						
• Yes	1	25.0	3	75.0	0.105	0.746
• No	905	32.6	1872	67.4		
Cardiac disease						
• Yes	4	44.4	5	55.6	.579	0.447
• No	902	32.5	1870	67.5		
Hypertension						
• Yes	16	47.1	18	52.9	3.28	0.070
• No	890	32.4	1857	67.6		
Anemia						
• Yes	37	39.4	57	60.6	2.038	0.153
• No	869	32.3	1818	67.7		
Menstrual problems						
• Yes	155	39.8	234	60.2	10.875	0.001
• No	751	31.4	1641	68.6		
Obesity						
• Yes	12	70.6	5	29.4	11.251	0.001
• No	894	32.3	1870	67.7		

primigravida (27.26%) compared with 22.31% in multipara.²⁷

C.S was increased in higher educational level (34.9%) with a highly significant difference. Also high rate of cesarean section occurred among women in Urban areas (42.5%) and among those with high wealth quintile (39.1%) with high significant. These results were in agreement with the results of other studies which showed that factors such as level of education of women, socio-economic status, maternal age, less parity are associated with C-section delivery.^{28,29,30,31}

Cesarean section rate was higher among women received antenatal care (35.9%) compared with women not received antenatal care (15.9%). This may be explained that antenatal care detected the high-risk groups of women and recommended for undergoing cesarean section. These findings were in disagreement with other study results which showed that the probability of a cesarean delivery increases by 20 to 40%

for women who do not participate in prenatal care. this may be explained that prenatal education may improve women's knowledge about doing of delivery. lack of knowledge results in some of them choosing cesarean rather than vaginal delivery Some mothers continued considering the cesarean is the optimal way of delivery, especially for the child, Also, prenatal education may have positive psychological effects on the pregnant mother, who may be anxious about giving birth. The fear of childbirth is strongly associated with doing cesarean section.^{32,33,34}

The current study showed that there was a higher rate (33.6%) of cesarean section with significant statistical differences between respondents who had cesarean section and those who did not have C.S regarding smoking this was consistent with the results of another study found that Women who smoke during pregnancy are at an increased risk for fetal compromise during labor leading to

increased rates of operative delivery (cesarean either instrumental).³⁵

Cesarean section rate increased with increasing weight (42.9%) for very overweight compared with (16.7%) for those of very underweight. with statistically significant difference and the majority of obese women (70.6%) underwent C.S. with significant difference. These results were in agreement with another study which revealed that higher BMI was also found to be associated with earlier decisions to perform a Caesarean section in the second stage of labor.³⁶

The results of this study revealed that cesarean section was increased among women who complained of chronic diseases as bronchial asthma with statistically significant difference, the health problems of pregnant women that cause the greater number of consultations and determine more frequent cesarean sections.³⁷

Conclusion

There was a higher prevalence rate for CS than that recommended by the WHO in Egypt. Age, higher educational level, urban residence, higher socioeconomic status, receiving antenatal care, smoking, overweight and obesity and bronchial asthma are the main contributing factors for occurrence of cesarean section.

References

1. Leung GM, Lam TH, Thach TQ, Wan S, Ho LM. Rates of caesarean birth in Hong Kong: 1987-1999. *Birth*. 2001;28:166-72
2. McCourt, C., Weaver, J., Statham, H., Beake, S., Gamble, J. and Creedy, D.K., 2007. Elective cesarean section and decision making: a critical review of the literature. *Birth*, 34(1), pp.65-79.
3. Tita, A.T., Landon, M.B., Spong, C.Y., Lai, Y., Leveno, K.J., Varner, M.W., Moawad, A.H., Caritis, S.N., Meis, P.J., Wapner, R.J. and Sorokin, Y., 2009. Timing of elective repeat cesarean delivery at term and neonatal outcomes. *New England Journal of Medicine*, 360(2), pp.111-120.
4. World Health Organization: Monitoring emergency obstetric care: a handbook. 2009
5. Villar, J., Valladares, E., Wojdyla, D., Zavaleta, N., Carroli, G., Velazco, A., Shah, A., Campodonico, L., Bataglia, V., Faundes, A. and Langer, A., 2006. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. *The Lancet*, 367(9525), pp.1819-1829.
7. Robson, M., Hartigan, L. and Murphy, M., 2013. Methods of achieving and maintaining an appropriate caesarean section rate. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 27(2), pp.297-308.
8. Betran AP, Ye J, Moller AB, Zhang J, Gumezoglu AM, Torloni MR. The increasing trend in cesarean section rates: global, regional, and national estimates :1990-2014. *PLoS One*. 2016;11(2):e148343.
9. Adnan A, Abu O, Suleiman H, Abu A. Frequency rate and indications of cesarean sections at Prince Zaid bin Al Hussein Hospital - Jordan. *J Med SciClin Res*. 2012;19(1):82-6.
10. Najmi R, Rehan N. Prevalence and determinants of caesarean section in a teaching hospital of Pakistan. *J Obstet Gynaecol*. 2000;20:479-83.
11. Al Rifai RH. Trend of caesarean deliveries in Egypt and its associated factors: evidence from national surveys, 2005-2014. 2017;17(1):417..
12. Betrán AP, Meriáldi M, Lauer JA, Bing-Shun W, Thomas J, Van Look P, et al. Rates of caesarean section: Analysis of global, regional and national estimates. *Paediatr Perinat Epidemiol* 2007;21:98-113.
13. Spaans WA, Sluijs MB, Van Roosmalen J, Bleker O.. Risk factors at caesarean section and failure of subsequent trial of labour. *Eur J Obstet Gynaecol Reprod Biol*. 2002;100:163-6.
14. Kun H, FangbiaoT BF, Joanna R, Rachel T, Shenglan T, et al. A mixed-method study of factors associated with differences in caesarean section rates at community level: the case of rural China. *Midwifery*.2013;29(8):911-20
15. Ecker JL, Chen KT, Cohen AP, Riley LE, Lieberman ES. Increased risk of caesarean delivery with advancing maternal age: indications and associated factors in

- nulliparous women. *Am J Obstet Gynaecol.* 2001;185:883–7
16. Mossialos E, Allin S, Karras K, Davaki K. An investigation of caesarean section in three greek hospitals:the impact of financial incentives and convenience. *Eur J Public Health.* 2005;15: 288–95.
17. Onwude JL, Rao S, Selo-Ojeme DO. Large babies and unplanned caesarean delivery. *Eur J Obstet Gynaecol Reprod Biol.* 2005;118(1):36–9.
18. Tatar M, Gunalp S, Somunoglu S, Demiroglu A. Women's perceptions of caesarean section: reflections from a Turkish teaching hospital. *Soc Sci Med.* 2000;50:1227–33.49.
19. Weiss JL, Malone FD, Emig D, Ball RH, Nyberg DA, Comstock CH, Saade G, Eddleman K, Carter SM, Craigo SD, Carr SR. Obesity, obstetric complications and cesarean delivery rate—a population-based screening study. *Am J Obstet Gynecol.* 2004;190(4):1091–7
20. Druzin ML, El-Sayed YY. Caesarean delivery on maternal request: wise use of finite resources? A view from the trenches review article. *Semin Perinatol.* 2006; 30(5):305–8.
21. Report of the National Family Health Survey (NFHS-III). Mumbai: IIPS. 2006
22. Barau G, Robillard PY, Hulsey TC, Dedecker F, Laffite A, Gérardin P, et al. Linear association between maternal pre-pregnancy body mass index and risk of caesarean section in term deliveries. *BJOG* 2006;113:1173–7.
23. World Health Organization. Statement on Caesarean Section Rates. (http://apps.who.int/iris/bitstream/10665/161442/1/WHO_RHR_15.02_eng.pdf) Accessed 12 Apr 2016.
24. Gibbons L, Belizan JM, Lauer JA, Betran AP, Merialdi M, Althabe F. Inequities in the use of caesarean section deliveries in the world. *Am J Obstet Gynecol.* 2012;206(4):331 e1-331 19. doi: 10.1016/j.ajog.2012.02.026. PubMed PMID: 22464076.
25. Al Rifai R. Rising cesarean deliveries among apparently low-risk mothers at university teaching hospitals in Jordan: analysis of population survey data, 2002-2012. *Glob Health Sci Pract.* 2014;2(2):195-209. doi: 10.9745/GHSP-D-14-00027. PubMed PMID: 25276577; PubMed Central PMCID: PMC4168617. [
26. Wahabi H, Fayed A, Esmaeil S, Alzeidan R, Elawad M, Tabassum R, et al. Riyadh mother and baby multicenter cohort study: the cohort profile. *PLoS One.* 2016;11(3):e0150297. doi: 10.1371/journal.pone.0150297. PubMed PMID: 26937965; PubMed Central PMCID: PMC4777404.
27. Raga A Elzahaf, Soad Ajroud. Prevalence and indication of cesarean section in Al-Wahda Hospital, Derna, Libya: A retrospective study, *Libyan Journal of Medical science,* 2018, (2) 68-72
28. Rakhshan Shaheen Najmi, N. Rehan, Prevalence and determinants of caesarean section in a teaching hospital of Pakistan, *Journal of Obstetrics and Gynaecology,* 2000 – (20) 5-12
29. Kun H, Fangbiao T BF, Joanna R, Rachel T, Shenglan T, et al. A mixed-method study of factors associated with differences in caesarean section rates at community level: the case of rural China. *Midwifery.* 2013; 29(8):911–20
30. Mossialos E, Allin S, Karras K, Davaki K. An investigation of caesarean section in three greek hospitals:the impact of financial incentives and convenience. *Eur J Public Health.* 2005;15:288–95
31. Ghana Statistical Service (GSS), Ghana Health Service (GHS), ICF International. Ghana Demographic and Health Survey 2014. Rockville: GSS, GHS, ICF International; 2015
32. Manyeh KA, Kukula V, Odonkor G, Ekey RA, Adjei A, Narh-Bana S, Akpakli DE, Gyapong M. Socioeconomic and demographic determinants of birth weight in southern rural Ghana: evidence from Dodowa health and demographic surveillance system. *BMC Pregnancy and Childbirth.* 2016;16:160.
33. Chen MM, Hancock H. Women's knowledge of options for birth after caesarean section. *Women Birth.* 2012; 25(3):e19–e26. doi: 10.1016/j.wombi.2011.08.001.
34. Loke AY, Davies L, Li SF. Factors influencing the decision that women make on their mode of delivery: the health belief model. *BMC Health Serv Res.* 2015;15(1):1. doi: 10.1186/s12913-015-0931.

35. Räisänen S, Lehto SM, Nielsen HS, Gissler M, Kramer MR, Heinonen S. Fear of childbirth in nulliparous and multiparous women: a population-based analysis of all singleton births in Finland in 1997-2010. *BJOG*. 2014;121(8):965–970. doi: 10.1111/1471-0528.12599.

36. Samuel Lurie, The Effect of Cigarette Smoking During Pregnancy on Mode of Delivery in Uncomplicated Term Singleton Pregnancies. 27(8) ·

37. Haim A. Abenhaim, , Alice Benjamin, Higher Caesarean Section Rates in Women With Higher Body Mass Index: Are We Managing Labour Differently? *J Obstet Gynaecol Can* 2011;33(5):443–448.

38. Karla Simônia de Pádua, Maria José Duarte Osis, Anibal Faúndes, Avelar Holanda Barbosa, Olímpio Barbosa Moraes Filho. Factors associated with cesarean sections in Brazilian hospitals *Saúde Pública São Paulo* 2010, 44 (1)