International Scholars Journals

International Journal of Public Health and Epidemiology ISSN 2326-7291 Vol. 7 (9), pp. 001-009, September, 2018. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Priority families for health care according to family socio-demographic risks

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Accepted 16 May, 2018

Socio-economic inequalities have been shown to be associated with disease burden in developing as well as developed countries. The aim of the study was (1) to test the association between family socio-demographic risks and health problems, and (2) to identify a "family sociodemographic risk line" above which families are at significant risk of developing health problems. A cross sectional community-based study was conducted in two districts in Cairo, Egypt. Socio-demographic status was assessed for 5400 families by a family socio-demographic risk score (FSRS) calculated according to the crowding index, family size, age and sex structure, education, economic dependency, smoking and addiction. The continuous FSRS (range: 0 - 12) was transformed into 5 quintiles. Association between FSRS and 21 health problems was done for the studied families using unconditional logistic regression analysis. It was found that increased FSRS was associated with a progressive increase in the prevalence of family health problems. The risk of health problems was significantly higher for the 5th compared to the 1st FSRS quintile families (odds ratio: 1.8 and 95% confidence interval: 1.41 – 2.35) which represented about 15% (784/5400) of the studied families. These would be considered the priority families for health services. Thus, the FSRS "7" was considered the "family socio-demographic risk line".

Key words: Socioeconomic status, family socio-demographic risk, health problems, health status, risk line.

INTRODUCTION

Much evidence indicates that social status is related to factors that determine one's health. Socio-economic inequalities have been shown to be associated with disease burden whether in the form of morbidity, mortality or disability in developing as well as developed countries (Dalstra et al., 2005; Luo et al., 2006; Weires et al., 2008; Yassin, 2000). Educational attainment, occupational social class, and income are established indicators of socio-economic position (Daly et al., 2002). These indicators may confer limits on one's access to adequate nutrition, safe living conditions and personal medical services, which in turn result in differential health outcome (Wallace, 2008). To date, the health reform aims to achieve equity in health care, however, there is a failure of publicly financed health care to reach the poor in almost all developing countries, an issue that deserves serious attention from governments (Wagstaff, 2002). Thus population-based studies of the association of socio-economic and demographic disparities with the occurrence of health problems can provide essential information for targeted public health programs to achieve equity in health care and reduce health disparity. The aim of the current study is testing the association between family sociodemographic characteristics and health problems as well as the identification of a "family socio-demographic risk line" above which families are at significant risk of developing health problems. This would guide the stakeholders to detect "priority families for health support" that deserve exemption from fee-for health services taking into account the health problems within the family setting and not merely the income of the

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Abbreviations: FSRS, Family socio-demographic risk score; **CSPM,** Center for Social and Preventive Medicine; **SES,** socio-economic status; **HDI**, Human Development Index; **MOHP,** Ministry of Health and Population.

family.

MATERIALS AND METHODS

Study settings and design

This study is a type of health system research with a cross sectional community-based study design. The study setting is the community within the catchment area of the Center for Social and Preventive Medicine (CSPM), affiliated to the Faculty of Medicine, Cairo University. CSPM catchment area included two districts formed of 27 Shiakha (clusters): Masr Al-Kadema (12 clusters) and Al-Saida Zeinab (15 clusters) with a total population of 434,225 residents or on the average 86,843 families.

Sample size and sampling technique

The sampling unit is the family. About 200 families were selected from each of the 27 clusters, thus a total of 5400 family were included in the study. Thirty urban community workers living in the studied clusters of the CSPM catchment area and affiliated to the CSPM were trained to do the data collection. A family health status questionnaire form was developed in the form of a simple, one-page, checklist-like questionnaire for data collection. It included direct questions that cover the three dimensions of health (physical, mental and social) and its socio-demographic determinants. Validation of the items used in the data collection was done by reviewing previous studies and by discussing the issue with the experts in the field of Public Health and Social Medicine. Twelve points were used to assess the socio-demographic risk of the family:

1. Crowding index (that is, number of individuals living in the household / the number of bedrooms): The family was considered at risk if the crowding index was more than 2.
2. Structure of the family: The family was considered vulnerable if the number of family members exceeded 5 individuals, or the family had one or more infants, children 1- < 5 years of age, school age children (6 – 18 years), females in the reproductive age (15 -49 years) and elderly (65 years old).
3. Families headed by women: Families economically dependent on the woman only (the husband is either dead or not working for cash) were considered at risk.
4. Education: Families were considered at risk if one or more of family members aged 6 – 60 years had no history of school enrollment.
5. Working for cash: Families were considered at risk if one or more of family members aged 25 – 60 years were not working for cash.
6. Smoking: Families were considered at risk if one or more of the family members were smokers.
7. Addiction: Families were considered at risk if one or more of the family members were addicts.

A total of 21 items were used to assess the health status of the family (14 morbidities, 2 disabilities, and 5 mortalities):

1. The morbidity: Families were asked if any of the family members were suffering from any of the following health problems: hypertension, diabetes, diseases of gastrointestinal tract (GIT), eye, psychological, locomotor, skin, blood, heart, chest, liver, genitourinary, central nervous system (CNS) or cancer. A person is considered to be suffering from any of the studied health problems if he reported seeking medical advice and was diagnosed to have the health problem.
2. The disability: Families were asked if any of the family members were suffering from congenital or acquired disability.
3. The mortality: Families were asked about history of pregnancy wastage (abortion or stillbirth) or premature death of any family member before the age of 60 years that is infant mortality, child 1 – 4 years mortality, or deaths of members aging 5 - 60 years.

Ethical approval

The study protocol was ethically reviewed and approved by the ethical committee at the Community Medicine Department, Faculty of Medicine, Cairo University. Verbal consent was obtained from the interviewed family member to complete the survey form.

Statistical analysis

Calculation of the FSRS

The FSRS is a composite measure of the cumulative living standard of a household used as a proxy for the socioeconomic status (SES). It was calculated for each family by considering the 12 socio-demographic items. For each item the family is given a score of “0” if the family did not have the risk and “1” if the family had the risk. The score was calculated by taking the sum of the 12 items. Thus, the FSRS score would range from 0 (that is, the family did not have any of the studied risks) to 12 (that is, the family had all the studied risks). FSRS and SES were inversely related that is, families with high FSRS are considered of low SES.

The continuous FSRS was transformed into a 5-level categorical variable by dividing it into 5 quintiles; each level representing 1 quintile. The first quintile (Q1) is the lowest FSRS (that is, the highest SES), while the fifth quintile (Q5) is the highest FSRS (that is the lowest SES). Because many households had identical FSRS score, the number of households in each quintile was not equal. The FSRS for the five quintiles Q1, Q2, Q3, Q4 and Q5 was 0-3, 4, 5, 6 and 7-12 respectively**.**

The association between FSRS and the 21 health problems representing morbidity, disability and mortality was done using unconditional logistic regression analysis, expressed as a crude odds ratio (OR) and 95% confidence interval (95% CI), with the lowest FSRS quintile as the referent. The quintile at which FSRS score started to be associated with a significant high probability of health problems among families was considered “the risk line” and accordingly, the proportion of families above the estimated risk line was detected. SPSS version 15 was used to conduct the statistical analysis.

Quality check and reliability testing

After data collection was completed, a different group of data collectors were sent to 10% of the families recruited in the study and the data collection was repeated. A very high level of concordance (94.3%) between the two rounds of data collection was found indicating a high level of reliability.

RESULTS

The current study included 5400 families who were residents within the catchment area of the CSPM. The total number of members in those households was 23,136 members.

Figure 1 shows the percent distribution of the studied families according to their estimated FSRS score. The calculated score ranged from 0 to 11. Only one family (0.02%) had a score of 11, while 36 families had a score of zero. The FSRS had a median of 5.0, mean of 4.6 (SD

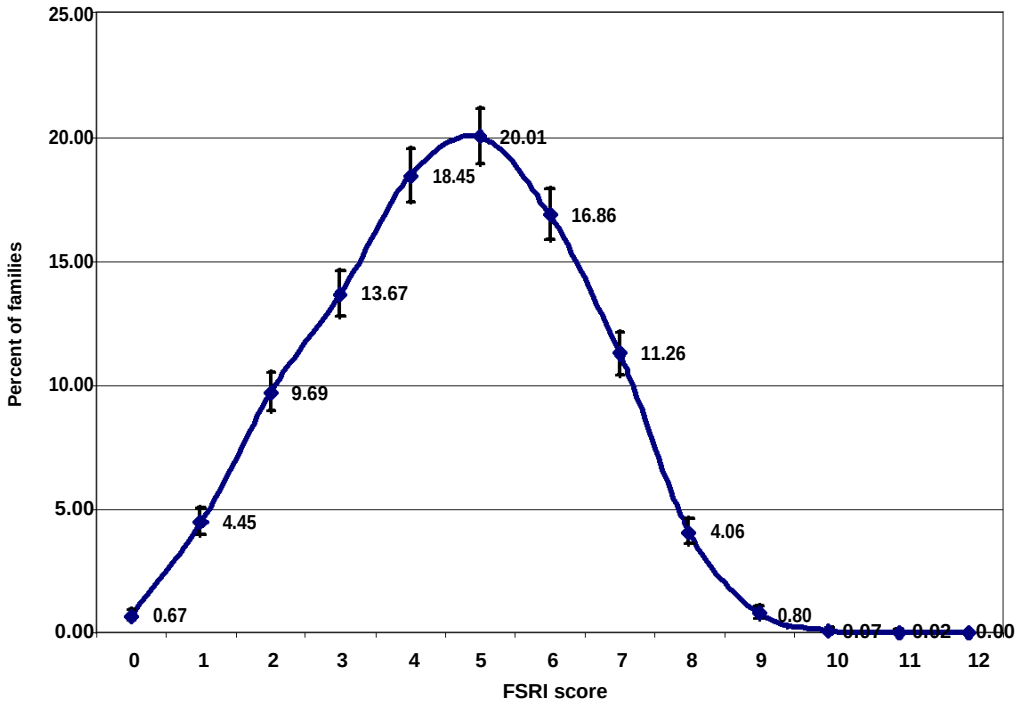

Figure 1. Percent distribution of families according to the FSRS score (error bars represent 95% CI)

Table 1. Number and percent of families with socio-demographic risks.

Socio-demographic variable	Number (n = 5400)	%
Crowding index > 2	2541	47.1
Family size more than 5	1193	22.1
Infants	328	6.0
Children 1- < 5 years	1404	26.0
School age children (6 - 18 years)	2916	54.0
Females (15 - 49 years)	4320	80.0
Elderly 65 year	702	13.0
Families headed by women	1139	21.1
Family members 6 - 60 years old with no education	3305	61.2
Family members 25 - 60 years old not working for cash	3780	70.0
Smokers	3062	56.7
Addicts	124	2.3

± 1.86) and mode of 5.0.

Table 1 illustrates the distribution of families with any of the studied socio-demographic risks. Almost half of the studied families had a high crowding index (more than 2 individuals / bedroom), and about one fifth (22.1%) had family size more than 5. According to the age and sex structure, about 80% of the families had females in the child bearing age (15 - 49) and 54% had children in the school age (6 - 18 years old).

Almost one out of five studied families (21.1%) was headed by a woman. About 61% of the CSPM served families had one or more of its members in the age group 6 - 60 years old who did not attend school or have any form of education, while 70% had one or more economically-dependent family member in the age group 25 - 60. Smokers were present in 56.7% of the families and addicts in 2.3% (Table 1).

Association between FSRS and morbidities in the studied families

Tables 2 and 3 show significantly wide socio-economic disparities in skin, chest, blood, psychological and CNS disorders. Families falling in the 5th FSRS quintile had

Table 2. Prevalence of morbidities among the studied families according to FSRS quintiles.

Morbidities	Q1 (n = 1537)		Q2 (n = 996)		Q3 (n = 1080)		Q4 (n = 910)		Q5 (n = 875)		Total (n = 5398)	
	N	%	N	%	N	%	N	%	N	%	N	%
Hypertension	668	43.4	397	39.9	415	38.4	371	40.8	369	42.2	1862	34.5
Musculoskeletal disorders	625	40.7	403	40.5	421	39	377	41.4	392	44.8	2218	41.1
GIT diseases	318	20.7	219	22	250	23.1	229	25.2	234	26.7	1250	23.2
Diabetes	417	27.1	219	22	215	19.9	183	20.1	174	19.9	1208	22.4
Eye diseases	330	21.5	175	17.6	222	20.6	180	19.8	177	20.2	1084	20.1
Blood diseases	205	13.3	186	18.7	228	21.1	197	21.6	202	23.1	1018	18.9
Chest diseases	208	13.5	161	16.2	200	18.5	166	18.2	205	23.4	940	17.4
Heart diseases	224	14.6	122	12.2	121	11.2	128	14.1	108	12.3	703	13.0
Genitourinary diseases	149	9.7	102	10.2	107	9.9	99	10.9	114	13	571	10.6
CNS diseases	97	6.3	69	6.9	84	7.8	75	8.2	81	9.3	406	7.5
Skin diseases	72	4.7	63	6.3	74	6.9	84	9.2	93	10.6	386	7.2
Liver diseases	115	7.5	51	5.1	58	5.4	49	5.4	54	6.2	327	6.1
Psychological disorders	47	3.1	37	3.7	54	5.0	38	4.2	50	5.7	226	4.2
Cancer	34	2.2	21	2.1	18	1.7	14	1.5	21	2.4	108	2.0

almost double the risk of having these disorder compared to those falling in the first quintile. A significant increase of the disease prevalence started at the level of 3rd FSRS quintile for all except the CNS disorders which started at the 5th quintile.

There were also significant socioeconomic differences for the renal, GIT and musculoskeletal disease groups. A significant increase of the disease prevalence started at the level of 4th FSRS quintile for the GIT and the 5th quintile for the genitourinary and musculoskeletal disorders (OR 1 - < 1.50 for the fifth compared to the first FSRS quintile). No significant socioeconomic inequalities could be demonstrated for cancer (Tables 2 and 3).

The association between FSRS and liver diseases showed that the prevalence of liver diseases among CSPM families decreased and almost showed a significant plateau from the 2nd to the 4th FSRS quintile (prevalence ~ 5%, 95% CI did not include 1). The prevalence of diabetes was also inversely related to the FSRS. There was progressive decrease in the proportion of families reporting the problem of diabetes with the increase in the FSRS. Significant decline in the prevalence of diabetes started at the 2nd FSRS quintile. This decrease in prevalence of the diabetes among families was 27.1% for families in the lowest FSRS quintile, and became 19.9% among those in the highest quintile (OR = 0.67) (Tables 2 and 3).

Association between FSRS and disabilities in the studied families

The proportion of families who reported congenital disability (among one or more of the family members) increased progressively from 1.3% among the families falling in the 1st FSRS quintile to 2.8% in the 2nd quintile and then plateaued at about 3% in the 3rd, 4th and 5th quintiles (Table 4). The risk significantly increased starting from the 2nd FSRS Quintile (Table 5).

The proportion of families who reported acquired disability (among one or more of the family members) significantly increased from 3.5 to 5.8% among those falling in the 1st and 5th FSRS quintiles respectively. Families falling in the 5th FSRS quintile had 1.7 times higher risk to have acquired disabilities compared to those falling in the 1st quintile (Tables 4 and 5).

Association between FSRS and mortalities in the studied families

History of abortion was reported by 23% of all the families. It was reported by 16.9% and 32.7% of the

Table 3. Odds ratio (OR) and 95% confidence interval (CI) for the prevalence of morbidities in different FSRS quintiles.

Morbidities	Q1	Q2	Q3	Q4	Q5
	OR	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Skin diseases	1	1.4 (0.97; 1.95)	1.5 (1.07; 2.08)[a]	2.1 (1.5; 2.88)[a]	2.4 (1.76; 3.35)[a]
Chest diseases	1	1.2 (0.99; 1.54)	1.4 (1.17; 1.79)[a]	1.4 (1.15; 1.79)[a]	2.0 (1.59; 2.43)[a]
Blood diseases	1	1.5 (1.21; 1.86)[a]	1.7 (1.41; 2.13)[a]	1.8 (1.46; 2.25)[a]	2.0 (1.59; 2.44)[a]
Psychological disorders	1	1.2 (0.79; 1.9)	1.7 (1.12; 2.49)[a]	1.4 (0.89; 2.14)	1.9 (1.28; 2.89)[a]
CNS diseases	1	1.1 (0.80; 1.52)	1.2 (0.93; 1.7)	1.3 (0.97; 1.82)	1.5 (1.11; 2.06)[a]
Genitourinary diseases	1	1.0 (0.82; 1.39)	1.0 (0.78; 1.32)	1.1 (0.87; 1.5)	1.4 (1.09; 1.82)[a]
GIT diseases	1	1.1 (0.89; 1.32)	1.1 (0.95; 1.38)	1.3 (1.07; 1.57)[a]	1.4 (1.16; 1.71)[a]
Musculoskeletal disorders	1	1.0 (0.85; 1.17)	0.9 (0.79; 1.08)	1.0 (0.88; 1.23)	1.2 (1.01; 1.41)[a]
Cancer	1	1.0 (0.55; 1.66)	0.7 (0.42; 1.33)	0.7 (0.37; 1.3)	1.1 (0.63; 1.90)
Hypertension	1	0.9 (0.74; 1.02)	0.8 (0.69; 0.94)[a]	0.9 (0.76; 1.06)	1.0 (0.81; 1.13)
Eye	1	0.8 (0.64; 0.96)[a]	0.9 (0.78; 1.14)	0.9 (0.74; 1.11)	0.9 (0.88; 1.00)
Heart	1	0.8 (0.65; 1.04)	0.7 (0.58; 0.93)[a]	1.0 (0.76; 1.22)	0.8 (0.65; 1.06)
Liver diseases	1	0.7 (0.48; 0.94)[a]	0.7 (0.50; 0.97)[a]	0.7 (0.50; 1.00)[a]	0.8 (0.59; 1.14)
Diabetes	1	0.8 (0.63; 0.91)[a]	0.7 (0.55; 0.80)[a]	0.7 (0.56; 0.82)[a]	0.7 (0.55; 0.82)[a]

[a]- 95% CI does not include 1.00.

families falling in the 1st and 5th FSRS quintiles respectively. (Table 4). The risk of abortion was doubled significantly in the families falling in the 5th compared to the 1st FSRS quintile (OR = 2.4). The proportion of families reporting history of stillbirth was also significantly associated with the 3rd (OR = 1.7) and 4th FSRS quintiles (OR = 1.6) (Table 5).

Though insignificant, yet infant mortality increased with the increase of FSRS, while families falling within the 2nd, 3rd and 4th FSRS quintiles had significantly lower child (1 - 5 years) mortality compared to families in the 1st and 5th quintiles. It was also found that there was a significant progressive decrease in the proportion of families who reported premature mortality with the increase in FSRS. Families falling in the 1st FSRS quintile had a 2.5 times higher risk having premature mortalities than those falling in the 5th FSRS quintile (Tables 4 and 5).

Association between FSRS and all health problems in the studied families

The overall proportion of families having morbidity problems (any of the 14 chronic diseases) was 77.9%. A progressive increase in the level of morbidities with the increase in the FSRS was observed. The significant morbidity level was detected at the 5th FSRS quintile, where families had a 1.6 times higher risk for developing morbidities than the families belonging to the 1st quintile. The mortality problem was almost the same across all FSRS quintiles, but significant association with the index was detected at the 5th quintile, where the families belonging to this quintile had 1.2 times higher risk to develop mortalities than those belonging to the 1st FSRS quintile (Tables 6 and 7).

Prevalence of disability also significantly increased with the increase in FSRS, but the significant level appeared at the 3rd quintile. The risk of having disability problems was almost doubled for the families belonging to the 5th FSRS quintile compared to those belonging to the 1st quintile.

Overall, 83.9% of the studied families had health problems (that is, morbidity and/or disability and/or mortality). A progressive increase in the health problems with the increase in the FSRS was observed. Almost 90% of the families belonging to the 5th FSRS quintile had health problems vs. 83% of those belonging to the 1st quintile. The risk of health problems was 1.3 times higher for the 4th-quintile families with borderline significant OR (95% CI: 1.01 – 1.59), while the risk was almost doubled for the 5th-quintile-families compared to the 1st- quintile-families with a highly significant OR (95% CI: 1.41 – 2.35).

A total of 784 families belonged to the 5th FSRS quintile where the FSRS ranged from “7 -12”. These families represent about 15% (14.5%) of the studied 5400 families

DISCUSSION

According to Egypt Human Development Report, Al-Saida Zeinab District and Masr Al-Kadema District ranks were 15 and 22 respectively among Cairo’s 29 districts (Egypt Human Development Report, 2003).The residents of the studied community are considered of medium and low socio-economic class. The current study tested the association between the families’ SES measured by a FSRS and the different health problems separately and

Table 4. Distribution of families with different disabilities and mortalities according to FSRS quintiles.

Disability/Mortality	Q1 (n = 1537)		Q2 (n = 996)		Q3 (n = 1080)		Q4 (n = 910)		Q5 (n = 875)		Total (n = 5398)	
	N	%	N	%	N	%	N	%	N	%	N	%
Congenital disability	20	1.3	28	2.8	35	3.2	28	3.1	26	3.0	137	2.5
Acquired disability	54	3.5	38	3.8	43	4.0	48	5.3	51	5.8	234	4.3
Abortion	260	16.9	205	20.6	266	24.6	231	25.4	286	32.7	1248	23.1
Stillbirth	55	3.6	32	3.2	63	5.8	51	5.6	40	4.6	241	4.5
Infant mortality	107	7.0	62	6.2	67	6.2	64	7.0	79	9	379	7.0
Child death (1- < 5 years)	83	5.4	26	2.6	40	3.7	24	2.6	33	3.8	206	3.8
Premature Mortality (5 - 60 years)	336	21.9	174	17.5	126	11.7	85	9.3	89	10.2	810	15.0

Table 5. Odds ratio (OR) and 95% confidence interval (CI) for the prevalence of disabilities and mortalities in different FSRS quintiles.

Disability/Mortality	Q1	Q2	Q3	Q4	Q5
	OR	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Congenital disability	1	2.2 (1.23; 3.93) [a]	2.5 (1.45; 4.4) [a]	2.4 (1.36; 4.32) [a]	2.3 (1.30; 4.21) [a]
Acquired disability	1	1.1 (0.72; 1.67)	1.1 (0.75; 1.71)	1.5 (1.03; 2.29) [a]	1.7 (1.15; 2.53) [a]
Abortion	1	1.3 (1.04; 1.56) [a]	1.6 (1.32; 1.94) [a]	1.7 (1.37; 2.04) [a]	2.34(1.97; 2.90)[a]
Infant mortality	1	0.9 (0.64; 1.23)	0.9 (0.64; 1.21)	1.0 (0.74; 1.40)	1.3 (0.98; 1.81)
Stillbirth	1	0.9 (0.58; 1.40)	1.7 (1.15; 2.41) [a]	1.6 (1.09; 2.30) [a]	1.3 (0.85; 1.96)
Child death (1- < 5 years)	1	0.5 (0.30; 0.74) [a]	0.7 (0.46; 0.99) [a]	0.5 (0.30; 0.76) [a]	0.7 (0.46; 1.04)
Premature mortality (5 – 60 years)	1	0.8 (0.62; 0.93) [a]	0.5 (0.38; 0.59) [a]	0.4 (0.29; 0.4) [a]	0.4 (0.32; 0.52) [a]

[a] - 95% CI does not include 1.00.

Table 6. Distribution of families with different health problems according to FSRS quintiles.

Health problem	Q1 (n = 1537)		Q2 (n = 996)		Q3 (n = 1080)		Q4 (n = 910)		Q5 (n = 875)		Total (n = 5398)	
	N	%	N	%	N	%		N	%	N	%	N
Morbidity	1186	77.2	733	73.6	818	75.8	731	80.3	735	84	4203	77.9
Disability	72	4.7	63	6.3	73	6.8	75	8.2	74	8.5	357	6.6
Mortality	598	38.9	372	37.3	410	38.0	340	37.4	379	43.3	2099	38.9
Morbidity- disability- mortality	1269	82.7	803	80.8	894	82.9	780	85.7	784	89.6	4530	83.9

Table 7. Odds ratio (OR) and 95% confidence interval (CI) for the prevalence of health problems in different FSRS quintiles.

Health problem	Q1	Q2	Q3	Q4	Q5
	OR	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Disability	1	1.4 (0.97; 1.95)	1.5 (1.05; 2.05) [a]	1.8 (1.31; 2.57) [a]	1.9 (1.35; 2.65) [a]
Morbidity	1	0.8 (0.69; 1.00)	0.9 (0.76; 1.10)	1.2 (0.99; 1.48)	1.6 (1.25; 1.94) [a]
Mortality	1	0.9 (0.80; 1.11)	1.0 (0.82; 1.12)	0.9 (0.79; 1.11)	1.2 (1.02; 1.43) [a]
Morbidity- Disability- Mortality	1	0.9 (0.72; 1.09)	1.0 (0.82; 1.24)	1.3 (1.01; 1.59)	1.8 (1.41; 2.35) [a]

[1a] - 95% CI does not include 1.00.

and combined. This association allowed for the estimation of the risk -line at which FSRS score started to be associated with a significant high probability of health problems among families and accordingly identify the proportion of families above the estimated risk line. The developed FSRS was based upon the condition of the family as regards crowding index, education, working for cash, head of the family and presence of vulnerable family members (infants, pre-school and school children, elderly and women in childbearing years). The study showed that the calculated FSRS was significantly associated with differences in the prevalence of certain morbidities, mortalities and disabilities. Thus, the developed FSRS could be of value to measure the family needs to health services.

Effect of SES on morbidities of the family

Inspite of the differences in the socioeconomic and demographic indicators used in different countries and in different studies, yet the results obtained are more or less concordant. Similar to our study, other studies on socioeconomic inequalities in morbidity problems from different countries observed an inverse relationship between SES and developing diseases of the CNS, GIT, genitourinary, rheumatism and arthritits (included in our definition of musculoskeletal disorders), respiratory diseases, anemia (included in our definition of blood diseases), while cancer was not associated with SES (Dalstra et al., 2005; Luby and Halder, 2008; Ngnie- Teta et al., 2009; Vukovic et al., 2008). Unlike our study, it was found that liver disorders and diabetes were inversely related with the SES; while heart disorders were directly associated with SES level (Connolly et al., 2000; Dalstra et al., 2005). For hypertension conflicting socioeconomic inequalities have been reported in literature (Bovet et al., 2002; Connolly et al., 2000; Vukovic et al., 2008).

In general, the current study showed that the reported prevalence of morbidities among the studied families was associated with higher FSRS that is, lower SES. A prospective study conducted in Germany also showed that low SES as measured by educational attainment was associated with higher prevalence of multimorbidity (Nagel et al., 2008).

Effect of SES on mortalities in the family

Our study showed that the overall mortality had a significant direct association with the FSRS. This in accordance with the findings obtained from a study conducted in Sweden. The SES as assessed by different occupational categories was inversely associated with both overall and cause-specific mortalities among men and women in age groups 30 - 60 years (Weires et al., 2008). The same findings were also detected in a study conducted in the US where an inverse association was detected between income and mortality among individuals 18 - 65 years of age controlling for age, race/ethnicity, marital status, level of educational attainment and occupational category (Rehkopf et al., 2008).

We found that abortion and stillbirth had significant positive association with FSRS. A study in Sudan also showed that women with lower education had a 2.3 times higher risk having a perinatal mortality (including stillbirth and early neonatal death) than women with higher level of education (Hassan et al., 2009). An Egyptian study also found that illiterate women had double the risk to experience abortion compared to literate women ($p < 0.001$) (Yassin, 2000). In Canada, assessment of SES status was done by developing neighborhood income quintiles that were calculated based on household-size–adjusted “income per single person equivalent”, when adjusted to maternal education, it was found that significantly higher rates of stillbirth were observed among neighborhood income quintiles from the richest to the poorest ($p < 0.001$), while infant mortality was not significant (Luo et al., 2006). This is in accordance with our study; where infant mortality was not significantly associated with the FSRS.

Effect of SES on disabilities in the family

Prevalence of congenital disability among the studied families showed a significant direct association with FSRS. This is in accordance with the results obtained from a large multicentered case-control study conducted in the US that measured the association between SES and selected birth defects. The individual SES was measured by maternal and paternal education,

occupation, and household income. All individual SES measures were combined to create a household SES index. This study revealed consistently increased risks of neural tube defects, conotruncal heart defects, and orofacial clefts in association with household SES index (Yang et al., 2008).

Effect of SES on overall health status of the family

The SES used for the current study was assessed at the family level and not at the individual level and considered the family socio-demographic and health status to reflect the application of public health holistic approach for community health assessment. This holistic approach considers a range of health conditions (e.g. different chronic diseases), risk factors (e.g. smoking), and protective factors (e.g. education). The holistic approach considers the distribution of life stages within the community, social, economic and behavioral differences and profile of morbidity and mortality. It was found that organized holistic approaches improve efficiency by programs within the community to leverage each other's strengths or by allowing programmatic activities to address multiple related outcomes (e.g. reduced level of smoking results in reduction in diabetes complications and coronary heart diseases). Holistic approach which involves all of the stakeholders is more likely to be accepted by the target population (Wallace, 2008).

Different studies selected a variety of single or combined indicators for the assessment of SES such as education (Dalstra et al., 2005; Hassan et al.,2009; Luby and Halder, 2008; Nagel et al., 2008; Ngnie-Teta et al., 2009; Vukovic et al., 2008; Yang et al., 2008; Yassin, 2000) , occupation (Bovet et al., 2002; Weires et al., 2008; Yang et al., 2008), crowding index (Luby and Halder, 2008; Vukovic et al., 2008), economic wealth as measured by income (Luo et al., 2006; Rehkopf et al., 2008; Yang et al., 2008), material used for housing construction, type of drinking water source and sanitation facilities, fuel used for heating and ownership of specific durable goods (Luby and Halder, 2008; Ngnie-Teta et al., 2009; Vukovic et al., 2008) . The current study included education, working for cash and crowding index, but not the economic wealth of the family in calculation of the FSRS and assessment of the family's SES. In fact, it was considered that income is the weakest measure and it was suggested that families have to be considered as "poor" on the basis of capability (or human development) not income poverty (Puri et al., 2007). Therefore, the current study added different dimensions to assess the families' SES and to consider families as "priority/at-risk families" such as families headed by women, vulnerable age and sex family members, smoking and addiction. The triggering move towards adding those dimensions were the findings derived from the human development report where Egypt ranked the 119th among the 177 countries in the Human Development Index (HDI), but it ranked the 55th in the Human Poverty Index (Human Development Report, 2005). This situation indicated that Egypt has a relatively good position/rank in the poverty index, but has unfavorable position in the HDI. Thus, the relatively high economic status is not invested and is not coupled with improvement in health and education status. The calculated FSRS in the current study was considered as a pivotal index to assess health inequity in selected Egyptian community. It was used as independent variable to determine the level at which the family becomes more susceptible to morbidities, disabilities and mortalities. Accordingly, it was found that health problems started to be significantly associated with the fifth FSRS quintile. The Egyptian Ministry of Health and Population (MOHP) Health sector reform declared that the percentage of exempted families should not exceed 15 - 20% of the families served by each Family Health Unit (MOHP, 2004a; MOHP, 2004b). Such decisions are based on declaration that 20.1% of the Egyptian families were below the poverty line (Egypt Human Development Report, 2003). The FSRS provided by our study succeeded to identify 784/5398 families which represent about 15% of the studied population who are at particularly higher risk of health problems. These families would be introduced to the health authorities as families who deserve special health care and exemption from fee-for health services in the studied community.

The calculated FSRS is community-specific that is, it is considered to have no value if measured for a family without being applied to the specific community where this family is hosted to determine the risk line at/and above which families are considered at risk. Therefore, the identified risk line would differ from one community to another and could not be developed or predicted in any community except after data collection and statistical analysis that ends in identifying the "at-risk families" which have a significantly higher risk of health problems than the reference group in the same community. This approach could thus be described as a "diagnostic tool" and used by health programs involved in equity in health care. This approach would have several advantages.

First, the collected data are objective data and there is a room to add other variables to the score as for example rural residence, child involvement in the labor force etc according to the structure and culture of the target community.

Second, it could be used in a sample of household in a specific community to calculate the FSRS and determine the cutoff point/risk line above which the family is considered a priority at risk family. Afterwards, it could be used as an integral part of the health system for a specific community, where data have to be collected on 12 variables only to make a decision of categorizing the family as "priority/at-risk" or not. Therefore, it facilitates coverage of large communities in a short time and at a

lower cost.

LIMITATIONS OF THE STUDY

We relied on reports of the interviewed family member about the presence of mortalities, disabilities and morbidities that were diagnosed on seeking medical advice only. Thus silent or undiagnosed morbidities or disabilities would not be counted. Recall bias might also play a role in under-reporting of the health problems.

CONCLUSION AND RECOMMENDATION

In conclusion, the present study is considered one of the equity-oriented/ family-oriented community-based researches with holistic approach to health and its determinants. The study provided the FSRS as a community-specific diagnostic tool that guide policy makers to categorize families as being at-risk or not, to make evidence based decisions. In the studied community, the FSRS score “7” was considered the “family socio- demographic risk line”, at and above which families were at significant risk of developing health problems. Thus, we found that 15% of the families in the studied community are at particular risk of health problems and deserve special health service intervention and exemp-tion from fee-for health services. Organizations involved in holistic approach in health care e.g. the MOHP, Ministry of Solidarity, Ministry of Family and Population, NGOs and Local Councils at the district level and others could effectively benefit from this study to initiate the process of community health analysis and risk-communication.

REFERENCES

Bovet P, Ross AG, Gervasoni JP, Mkamba M, Mtasiwa DM, Lengeler C, Whiting D, Paccaud F (2002). Distribution of blood pressure, body mass index and smoking habits in the urban population of Dar es Salaam, Tanzania, and associations with socioeconomic status. Int. J. Epidemiol., 31: 240-247.

Connolly V, Unwin N, Sherriff P, Bilous R, Kelly W (2000). Diabetes prevalence and socioeconomic status: a population based study showing increased prevalence of type 2 diabetes mellitus in deprived areas. J. Epidemiol. Community Health, 54: 173-177.

Dalstra JA, Kunst AE, Borrell C, Breeze E, Cambois E, Costa G, Geurts JJ, Lahelma E, Van Oyen H, Rasmussen NK, Regidor E, Spadea T, Mackenbach JP (2005). Socioeconomic differences in the prevalence of common chronic diseases: an overview of eight European countries. Int. J. Epidemiol., 34: 316-326.

Daly MC, Duncan GJ, McDonough P, Williams DR (2002). Optimal indicators of socio-economic status for health research. Am. J. Public Health, 92: 1151-1157.

Egypt Human Development Report (2003). United Nations Development Program, Institute of National Planning. pp. 50, 37.

Hassan AA, Abubaker MS, Radi EA, Adam I (2009). Education, prenatal care, and poor perinatal outcome in Khartoum, Sudan. Int. J. Gynaecol. Obstet., 105: 66-67.

Human Development Report (2005). International cooperation at a crossroads Aid, trade and security in an unequal world. pp. 225, 229.

Luby SP, Halder AK (2008). Associations among handwashing indicators, wealth, and symptoms of childhood respiratory illness in urban Bangladesh. Trop. Med. Int. Health, 13: 835-844.

Luo ZC, Wilkins R, Kramer MS (2006). Effect of neighbourhood income and maternal education on birth outcomes: a population-based study. CmajCMAJ., 174: 1415-1420.

Ministry of Health and Population (MOHP) (2004a), Family Health Fund and Contracting Strategy: Family Health Facility Implementation Manual: Central Department for Technical Support and Projects.

Ministry of Health and Population (MOHP) (2004b), Public-Private Partnership: Summary and outlines: Sector of Technical Support and Projects. 3: 15-25.

Nagel G, Peter R, Braig S, Hermann S, Rohrmann S, Linseisen J (2008). The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort. BMC Public Health, 8: 384.

Ngnie-Teta I, Kuate-Defo B, Receveur O (2009). Multilevel modelling of sociodemographic predictors of various levels of anaemia among women in Mali. Public Health Nutr., 12: 1462-1469.

Puri J, Gaye A, Kurukulasuriya S, Scott T (2007). Measuring Human Development - A Primer, 2: 33-76.

Rehkopf DH, Berkman LF, Coull B, Krieger N (2008). The non-linear risk of mortality by income level in a healthy population: US National Health and Nutrition Examination Survey mortality follow-up cohort, 1988-2001. BMC Public Health, 8: 383.

Vukovic D, Bjegovic V, Vukovic G (2008). Prevalence of chronic diseases according to socioeconomic status measured by wealth index: health survey in Serbia. Croat. Med. J., 49: 832-841.

Wagstaff A (2002). Poverty and health sector inequalities. Bull. World Health Organ., 80: 97-105.

Wallace RB (2008). Maxcy-Rosenau-Last Public Health and Preventive Medicine (15th ed.): McGraw-Hill Incorporated.

Weires M, Bermejo JL, Sundquist K, Sundquist J, Hemminki K (2008). Socio-economic status and overall and cause-specific mortality in Sweden. BMC Public Health, 8: 340.

Yang J, Carmichael SL, Canfield M, Song J, Shaw GM (2008). Socioeconomic status in relation to selected birth defects in a large multicentered US case-control study. Am. J. Epidemiol., 167: 145-154.

Yassin KM (2000). Incidence and socioeconomic determinants of abortion in rural Upper Egypt. Public Health, 114: 269-272.