ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2016

working paper series

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Working Paper No. 1065

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December 2016

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First published in 2016 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper assesses the prevalence of out-of-pocket catastrophic health expenditure and pinpoints the factors associated with its risk in Egypt and Palestine. Data used in this research is obtained from the ERF Harmonized Household Income and Expenditure Surveys for Egypt and Palestine in 2010/2011. Finite mixed models are applied to assess the socio-economic indicators of catastrophic impacts of out-of-pocket health expenditure. The results suggest that rich households are more likely to incur catastrophic health expenditure compared to the poor households. The probability of catastrophic health expenditure is higher in rural areas and among elderly household members.

JEL Classification: I21, I13

Keywords: Out of pocket health expenditure; Arab countries, Finite mixed models

ملخص

نقوم في هذه الورقة بتقييم انتشـــار الإنفاق (الخارج من الجيب) الصـــحي الكارثي وربط ذلك بالعوامل الخطرة المرتبطة به في مصـــر وفلسطين. يتم الحصول على البيانات المستخدمة في هذا البحث من مسوحات دخل الأسرة والإنفاق لمصر وفلسطين في 2011/2010 والذي يصدره منتدى البحوث الاقتصادية. وتطبق نماذج مختلطة محدودة لتقييم المؤشرات الاجتماعية والاقتصادية للآثار الكارثية من الإنفاق على الرعاية الصـحية خارج الجيب. وتشير النتائج إلى أن الأسر الغنية هم أكثر عرضـة لتكبد النفقات الصـحية الباهظة مقارنة مع الأسر الفقيرة. احتمال الإنفاق الصحي الكارثي هو أعلى في المناطق الريفية وبين أفراد الأسرة المسنين.

1. Introduction

Out–of-pocket health expenditure constitutes the largest proportions of total health expenditure in the MENA compared to any other region. The proportion of out-of-pocket health expenditure amounts to 45.6% of total private health expenditure (WDI, 2013). Moreover, public health expenditure in the MENA region accounts to approximately 50% of total health expenditure which constitute about 6% of GDP- it is higher compared to Europe and East Asia and pacific (WDI, 2013). Despite the presence of public and semi public health providers, around half of the population are not covered with medical insurance especially those who are marginalized as well as people working in the informal sector (Health Insurance Organization, 2011). This leads to the appearance of household direct out-of-pocket (OOP) payment which is considered another large financial flow apart from state budget and social health insurance. Furthermore, public health facilities in Arab countries do not always meet the patients needs which ends up that patients go to the private hospitals and spends a lot (WorldBank, 2015). The high share of household out-of-pocket health expenditure reflects social injustice in the public health care system and if it exceeds income that will cause "financial catastrophe" for the individual and households. This may lead to pulling people into poverty as they cut their spending on other essential needs such as food , clothing or unable to pay children's education (Xu et al., 2003). Thus , high incidence of catastrophic health expenditure and impovershiment are considered an indication of lack of social protection for households which is one of the objectives of universal health coverage (World Heath Organisation, 2010). In this regard, financial protection through private or public insurance decreases the amount paid by people to demand medical care, yet in some countries where the financial burden is still high that creates barriers for health care access and usage. . Recent data showed that Egypt out-of-pocket health payment is about 58% of total health expenditure, whereas public health expenditure is 40.7% of total health expenditure. In Tunisia, out-of-pocket health payment is about 35.3% while public health is about 59.3%. In contrast, Jordon allocates 66% for public health expenditure and its out-of-pocket health payment is about 23.5%. Sudan allocates only 21.1% for public health expenditure and this associated with out-of-pocket health payment reaches about 75.8% (WDI, 2013). Finally, Palestine allocates 36.3% for public health expenditure and its out-pocket health payment 35.3% in 2011(PCBS, 2010)

2. Health Care Structure in Egypt and Palestine

This section provides more insights to the structure of health system in the countries under the scope of the study.

2.1 Egypt

Egypt is known by its pluralistic health care system with different providing and financing agents. There are three main sources that are currently managing and funding the health facilities in Egypt: Government, parastatal and private sector. The government sector represented in the Ministry of Health (MOH) is the main health service provider ranging from outpatient clinics to large urban hospitals delivering different care services. The MOH medical services are subsidized and provided to a large proportion of population free of charge and funded from the Ministry of Finance on a decentralized basis to all the 27 Egyptian governorates. The parastatal sector is the second major source of providing health care in Egypt and it includes the health insurance organization, curative care organization and teaching hospital and institutes. Health insurance organization is initially introduced to cover the medical expenditure of all the population but ended up to cover the formal employees and some urban cities. Funds for university hospitals comes from the Ministry of Higher Education and there are other ministries as Defense, Interior and transportation running their own medical hospitals for their staff and their families and sometimes they are opened for public. The difference between the government sector and the parastatal sector, is that the latter is governed by its own rules; has separate budgets and exercise more autonomy on its daily transactions

therefore delivers better quality of health service compared to the services provided by the Ministry of Health. Finally, private sector includes both profit and non-profit organization. This sector includes private hospitals and pharmacies as well as charity and religion clinics that are under the supervision of Ministry of Social Solidarity. These centers are located in metropolitan areas of Egypt (Rannan-Eliya, Blanco-Vidal, & Nandakumar, 1999).

2.2 Palestine

The health care system in the Palestinian territory is reasonably equipped with primary clinics and effective public health service. There are four major providers for health care in Palestine. They are MOH, United Nations Relief Works Agency (UNRWA), Non-governmental organizations (NGO's) and the private sector. The primary care service is the role of the ministry of education and UNRWA. While, the secondary health care service is the main role of the ministry of education and NGO's. Finally, the private sector is the only provider for tertiary care service. Public insurance covered only the workers who pay medical insurance and children who are less than three years as well as the private medical insurance companies. Funds for Ministry of Health come from regular planned budget, health insurance and co-operative payments. While, UNRWA funds comes mainly from donations. Finally, NGO's funds is largely provided by international donors and organizations (WHO, 2001, 2010).

3. Literature Review

Very few studies examine the determinants of the catastrophic impact of out-of-pocket health expenditure in Arab countries. They also differ from the scope of the proposed study. Rashad (2014) examines the relationship between the size of public health spending and the prevalence of impoverishment in Jordon, Egypt and Palestine. Erus and Aktakke (2010) explore the reform's impact on the size and the prevalence of out-of-pocket health expenditure in Turkey using Household Budget Surveys from 2003 to 2006. Elgazzar (2007) examines the impact of income on the outpatient and inpatient of health care service in both Egypt and Lebanon using cross sectional analysis from the WHO. At the same time, there are number of studies addressing the distribution impact that out-of-pocket health payment has on household's well-being at different thresholds of household income (Abou-ali, 2007). Moreover, There are contradicting findings with respect to socio-economic determinants of out-of-pocket health expenditure in developing countries. (Makinen et al., 2000) argue that wealthier quintiles in Burkina Faso, Thailand and Paraguay spends less compared to poorest quintiles as a percentage of total consumption on health care whereas South Africa and Guatemala showed progressive trend. Furthermore, (Xu et al., 2003) examined the determinants of catastrophic heath expenditure in 59 countries. The results showed different pattern across countries whereas the lowest income groups are more likely to incur catastrophic health expenditure compared to high income countries.

Other studies argue that higher out-of-pocket expenditure on heath is due to structural problem in financing health care in Vietnam whereas many households were pushed into poverty due to heath care payment (Minh, et al., 2013). This is consistent with the conclusion of (Krůtilová & Yaya, 2012), revealed that increasing out-of-pocket payment on health create financial obstacles to households that not only limit their demand on heath but also cause financial obstacles to households. (Brown, Hole, & Kilic, 2014) also revealed the negative relation between poverty and catastrophic expenditure on health in Turkey. (Wagstaff & Doorslaer, 2003)It aims to capture the incidence and the existence of catastrophic health expenditure in addition to the extent to which catastrophic payment push into poverty in Vietnam over the time period 2003-2008 . The study finds that catatrophic health payment increases over time , however the poverty impact of out-of pocket payment negatively affect the poor who become even poorer rather than the non-poor being made poor. Dooraer et al. (1993) reassess poverty measures in 11 Asian countries by calculating total household resources both with and without out-of-pocket health payment. The paper concludes that out-of- pocket health payment aggravates poverty in Asia.

This paper contributes to the existing literature on catastrophic health expenditure by analyzing the occurance and the determinants of catastrophic heath expenditure in Arab Countries and identify the socio-economic indicators associated with them. **Arab Countries is considered a good choice.**As to the authors knoweldege , the relation has not been examined before in comapartive framework.

4. Data

Data used in this study are obtained from ERF harmonized household budgets survey. The ERF database involves 2010/2011 round of the Household Budget survey of two Arab countries – Egypt and Palestine. There are eleven rounds of the Egyptian Household Income, Expenditure and Consumption Survey (HIECS). However, for the sake of comparison, we exploit in this paper, the 2010/2011 round which includes 26,500 households out of which 16,500 new households and 10,000 panel households. The survey period extends over a 12 months' period starting from July 2010 and ending in June 2011. About 1100 households are collected every 15 days distributed between urban and rural areas with the percentage of 47.1 and 52.9, respectively.[1] Households observed for two weeks continuously, this is to collect information on food expenditure. The cluster size used is 16 households that were increased to 18 households in urban governorates and Giza, while the cluster size of the panel sample was 4 households. For the sample estimates for HICES to be nationally representative, it is crucial to multiply the data by sampling weight or expansion factor. The basic weight for each sample household would be equal to the inverse of its probability of selection (CAPMAS, 2011).

As concerns Palestine, the 2010 Expenditure and Consumption survey is used. It contains about 3,757 households, 2,574 households in West Bank and 1,183 households in Gaza Strip. About 120 to 150 household are collected every month. The field work involved four teams of female interviewers, 3 in the west bank and one in Gaza strip. Each team consisted of a supervisor, and 10-20 well-trained interviewers. The sample is a stratified cluster systematic random sample with two stages. First stage, entailed the selection of a systematic random sample of 192 enumeration areas and the weight is called enumeration areas. Second stage, selection of a systematic random sample of 24 households from each enumeration area is chosen and the weight is called household weight. Thus, a weight is calculated for each stage and the household weights are calculated by multiplication of the two weights (PCBS, 2010).

The surveys provide large amount of information measuring the living standards of households and individuals. It includes data that facilitate measuring poverty and relative incomes, income distribution, as well as households' ownership of assets. Besides, data can be found on the characteristics of household education, health and demography in addition to household expenditure on food, health and education. Education expenditure has not been covered in depth using the survey data in the MENA region.

Descriptive statistics are presented for Egypt and Palestine in Table (1) and Table (2), respectively. It is observed that there are differences in the mean value of total annual health expenditure across countries. For example, total annual health expenditure is 1735 L.E ($302.2) and Palestine 3449.9 ($966.3). Also, the variation existed with respect to total annual household expenditure across countries; it ranged from 22,215.92 L.E ($3870.3) and 67182 pound ($ 18,818) for Egypt and Palestine, respectively. With respect to other household characteristics, the average household size is estimated to be 4 members for Egypt and 6 members for Palestine. The mean numbers of children less than 14 are as follows: 1.3 for Egypt and 2.3 for Palestine. On the other hand, the average number of elderly in household is 0.2 for both countries.

In this paper, catastrophic health expenditure (CHE) is defined at *40%* threshold levels for Egypt and Palestine. The choice of both the definition of catastrophic health expenditure (CHE)

[1] Rotation between households is every 15 days.

and the threshold level are based on the exiting literature to allow providing a comprehensive picture of the occurrence of catastrophic health expenditure in both countries.

5. Methodology

Household decision making models are first introduced by Behrman, Pollak, and Taubman model (1982) where decesions are made based on a demographic charactrestics such as household size, number of children, number of infants and number elderly people in the household. In this regard, household expenditure functions are much suitable to analyze the risk factors associated with catastrophic health payments in Egypt and Palestine.

There are different approaches for measuring catastrophic health expenditure in the literature. Following O'Donnell, van Doorslaer, Wagstaff and Lindelow, (2008), the prevalence of catastrophic payment can be measured by the following equation:

$\boldsymbol{H = \frac{1}{N}\sum_{i=1}^{N} E_i}$, Where N= Sample size and $E_i = 1$ if $^{T}/_{\chi}$ which is the ratio of heath payment to total household expenditure when it exceeds threshold z and equal to zero otherwise**.** The thresholds used to measure catastrophic health expenditure is taken arbitrary and can vary from 2.5% up to 40% of total household consumption/income (Abou-Ali, 2007; Arsenijevic, Pavlova, & Groot, 2013; Brown et al., 2014; Minh et al., 2013; Xu et al., 2003; Yardim, Cilingiroglu, & Yardim, 2010). The threshold of 40% has received much attention in the empirical literature (Xu et al., 2003). The paper employed the 40% threshold to be able to examine the incidence of catastrophic health expenditure as well as the characteristics of the most vulnerable households (Arsenijevic et al., 2013; Wagstaff. , 2008; Wagstaff & Pradhan, 2005). Knowing that, the higher share of out of pocket health expenses could cause a threat to household's ability to satisfy basic needs as food and clothing or finance off-spring's education.

The purpose of this study is to investigate the socioeconomic determinants of catastrophic health expenditure in Egypt and Palestine using finite mixture models. The dependent variabley_i is assumed to follow a poisson distribution with mean λ_i defined as a function of the covariates x_i. The model is specifies as follows (Jones, Nigel, d'Uva, & Balia, 2013):

$$f\left(y_i \left| x_i\right.\right) = \frac{\exp(-\lambda_i)\lambda_i{}^{y_i}}{y_i{}^{!}} \quad (1)$$

Where the conditional mean λ_i is usually defined as:

$$\lambda_i = E\left(y_i \left| x_i\right.\right) = Exp\left(x_i\beta\right) \quad (2)$$

The conditional variance equals the conditional mean, reflecting the equidispersion property of the Poisson distribution:

$$V\left(y_i \left| x_i\right.\right) = \lambda_i = Exp\left(x_i\beta\right)$$

Where, y_i takes the value of 1 if the household out-of-pocket expenditure on health care exceeds 40% of household consumption expenditure and 0 otherwise. This is called catastrophic health expenditure. x_i represents a number of socioeconomic indicators affecting catastrophic health expenditure in developing countries that has been found in the existing literature. For example, household income quintiles have been used by (Makinen et al., 2000; Xu et al., 2003) who observe no distinct patterns in eight developing countries. In the same vein, (Wagstaff & Doorslaer, 2003) who argue that households that belong to lowest income quintiles are more likely to experience catastrophic health expenditure but if the threshold is set lower, the richer household are observed to incur catastrophic health expenditure. In addition, there are other factors are associated with risk of catastrophic health expenditure as having elderly, unemployed members in household (Kawabata, Xu, & Carrin, 2002). With respect to (Brown et al., 2014) argue highly educated household head and living in urban areas are inversely associated with the incidence of catastrophic health expenditure. Finally, the

study attempts to assess the socioeconomic determinates of catastrophic health expenditure in two Arab countries. The cross-sectional analysis will be undertaken for Egypt and Palestine, in 2010/2011.

6. Empirical Results

The results from the finite mixed model are presented for Egypt and Palestine in **Table (3)**. It is apparent that catastrophic health expenditure is used as a dependent variable, at 40% threshold. The findings indicate that households belonged to highest income quintiles are more likely to incur catastrophic health expenditure compared to households belong to the first income quintile in both countries. In consistent with the literature, households with elderly members are more likely to incur catastrophic health expenditure in Egypt. On the other hand, households with children less than 14 years old are less likely to incur catastrophic health expenditure in Palestine. This is due to the medical insurance provided by the public sector to school age children. Households whose heads located in urban areas are less likely to incur catastrophic health expenditure compared to those located in rural areas in Egypt. Besides, there is a negative correlation between household size and catastrophic health expenditure in both countries. This suggests that people in large household size could provide support for other family members and thus lead to reduction in health service utilization (Minh et al., 2013).

7. Conclusion

This paper is the first attempt to investigate the determinants of catastrophic health expenditure in Egypt and Palestine in 2011. In fact, household out of pocket health payment is considered a crucial indicator that reflects the degree of social justice in the health system of the selected countries. Our analysis showed that out of pocket health payment is the highest for Egypt among the MENA countries. According to WHO, the out of pocket health payment for Egypt is about 58% of total health expenditure while, it is 45.6% for MENA in 2013.

Our results suggest that the poor households are less likely to incur catastrophic health expenditure compared to the noon poor households across the selected countries. This result highlighted the vulnerability of the disadvantaged group in terms of demanding health services. Special attention should be given to the poor in health care reforms in the selected countries whether in terms of improving the quality of health care provided by the public sector or increasing their financial protection. In addition, households located in rural areas are more likely to incur catastrophic health expenditure compared to urban areas particularly Egypt. This implies special attention for health care policies for rural areas Egypt in terms of both quality and quantity of the health service as well as the social protection.

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Table 1: Descriptive Statistics (Egypt 2010)

Variables	Obs.	Mean	Std. Dev.	Min	Max
Continuous variables					
Total annual household expenditure	7627	22215.92	16557.93	2343.4	363023
Total annual household health expenditure	7627	1735.13	2927.17	2.5	91454
Household size	7627	4.42	1.99	1	21
children less than 14 years	7627	1.35	1.36	0	9
Elderly :65+ years	7627	0.21	0.47	0	3
Expenditure quintile					
1st quintile	7627	0.20	0.40	0	1
2nd quintile	7627	0.20	0.40	0	1
3rd quintile	7627	0.20	0.40	0	1
4th quintile	7627	0.20	0.40	0	1
5th quintile	7627	0.20	0.40	0	1
Education of household head					
Primary and less	7627	0.58	0.49	0	1
Secondary	7627	0.25	0.43	0	1
Higher education	7627	0.17	0.37	0	1
Employment status of household head					
Employed	7627	0.75	0.43	0	1
Unemployed	7627	0.01	0.08	0	1
Out of labour force	7627	0.24	0.43	0	1
Gender of household head					
Male	7627	0.83	0.37	0	1
Female	7627	0.17	0.37	0	1
Location					
Rural	7627	0.54	0.50	0	1
Urban	7627	0.46	0.50	0	1

Table 2: Descriptive Statistics Palestine (2010)

Variables	Obs.	Mean	Std. Dev.	Min	Max
Continuous variables					
Total annual household expenditure	2797	67182.82	55503.35	5911.2	813306
Total annual household health expenditure	2797	3449.96	19212.96	12	713400
Household size	2797	6.03	2.80	1	24
children less than 14 years	2797	2.28	1.92	0	12
Elderly :65+ years	2797	0.22	0.51	0	3
Expenditure quintile					
1st quintile	2796	0.19	0.39	0	1
2nd quintile	2796	0.20	0.40	0	1
3rd quintile	2796	0.20	0.40	0	1
4th quintile	2796	0.21	0.41	0	1
5th quintile	2796	0.21	0.41	0	1
Education of household head					
Primary and less	2797	0.64	0.48	0	1
Secondary	2797	0.17	0.38	0	1
Higher education	2797	0.19	0.39	0	1
Employment status of household head					
Employed	2797	0.74	0.44	0	1
Unemployed	2797	0.06	0.24	0	1
Out of labor force	2797	0.20	0.40	0	1
Gender of household head					
Male	2797	0.91	0.29	0	1
Female	2797	0.09	0.29	0	1
Location					
Rural	2797	0.68	0.47	0	1
Urban	2797	0.81	0.39	0	1

Table 3: Determinants of Catastrophic Health Expenditure Using the Cut-Off Points 40%

	Egypt	Palestine
Variable / threshold	**Finite mixed models**	**Finite mixed models**
Omitted group :First quintile		
2nd quintile	0.3694	2.3908*
	-0.6143	-1.0851
3rd quintile	1.6369**	2.3439*
	-0.5091	-1.1861
4th quintile	2.4419***	3.6645***
	-0.506	-1.0689
5th quintile	2.8287***	2.6613
	-0.5654	-1.4329
children less than 14 years	-0.3637	-16.9197***
	-0.3346	-0.4112
Elderly :65+ years	0.8543***	-0.0702
	-0.2104	-0.3181
Household size	-0.9149***	-0.6676**
	-0.163	-0.2414
Omitted group: Primary or less		
Secondary	0.2429	-0.4172
	-0.3898	-0.7497
Higher education	-0.3345	-1.2823
	-0.4913	-1.2005
Omitted group : rural		
urban	-0.7374*	-0.0175
	-0.3236	-0.6224
Constant	-3.1067***	-3.6281***
	-0.5059	-1.0884
Number of Obs.	6,946	2,004
Log likelihood	-296.98981	-104.38418
.LR chi2	108.24	5736.56
Prob>Chi2	0.000	0.000
Standard errors in parentheses	* p<0.05, ** p<0.01, *** p<0.001	