



## **Poverty Trends in Health and Nutrition Expenditures in Tehran Households during 1984 -2014: A Cohort Approach**

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### **ABSTRACT**

**Background:** Health and nutrition are important aspects in the analysis of households' multidimensional poverty. The present research investigated poverty in Tehran's households through a cohort approach. In this regard, households' financial participation about health costs and food intake calories were analyzed.

**Methods:** Households' data of costs – income survey were then collected. Health and nutrition poverty trend was investigated through generational approach, index of poverty "Foster, Greer, Turbak", and in the period of 1984-2014 by dividing Tehrani families into eight various age groups. Excell and Stata<sub>11</sub> were applied to process and calculate the indices.

**Results:** During the study years, the highest level of health poverty (29%) in 1999 was in age range of 21-26 and the highest level of nutrition poverty in 1984 (65%) was in age range of 42-46. There has been an ascending trend of health and nutrition poverty at the end of the Fourth Development Plan (2009) up to 2013 for all age groups.

**Conclusion:** Generally, rate and severity of health and nutrition poverty had many fluctuations among different age groups of Tehrani households' heads. This rate has raised during recent years which indicates lack of stable and coherent social policies to reduce households' exposures with catastrophic health care costs and funding of the food aid needs.

**Keywords:** Health Poverty, Nutrition Poverty, Generational Approach, FGT Index

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## Introduction

The development of poverty conceptual thinking based on the functions and capabilities is highly influential in evolution of other human poverty indices. Meanwhile, nutrition and health are important aspects in analysis of poverty from multidimensional point of view (1). Food deprivation has more acute effects in children (because of the vulnerability caused by age and children attachment) than adults (2). Since childhood is a short-term stage and is very influential in whole periods of life, all unfavorable conditions in this period is associated with negative long-term consequences (3). Nowadays, health and nutrition poverty has attracted much attention.

The analysis of household financial participation in health system can be considered as an indicator of poverty in financing the health costs called "health causing poverty costs" or "lack of health" in different researches (4,5). The analysis of household financial participation in health system can be carried out in two approaches: income approach and financial approach. In income approach, change in distribution of income will be checked by household payments for health systems. In the second approach, health payments will be checked in terms of its effects or distressing experiences on households (such as, calculation of the Fairness in Financial Contribution index and percentage of households facing with catastrophic costs) (6). Catastrophic cost ratio is the share of health payments from the total household budget. But a part of household expenditure is related to basic items such as food prices. In some households, these costs constitute a large amount, so that a small share remains to other costs such as health costs. Hence, in defining catastrophic expenditures, the share allocated to health costs is considered from net costs and basic needs' costs. Net costs from basic costs are interpreted as the capacity to pay. In the case of using capacity to pay, the main problem is to define basic costs which are usually considered as food costs. Although there are other essential needs, but non-food costs can distinguishes between different

deciles better (7,8). Catastrophic health expenditure happens when payment for health services exceeds a certain threshold household finances. So, health costs of a household will be onerous if these costs are over than 40 % of households remained income, after meeting the basic needs. The remaining income of a household after meeting the basic needs is known as the capacity of payment.

Ki Zhu et al. (9), studied catastrophic costs in some countries and analyzed variables of interest effecting catastrophic health care costs using linear regression. The results showed that catastrophic payments have wide range of shares among countries, developing countries and South America had the highest percentage of households facing with catastrophic costs. Hassan Zadeh et al. (10), in a study showed that equity index of financial participation in 1995-2002 reflected an unfavorable situation in financial participation of households in the financing of health costs. They also reported that at least 2% of households fall annually into poverty due to payments for medical expenses. Lack of health has been investigated in various studies using household financial partnership approach as well as Foster, Greer, and Turbak indicator in countries of the world (11,12). On the other hand, poverty has a mutual relationship with health and nutrition is an important factor in determining the nature of relationship. Nutrition is an important aspect of well-being and affects it, especially in childhood. It is an important element for the growth and development of healthy adults. The results have shown a significant relationship between household nutritional expenses (inequality in cost of nutrition) and malnutrition. This issue reflects the importance of social and economic factors in the pattern of nutrient intake (13-15). Poverty of nutrition means inability in financing and access to proper nutrition basket in which both quantity and quality of food are important. According to World Health Organization standards, a healthy diet includes a balanced and nutritious diet to maintain good health (13). The household that fails to



provide the minimum resources to finance diet is known as having food poverty by WHO (16). According to this definition, there are indicators set by WHO for assessing poverty status (17). Of course, using each of these indices needs appropriate data and this important issue is often a constraint in developing countries. The WHO noted that Nutrition practices within the family affect the nutritional status directly (18). The amount of daily calories is a very important indicator of food poverty used in many studies (19-21). Reduction of individuals' share from health care costs and improvement of nutritional indicators' status in different levels of Iranian law has been confirmed. This confirmation was the first principal of 29, 43 and 48 of the constitution and article 38 and 34 of the Fifth Development Plan law of Islamic Republic of Iran (2011-2015) (22). According to the above mentioned issues, the present article intended to study poverty in two dimensions of health and nutrition in Tehran's households through a generational approach and analyze its trend from 1984 to 2014.

### Materials and Methods

The present process study investigated the poverty process of health and nutrition expenses during the years 1984-2014 using age cohorts within the household (using pseudo-panel data). Pseudo-panel data means those data collected in the form of "repeated cross-sectional" in which a certain group people are not followed contrary to the panel data (23). Statistical population of this study included households living in cities (urban and rural) of Tehran. The sample consisted of heads of Tehrani households (in eight age groups) and their information was collected by the Statistical Center of Iran (cost-income of households plan). Income-cost survey of households by Statistical Center of Iran provides the data necessary for studying the behavior of consumers and calculation of poverty indices and income distribution. In this study, households' heads were categorized into eight age groups that covered ages of 20 to 60 years. Participants were selected in the initial year of Iran's development

plans and were followed to the last year. Then, the trend of health and nutrition poverty in Tehrani households was investigated by using micro data of the Statistical Center of Iran (survey of cost – income of the household). The age groups consisted of: 21-26, 27-31, 32-36, 37-41, 42-46, 47-51, 52-56, and 57-61 years old. These groups were then followed in terms of health and nutrition poverty from the year of family heads' entrance to the study. For example, households' heads who entered the study in the age range of 21-26 years in 1984, were 27-31 years in 1989 (i. e., five years later) and thus will be excluded from the study at 52-56 years old. Other age groups were enrolled on the same basis from other years and the situation of their poverty of health and nutrition was followed during the study years.

Method of index calculation was in such a way that after identifying the Heads of Tehrani households (by using the codes related to the family heads), their data of health costs was broken down. Then, by defining the threshold proposed by WHO (poverty line of health was estimated based on threshold of 0.4 of health cost ratio to the household capacity to pay (9)) the indicators of health poverty were estimated. In order to calculate the food poverty, Tehrani households were separated and their food expenditure information was extracted by using micro-data of "household food expenditure information" including products' code as well as their quantity and values. Later, by defining the threshold (the nutrition poverty line based on the required calorie based on the age-gender ratio) the indices of census, gap, and poverty severity of nutrition were estimated.

In this study, a set of FGT (Foster, Greer, and Turbak) indices were used to show the amount, gap, and severity of poverty in Tehrani households' health. This index measures all metrics of poverty, poverty gap, and square of poverty gap (severity of poverty). The general formula of this group of poverty indices depends on parameter  $\alpha$  that represents degree of poverty hatred. The poverty census ratio index indicates distribution of households experiencing health poverty in the community. But, it is unable to



express the depth of poverty at the community level. Index of poverty gap ratio, in contrast to the census ratio index is completely insensitive to the percentage of poor households and does not have any comment in this case but expresses the depth of poverty at the community level. However, poverty gap considers the distance of the poor people from the poverty line, the square of poverty gap (severity of poverty) calculates the square of this distance. In this way, more weight is given to the poor that their poverty is more (24). Eventually, indices were processed and analyzed by Excell and Stata<sub>11</sub> Software. Also, this research was confirmed by the Research Ethics Committee of Welfare and Rehabilitation Sciences University with the ethics Code No. 29249.

### Results

In order to avoid too many tables and charts, the 21-26 year-old age group was examined in terms of poverty of health and nutrition from 1984 to 2014. Then, process of health poverty indices for different age groups were compared. The following table and graph show the situation of health poverty indices in the 21-26 age group from their entrance until exclusion.

As it is shown in Table 1, indices of poverty in households aged from 21 to 26 years in 1984 had fluctuations in comparison to 52-56 age group in 2014. The census (rate) of health poverty in 1984 that the 21-26 age group entered the study was 0.18 (i.e., 18% of households in this age group have been involved with health poverty) and this rate in 2014, when the mentioned age group were in the age range of 52-56 years, was reduced to

0.08 (with fluctuations). Food poverty index in this age group was associated with fluctuations; it especially was rising in the recent period (the years leading up to 2014 and reaching this age group to older age).

As noted above, gap and severity of poverty indices showed percentage of households' depth and severity from poverty line. Another application of pseudo-panel data approach is to investigate the effects of a specific age group around occurrence of the desired index (in this case it is poverty of health and nutrition) in different years.

Tables 2 and 3 respectively show the trend of health and nutrition poverty in different age groups within the study period.

As Table 2 indicates, health poverty rates had fluctuations in different age groups and this rate was rising for all age groups in the period leading up to 2014. Through the years of study, the year 1999 had the highest rate of health poverty (29%) in group age of 21-26 and 31-37 age group (20%). Another trend clear within indicators is the difference of indicators' trend in the years of development programs.

According to Table 3, year 1984 had the highest rate of nutrition poverty among the age groups of 42-46 (65%) and 47-51 (63%) during the years of study. In 1984, apart from age group of 21-26 with the poverty rate of 44%, the rest of age groups of this year had higher poverty rates compared with age groups of other years. Further, poverty rate of nutrition in younger age groups was higher than other groups in the recent period.



**Table 1.** Poverty, health, and nutrition indices' follow-up in the age group of 21-26 years, Tehran Province (1984-2014)

Age group	Health			Nutrition		
	$P_0$	$P_1$	$P_2$	$P_0$	$P_1$	$P_2$
(21-26 Age group) 1984	0.18	0.4	0.49	0.44	0.05	0.03
( 27-31 Age group) 1989	0.10	0.26	0.34	0.50	0.24	0.15
(32-36 Age group) 1994	0.13	0.32	0.41	0.38	0.15	0.08
(37-41 Age group) 1999	0.17	0.4	0.5	0.53	0.08	0.03
(42-46 Age group) 2004	0.10	0.25	0.32	0.23	0.06	0.02
(47-51 Age group) 2009	0.07	0.3	0.2	0.34	0.10	0.04
( 52-56 Age group) 2014	0.08	0.18	0.30	0.36	0.10	0.03

**Table 2.** The trend of health poverty rates in different age groups (1984-2014)

Health poverty rates in Tehran within the different age groups							
Year Poverty rate	1984	1989	1994	1999	2004	2009	2014
21-26 Age group	0.18	0.09	0.16	0.29	0.10	0.05	0.19
27-31 Age group	0.15	0.10	0.14	0.20	0.18	0.10	0.13
32-36 Age group	0.14	0.12	0.13	0.16	0.14	0.09	0.11
37-41 Age group	0.13	0.12	0.13	0.17	0.13	0.10	0.13
42-46 Age group	0.12	0.11	0.13	0.16	0.10	0.05	0.09
47-51 Age group	0.12	0.12	0.13	0.16	0.10	0.07	0.08
52-56 Age group	0.16	0.14	0.14	0.17	0.15	0.06	0.08
57-61 Age group	0.18	0.13	0.12	0.17	0.11	0.07	0.09

**Table 3.** The trend of nutrition poverty rate in different age groups of family heads (1984-2014)

Nutrition poverty rate in Tehran province during different years of study							
Year Poverty rate	1984	1989	1994	1999	2004	2009	2014
21-26 Age group	0.44	0.58	0.30	0.57	0.27	0.44	0.56
27-31 Age group	0.61	0.50	0.33	0.59	0.27	0.30	0.33
32-36 Age group	0.61	0.44	0.38	0.53	0.25	0.27	0.33
37-41 Age group	0.60	0.46	0.44	0.53	0.20	0.26	0.29
42-46 Age group	0.65	0.46	0.46	0.45	0.23	0.40	0.44
47-51 Age group	0.63	0.52	0.51	0.54	0.20	0.34	0.54
52-56 Age group	0.61	0.50	0.33	0.59	0.27	0.30	0.33
57-61 Age group	0.61	0.44	0.38	0.53	0.25	0.27	0.33

### Discussion

The results showed that the rate of health and nutrition has fluctuations in different age groups and its rate also has been high during the study. To make a more detailed analysis on the basis of different age groups of family heads under the study, this must be mentioned that during the imposed war (in 1988-1984 of this study period), generally health and nutrition trend of poverty rate has been decreasing in the age groups. It seems that because of the special political and economic circumstances prevailing in the country, people's

preference has tended to cheaper health services such as Primary Health Services (PHC) (compared with more expensive services). In this period, the rate of nutrition and health poverty has been related to older groups of family heads (52-56 and 57-61). This represents that these age groups were restricted in providing their health costs due to some factors such as more health problems during this period and lack of hospitalization and treatment costs' coverage.

During the first and second development plans (1999-1984) an increase in health poverty rate of



Tehrani households was observed among most age groups. But nutrition poverty index was associated with large fluctuations. To explain these fluctuations, it can be noted that during these years, government policies in the field of households' health compared with other policy areas did not have stability. It can be explained that because of applying structural adjustment policies, government policies in the field of households' health and nutrition did not have much stability in comparison with other fields' policies and government's policies were made mostly on issues of the day rather than being influenced by strategic planning and in line with long-term prospects. Among the studied years, year 1999 (implementation period of the Second Development Plan) has allocated the highest health and nutrition poverty rate to itself among the age groups. According to economic provisions and policies of this period, average inflation of health sector has always been more than the whole country's inflation (25). The steepest rise in prices of goods and health care services has been related to the first and second development programs while the main reasons can be reduction of subsidies, relative release of exchange rate, and rotation in economic policymaking (26). Findings of this research, also confirmed this issue. In a study conducted by Razavi et al. (27), it was reported that justice indices in financing of health costs had an unfavorable and growing trend during the second development and early third development program. During this period, at least 2% of households have fallen into poverty every year because of paying for catastrophic medical expenses.

According to the results of the current study, health and nutrition poverty of Tehrani households during the third development plan (1999-1994) have been decreased. In the fifth season of the Third Development Plan (Social Security system and subsidies) the following items are mentioned: supporting the prevention from non-insurance sections, rehabilitation and support for the poor, and providing special services in health and nutrition programs for the needy people (28). It has

been indicated in some studies (29) that poverty rate and severity have decreased in basic goods, such as health during the years 1992-2007 and within the Third Development Planning period among Iranian households. In another study (30) conducted during the years of the Third Development Plan, the share of food expenditure to total expenditure ratio of rural and urban families has been mainly declining. During the Fourth Plan (2009-2014) despite that the national important document of "food and nutrition security" was approved in the first year of implementation of the program, the high indices and their raising trends in urban and rural areas in different age groups showed that this document and its provisions have not been implemented completely in practice. In other words, nutritional security programs during the year of implementation of the Fourth Development Plan didn't have any effect on reducing the rate of households' nutrition poverty.

### Conclusion

Rate of health and nutrition poverty has increased in all age groups at the end of Fourth Development Plan and the first two years of the Fifth Development Plan (2009-2013). Given that the Fifth Development Plan is one of the most comprehensive programs that has been approved in the field of health and nutrition and the fact that it contains some issues such as tolls' tax on health, realization of treatment costs from people's pocket up to 30 %, and spending 10 % of government revenues from subsidies, but practically this study showed that much greater loads have been incurred on families in health and nutrition costs and legal provisions of this program were not implemented well at least in the first two years. Maybe, another reason for increasing rate of health poverty in this period can be explained by the increasing trend of poverty in the area of families' nutrition status. According to Table 3, nutrition poverty rate in Tehrani families was rising at the end of the fourth development program and beginning of the fifth one which is along with the rising trend of health poverty in this period. This can show the



importance of nutrition as an effective good in survival and also improvement of families' health levels. Meanwhile, highness of these costs can indicate existence of cost restrictions in families to pay attention to other needs. Allocation of this amount of share to feeding and nutrition from the households' consumption expenses will lead to neglect of other household needs, such as recreation and training. Both of these two items are effective on the level of household health and can increase the poverty caused by health costs.

Advantages of this study included using a generational approach and calculating the depth of health and nutrition poverty in households of Tehran. However, data deficiencies, especially in the early years of the study indicated a limitation so that made data processing hard in these years. According to the results of the research as a package of interventions and policy entry points, it is recommended to cover expensive health services, especially for excluded and under the poverty line groups. Paying special attention to households' health and welfare, particularly in housing and feeding (to meet basic needs and ease the burden of catastrophic health care costs) can reform the plan. Targeting subsidies in the form of nutrition and health services, especially for young families and young population, institutionalization of nutritional security and fight malnutrition in

schools, consulting parents at health centers regarding feeding patterns on the correct style, and finally continuous monitoring of the new healthcare also can improve the plan to enhance the equitable provision of financial equity index of household health. It is also suggested to calculate poverty trends regarding household's characteristics (such as: occupation, family size, and vulnerability to poverty) in future studies and attempt to provide specific policy packages for each case according to the results.

#### **Conflicts of interest**

The authors declare that they have no conflict of interest.

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#### **Authors' contributions**

Sharifian Sani M designed research; Nosratabadi M and Vameghi M conducted research; Sharifian Sani M, Vameghi M and Nosratabadi M analyzed data; and Amini Rarani M and Nosratabadi M wrote the paper. Sharifian Sani M had primary responsibility for final content. All authors read and approved the final manuscript.

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