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A Study on the Effect of Degree of Urbanization on Medical Expenditure using Regression Analysis

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Abstract

Along with the civilization, people start to pay attention to the maintenance of the quality of life. The changing population age distribution stresses on improving humans' quality of life through good interaction between people and society. The degree of urbanization is accelerating along with the changing era. Since medical resources are easily concentrated on areas with highly socioeconomic development and dense population, areas with low socioeconomic development are often lack of medical resources. Such unfair medical resource allocation would further influence the health of residents in such areas with inadequate medical resources. The public statistics provided by Shanghai Municipal Government are the sample sources for this study. According to the degree of urbanization and the medical expenditure in various areas announced by the government, the research results are concluded as followings. 1. Degree of urbanization presents significantly positive effects on "general administrative expenditure" in medical expenditure. 2. Degree of urbanization shows remarkably positive effects on "public health expenditure" in medical expenditure. 3. Degree of urbanization reveals notably positive effects on "personal medical expenditure" in medical expenditure. 4. Degree of urbanization appears significantly positive effects on "medical supplies expenditure" in medical expenditure. According to the results, suggestions are proposed to establish reasonable systems and improve medical resource allocation to diminish health inequalities as well as provide important directions for improving medical expenditure policies.

Keywords: degree of urbanization, medical expenditure, medical resources

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INTRODUCTION

Because of engaging in various behaviors to result in uncomfortable feelings, humans start to appear the concept of health. The provision of solutions for pains opens the medical concept. Since the development of the prototype of medical awareness, the descriptions of health problems and illnesses have opened the development of medicine. Along with the civilization, the division of labor in medical care, nursing, and care becomes finer. People extend the life with medical care, release discomfort and pain with nursing, and maintain the quality of life and dignity through care. Nevertheless, medicine, regardless the constant progress, still encounters restrictions and bottleneck, e.g. dementia and cancers. People nowadays do not blindly pursue the enhancement of life expectancy, but pay attention to the maintenance of the quality of life. The changing population age distribution also changes the living arrangement of aged population. In comparison with domestic current conditions, aging does not simply stand for increasing number and rate of the elderly population. The continuous growth of life expectancy result in high probability to become the elderly, and the extending time for being the elderly also enhances the medical expenditure for the elderly. The results of "person in situation" and "person in environment" are generally emphasized in Chinese society, stressing on improving humans' quality of life by enhancing good interaction between people and society to develop people's social function. Environment is so important to humans, while people seem to get used to and forget the fact that humans have been living in cities for long and seldom think of the change of cities with the time. The accelerating degree of urbanization might cause distinct effects on people, e.g. effects on population distribution and effects on needs for medical care. Industrial society results in more serious problems in health, pollution, environmental protection, and ecology. WHO promotes the idea of healthy cities, expecting to have cities, under the negative effects of dense population on nervous life and

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environmental pollution, develop toward health and LOHAS. It implies the idea of "healthy city" to promote health. Nonetheless, the effect of health promotion is not simply to individuals; correct concepts and policy promotion could connect national consensus. Good health promotion could delay disability and degradation and avoid the inconvenience and low quality of life caused by sudden disability. That is, it is possible to recover the self-care ability of people with mild disability, without early intervention of long-term care. Medical resources are likely to concentrate on areas with highly socioeconomic development and dense population that areas with low socioeconomic development often encounter the shortage of medical resources. Unfair medical resource allocation would further influence the health of residents in areas with inadequate medical resources. Aiming at the effect of degree of urbanization on medical expenditure, this study expects to establish reasonable systems and improve medical resource allocation to diminish health inequalities as well as provide important directions for improving medical expenditure policies.

LITERATURE REVIEW

Degree of Urbanization

Degree of urbanization refers to the ratio of urban population in total population in a society. Lin et al. (2017) indicated that it was necessary to calculate the numbers of total population and urban population before calculating the degree of urbanization of a society. The calculation of urban population could be calculated after defining which population settlement was a city (Bade and Silvestri 2016). Urban and rural are relative ideas. Generally speaking, urban settlements appear higher population, population density, and more complicated socioeconomic functions than rural settlements. Although the idea seems to be easily discriminated, it is an important issue to divide urban and rural areas (Sutradhar et al. 2017). Cheung et al. (2015) explained urbanization as the continuous increase of urban population in an area or a nation. There is about three billion population living in cities that is about a half of total population in the world (Davis et al. 2016). In other words, urbanization is the uneven distribution of population in a space caused by population largely concentrating on cities. Chiang and Kao (2016) divided space in an area into settlement, urbanized area and metropolitan region (Hui et al. 2014), where settlement was defined with population density and basic public facilities and services, while urbanized area was constructed based on settlements. Wang et al. (2016) indicated that cities and towns were the basic spatial units in metropolitan region, and population size and demographic characteristics were taken into account of population. Population density was not the major consideration. The interactive relationship between spatial units was also considered, and work commute was regarded as the indicator.

Referring to Chiang et al. (2017), the variables of population density (persons/square kilometer), ratio of population with the educational standard above colleges, ratio of population aged above 65, agricultural population ratio, and number of Chinese traditional medicine and western medicine per hundred thousand people are used in this study for divided areas into "high urbanization", "emerging town", "general city center", "aging town", "agricultural town", and "remote township".

Medical Expenditure

Le et al. (2014) pointed out medical expenditure as the ratio of all expenses on medical treatment, health food and medicine, and assistive devices of crutches and hearing aids (National Health Expenditure) in gross domestic product. Chen and Cheng (2016) regarded medical expenditure as various health-related final budgets, covering health administration, epidemic prevention, health care, medical administration, pharmacy administration, food, environmental health, sanitation inspection, sanitary building and equipment, coordinating subject, and social welfare fund of health units. Kelly and Smith (2014) included public health expenditure, health administrative expenditure, and personal health expenditure in the statistics of medical expenditure, where personal health expenditure contained the outpatient of Chinese traditional medicine, western medicine, and dental clinic, the medical care expenditure of psychiatry, chronic diseases, long-term care institutions, and other professional institutions, traditional medical expenditure, expenses of the public self-purchasing drugs, health care supplies, medical equipment and facilities, as well as investment in medical care institutions. Medical expenses present certain correlations with medical utilization (Choi et al. 2015). Lo-Ciganic et al. (2016) indicated that many factors in inducing patients' visit to hospitals would increase medical expenditure. Factors in rising health expenditure include population growth and aging, economic development, health insurance system, medical technology development (medical technology, drugs, instrument and equipment, disposal), seeking care at higher level health care institutions without

referral, GDP, income, ratio of insured population, and medical relative prices (Morishima et al. 2014).

Referring to Huang et al. (2017), the following research variables are contained in this study for medical expenditure.

(1) General administrative expenditure: general administrative expenses of governments at all levels and non-profit groups (e.g. administrative management and business management).

(2) Public health expenditure: expenses of governmental health care units – general administration.

(3) Personal medical expenditure: hospital outpatient, hospitalization benefits, family-paid hospitalization, and expenditure for giving birth.

(4) Medical supplies expenditure: medical payment and family-paid expenses of drug dealers and pharmacies.

Research Hypothesis

Wang et al. (2016) indicated that medical resources were easily concentrated on socioeconomically developed and dense-population areas with high degree of urbanization that areas with low socioeconomic development often encountered medical expenditure shortage. Chiang et al. (2015) proposed that unfair medical resource allocation would further affect the health of residents in such areas with inadequate medical resources. Cheung et al. (2015) stated that most residents in rural and remote areas in the world appeared worse health conditions and required larger medical care, because of the restrictions of space and non-space medical accessibility, as well as larger amount of medical expenditure. Chiang and Kao (2016) mentioned that large population concentrating on cities and high population flow rate resulted in difficulties in the tracking of preventive health care. Lin et al. (2017) pointed out the worsening of environmental pollution problems, e.g. air pollution, noise, sewage, and garbage, caused by rapid urbanization and industrialization. The more democratic politics and popularity of the thought of human rights have more people regard the acquisition of health care service as a fundamental human right and ask for the popularity of health care service. It therefore results in higher medical expenditure in areas with higher degree of urbanization to cause urban/rural medical resource differences. Chiang et al. (2017) indicated that medical utilization in central, southern, and eastern areas was higher than it in northern areas, possibly because people in northern areas, although with higher degree of urbanization, seldom used medical resources due to busy work. Huang et al. (2017) indicated that, with logarithmic regression, people living in non-urban areas appeared 1.32 times higher hospitalization rate than those living in urban areas. With linear regression, residents in non-urban areas showed 1.08 times of western medicine utilization than those in urban areas, after controlling other variables. Accordingly, the following hypotheses are proposed in this study.

H1: Degree of urbanization presents remarkably positive effects on "general administrative expenditure" in medical expenditure.

H2: Degree of urbanization shows notably positive effects on "public health expenditure" in medical expenditure.

H3: Degree of urbanization reveals significantly positive effects on "personal medical expenditure" in medical expenditure.

H4: Degree of urbanization appears remarkably positive effects on "medical supplies expenditure" in medical expenditure.

RESEARCH METHOD

Research Sample

The public statistics of degree of urbanization and medical expenditure provided by Shanghai Municipal Government are used as the sample source of this study.

Analysis Method

The retrieved questionnaire is analyzed with SPSS, and Regression Analysis is applied to understand the relationship between degree of urbanization and medical expenditure and test various hypotheses.

RESEARCH RESULT AND ANALYSIS

Correlation Analysis of Degree of Urbanization and Medical Expenditure

To test H1 with Regression Analysis, **Table 1**, the analysis results reveal notable effects of high urbanization ($\beta=2.316$, $p=0.000$), emerging town ($\beta=2.043$, $p=0.004$), general city center ($\beta=1.923$, $p=0.012$), aging town ($\beta=1.586$, $p=0.046$), agricultural town ($\beta=1.962$, $p=0.015$), and remote township ($\beta=1.835$, , $p=0.028$) on general administrative expenditure in medical expenditure that H1 is supported.

Table 1. Regression Analysis of degree of urbanization and medical expenditure

dependent variable →	medical expenditure							
independent variable ↓	general administrative expenditure		public health expenditure		personal medical expenditure		medical supplies expenditure	
degree of urbanization	β	ρ	β	ρ	β	ρ	β	ρ
high urbanization	2.316**	0.000	2.511**	0.000	2.473**	0.000	2.615**	0.000
emerging town	2.043**	0.004	2.314**	0.000	2.255**	0.000	2.427**	0.000
general city center	1.923*	0.012	2.166**	0.000	2.224**	0.000	2.155**	0.000
aging town	1.586*	0.046	2.231**	0.000	2.163**	0.000	2.285**	0.000
agricultural town	1.962*	0.015	1.677*	0.038	2.542**	0.000	2.077**	0.000
remote township	1.835*	0.028	1.546*	0.046	2.633**	0.000	2.322**	0.000
F	16.438		21.752		24.633		27.135	
significance	0.000***		0.000***		0.000***		0.000***	
R2	0.163		0.214		0.251		0.282	
adjusted R2	0.141		0.173		0.216		0.237	

Note: * stands for $p<0.05$, ** for $p<0.01$.
Data source: self-organized in this study

Correlation Analysis of Degree of Urbanization and Public Health Expenditure in Medical Expenditure

Using Regression Analysis for testing H2, **Table 1**, the analysis results appear significant effects of high urbanization (β=2.511, p=0.000), emerging town (β=2.314, p=0.000), general city center (β=2.166, p=0.000), aging town (β=2.231, p=0.000), agricultural town (β=1.677, p=0.038), and remote township (β=1.546, p=0.046) on public health expenditure in medical expenditure that H2 is supported.

Correlation Analysis of Degree of Urbanization and Personal Medical Expenditure in Medical Expenditure

Applying Regression Analysis to test H3, **Table 1**, the analysis results present remarkable effects of high urbanization (β=2.473, p=0.000), emerging town (β=2.255, p=0.000), general city center (β=2.224, p=0.000), aging town(β=2.163, p=0.000), agricultural town (β=2.542, p=0.000), and remote township (β=2.633, p=0.000) on personal medical expenditure in medical expenditure that H3 is supported.

Correlation Analysis of Degree of Urbanization and Medical Supplies Expenditure in Medical Expenditure

To test H4 with Regression Analysis, **Table 1**, the analysis results show notable effects of high urbanization (β=2.615, p=0.000), emerging town (β=2.427, p=0.000), general city center (β=2.155, p=0.000), aging town (β=2.285, p=0.000), agricultural town (β=2.077, p=0.000), and remote township (β=2.322, p=0.000) on medical supplies expenditure in medical expenditure that H4 is supported.

CONCLUSION

The research results, **Table 1**, explain the higher degree of urbanization, the higher medical expenditure. Rapid urban development facilitates employment population. However, the concentration of population on cities results in uneven resource allocation and inconvenient transmission of resource information. When people require more professional integration and various resources for services, the acceleration of aging and low birth rate would more significantly enhance medical expenditure. A lot of medical services appear uneven resource transmission due to urban-rural differences. To cope with the needs, the authorities should allot the resources distribution and properly allocate resources according to need strength, rather than uniformly allocating services to various areas, as it would result in dissatisfied needs in cities but no-one using the services in remote townships. Nevertheless, the construction of medical service in medical expenditure should emphasize on the applicability, in addition to the cultivation of professional personnel, and utilize local resources for maximum integration to provide services.

SUGGESTION

Consequently, it is suggested in this study that

1. More indicators could be measured for the development or planning of medical policies, and reflection and revision could be proceeded aiming at current policies. The future policy evaluation could be analyzed and tracked aiming at the comparison of health results in order to effectively apply medical expenditure.

2. The standard to evaluate regions lack of primary medical care could be re-built through the viewpoints of experts, researchers, and interested parties. Besides, improvement programs could be rewarded for applications. Hospitals or clinics which have applied for mobile medical care services could be evaluated annually. Moreover, regions which can hardly acquire mobile medical supports could be enhanced the medical expenditure by going beyond the year to balance medical services in various areas.

3. Policy makers should flexibly define the standard according to regional requirements to adapt to local conditions. When planning improvement programs for medical expenditure and medical resources, space and non-space accessibility could be combined to define insufficient areas.

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