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The Study on the Influence of Living Conditions to Health

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Abstract—This paper has the access to the information of Chinese Family Panel Studies (CFPS) in 2016. It mainly studies how living conditions affect the residents' health, which means from two different aspects of personal housing conditions and community environment conditions respectively. Then it will be based on oprobit regression analysis of self-assessment health and mental health regression to conclude the physical health influence based on the probit regression analysis. It is found out that there are relationships between these elements. The government should take improving living conditions as one of the most significant measures to promote the health of the population and also paying more attention to the construction of human resident environment and improve the healthy development of urbanization.

Keywords—individual living conditions; community environment; health

I. INTRODUCTION

Along with the improvement of human living standards, residence conditions, as one of the important indicators to measure it, are also constantly improving and rising up. According to the national bureau of statistics, from 1978 to 2012, per capita residential area of urban residents has increased from 6.7 square meters to 32.9 square meters and that of rural residents from 8.1 square meters increased to 37.1 square meters,. From 2004 to 2014, the urban water usage rate has increased from 88.8% to 97.6%, and the urban gas penetration rate has increased from 81.5% to 94.6%. These statistics can partly reflect the improvement of people's residence conditions. However, too aggressive development, which only emphasizes the developing speed and ignores the quality will not only waste the resources, but also aggravate the contradiction between the urban and rural areas and cause a series of problems of human settlements.

China is in the period of rapid development of urbanization and industrialization, which has to face with the residence environment problems experienced in developed countries. If it does not pay attention to these problems, it will not only lead to the spread of diseases, but also result in housing isolation because of the huge urban-rural gap and wealth gap, then it continually comes up with severe social conflicts. The theory of human settlement environment is made up of five sub-systems, including nature, human, habitation, society and support. Among them, natural and human systems are the most basic elements, while habitation, society and support systems are additional human-controlled parts. The habitation and supporting system contain the living conditions of individuals and communities, while the human system contains the physical and mental health factors of humans. Therefore, residence conditions and health are two closely related factors within an organism body. To explore the impact of residence conditions on health is conducive to understanding how the positive housing factors and negative housing factors affect health. Therefore it will be able to provide effective suggestions for improving public policies that relate to the residence conditions.

II. LITERATURE REVIEW

In aspects of urbanization and industrialization, China has fell behind western countries and paid less attention to the residence conditions and the relevant research is comparatively less. The objects of this study is relatively single, mainly focus on the living conditions of the urban floating population. Urban floating population generally refers to the external population but stay in the current city, the most typical is the migrant workers group. Due to the transition of the living environment, the support from their family and society will greatly reduce. In addition to the limitation of the group itself, such as the low income, worse working environment and discrimination, etc., their physical and mental health is more vulnerable than urban resident population (Linwei Yu, 2016). [1] A survey based on the statistical information of Shanghai in 2008 respectively study the effect of individual residence and community living conditions to the health. The study found out that the influence that the floating population living conditions is inferior to the local residents but the health of their body and mind are better than local residents, which verifies that living conditions are an important factor affecting health, but different variables will result in the different direction and degree of the influence (Guixin Wang, Xiaoxin Su, Ming Wen, 2011). [2] Another study based on the research subject of migrant workers in Wuhan, it operated the empirical analysis on their rational choice of residence under the constraints of its high liquidity. It was thought that the living condition of the rural migrant workers in the city is affected by the willingness to stay in that city in turn, which means that the more they are willing to stay, they have more tendency to improve their residence conditions. On the contrary, those migrant families who only require a temporary residence are tending to keep their housing at the lowest level. Meanwhile, for migrant workers, housing is not only the general consumer goods that can meet their basic requirement for urban life but also the property of production capital goods to meet their needs for their work (Jingwei Xiong,

Junhan Ji, 2018). [3] At the same time, there are some views state that owning a property may also limit the freedom of the residence movement and mobility. Some studies have examined the impact on the subjective well-being of urban residents from the perspective of housing inequality. Housing inequality refers to the absolute inequality and relative inequality. The absolute inequality is reflected by the two indicators of housing area and housing quantity, while relative inequality refers to the difference between housing areas and residents within a region. Through the multi-level linear model analysis, the conclusion is that the effect of housing area on subjective well-being is tended as inverted u-shaped. The number of housing ownership is positively correlated with subjective well-being and the relative inequality of housing is negatively correlated with the subjective well-being (Mina Liu, Junrong Du, 2013). [4] In order to improve the residence conditions and reduce the housing inequality, improving the public housing system is crucial for low-income groups. According to a research that public residence can meet the basic housing requirements of approximate 40% of low-income urban residents. The public policy system of housing should be established based on different levels, for example the low-rent houses is set to satisfy the people with difficulties in living. Public rental flat, price-fixing flat and affordable flat to meet the requirement of low-income groups. The group with normal income could deal with the adjustment of fiscal policies and credit policies. Then the market needs to regulate the needs of high-income families (Laicheng Wen, Si Zhang, 2013). [5]

This paper attempts to understand the meaning of living conditions from the perspectives of personal resident conditions and community environment. Then it will explain the health status of the residents from three dimensions as self-evaluation of health, mental health and physical health. On the basis of oprobit and probit regression analysis, it will obtain the significant factors that affects the health from the living conditions, so as to provide the effective clue for improving living environment.

III. Research Design

A. Data Sources

The research data in this paper is derived from the table of the Adult and the table of the Family in the Chinese Family Panel Survey (CFPS) in 2016. With combining the three tables into one table by stata13, a total of 13,760 sample datas were collected. Among them, there were 9,289 samples left after wiping out the inapplicable, blank, unknown, refusal to answer, other and missing data. Since this paper will not analyze the subject from the perspective of floating population, but study the general impact of living conditions on health on the national level. Therefore, there are no restrictions on ages, regions or urban and rural areas in the sample data. At the same time, the definition of living conditions in this paper is clarified as two levels: individual resident conditions and the community resident conditions.

B. Variable Setting

There are three dependent variables in this research, including self-assessed health, chronic diseases within half a year and depressed mood respectively as the evaluation indexes of overall health, physical health and mental health. The specific variable definitions are shown in the Table I.

C. Research Methods

The dependent variables y1 and y3 in this research are all sequential variables so oprobit regression analysis model is adopted, assuming $y^*=x'\beta+\varepsilon$ (y^* is referred as unobservable), if $r_{j-1}\leq y^*$, $y=J$; assuming that $\varepsilon\sim N(0,1)$, the regression equation is expressed as:

$$P(y=J|x)=1-\varphi\left(r_{j-1}-x'\beta\right)(1\leq x\leq 21, x\in N) \quad (1)$$

where, $r_0<r_1<r_2<\cdots<r_{j-1}$ is the parameter to be estimated, when the dependent variable is 'self-assessed health condition', $J=\{1,2,3,4,5\}$;

When the dependent variable is in 'emotional state', $J=\{1,2,3,4\}$.

Since the dependent variable y2 is a binary classification variable in this research, the probit regression analysis model is adopted and the regression equation is expressed as:

$$P/(1-P)=\alpha_k+\sum\beta_i X_i\,(1\leq x\leq 21, X\in N) \quad (2)$$

Where, $P=p(y=k)$ represents the probability of each degree value of the dependent variable. When the dependent variable is 'whether there is chronic disease within half a year', $k=\{0,1\}$。α_k is the intercept term of the regression equation, β_i is referred as the coefficients of the respective variables, X_i represents the value of each variable.

IV. Empirical Analysis

The results were obtained from Table II (The health impact model by individual housing conditions) and Table III (The health impact model by community environmental conditions). Since the p values of model y1, y2 and y3 are all less than 0.05 in the both cases, which indicates that the overall imitative effect is satisfying.

A. The Health Impact of Individual Residence Conditions

Firstly, the impact of individual residence conditions on self-assessed health status. As shown in the Table II, cooking water on self-assessed health is significant at the statistical level of 1%, and housing property rights, types, household appliances and furnishings are significant at the statistical level of 5%. Among them, the more hygiene the water for cooking and drinking, the higher for the self-assessed health score is. Unhygienic domestic water is not good for health, which has formed a common sense. Therefore, people who cook with tap water and pure water are expected to have a healthier state than those who cook with unfiltered water. People with their own house have a better self-assessed health, rent or shared room makes people feel worse. This is because the housing as the fixed assets is the symbol of social status, fully owned building property right can produce a strong sense of belonging and a sense of achievement, which also represents their personality and dignity, they naturally own a more optimistic attitude

about their own health. For those who have even no house property will produce inferiority complex and disturbing emotions, thus affecting health. Living in bungalows, courtyard houses and flats or other ordinary residential have higher assessment on their own health. Those who live in villa, terraced house or small high-quality house have lower self-assessed health scores. Since the property is a reflection of economic strength, due to the different economic status, their expectations are various. Rich people normally has higher health expectation so they are not easily satisfied with their health evaluation. On the contrary, the satisfaction for the health state in the poor family is limited to enough food and clothing so they have better self-assessment health score. The richer the household electrical appliances owned, the better the self-assessment health is. The reason is because the richer the household equipment a family owns, the more intelligent the household environment is, which can increase the comfort level of living, which makes the life style more scientific and healthy therefore it will reduce the prevalence rate, so the self-assessment health is better.

The second aspect is the effect of individual housing conditions on physical health: there were fewer significant factors influencing chronic diseases comparing to the other two models. In addition to the control variables, only one variable showed positive significance which is the year of housing purchase and construction and it is at the statistical level of 10%. It means that the newer the houses, it will easier to cause chronic diseases due to the modern housing decoration with more contains of chemical synthetic materials such as formaldehyde, lead, mercury, benzene, dust and other carcinogenic substances, which is gently and quietly endangering human health leading to allergic rhinitis, chronic bronchitis, emphysema, asthma and other chronic diseases.

The last, the personal housing conditions influence on the mental health: water for cooking, years of homes construction has a significant influence on mental health in 1% of the statistical level. The type of the residential houses effect on mental health is on the 5% level of statistical significant. The household cleanliness level effect on the mental health is in 10% of the statistical level significantly. These four variables all reveals the positive correlation between the mental health level. The more sanitary the water for cooking, the better their mental health expectation. A brand new environment can bring people new feelings and the new house, especially the one that family just moved in can stimulate high emotions. As the housing age increases, the freshness disappears and the problems such as outdated decoration, disrepair and safety hazards emerge, which may cause restlessness and irritability therefore it will greatly affect the mental health. The mental health of the person who lives in the common residence such as bungalow, quadrangle courtyard or unit is poorer and those that lives in the residence such as villa, terraced house, small building has a better mental health. It is because the smaller living area and crowd space may lead to psychological diseases such as depression. Then the latter is larger in general and far from the city center, where the scenery is beautiful, the environment is superior as it will be helpful for excreting gloominess and maintaining a relaxed and cheerful mood. In addition, the higher the housing type, the richer the corresponding housing infrastructure and more complete entertainment equipment will have, while the economic strength of people living in the flat or the bungalow is relatively poor so they may worry about their livelihood. Therefore, people living in the villa and the small properties are in a better emotional state than those living in the flat and the bungalow. The tidier your home, the cleaner and more comfortable it will be, which will help relieve the depression.

B. The Impact of Community Environmental Conditions on Health

First is the community environment's influence on self-assessment health and mental health: in the Table III, compared with model y2, model y1 and y3 estimates the similarity on the community public facilities and surrounding environment conditions, community surrounding security status, community neighborhood and the affections to the community are all at the statistic level of 1%, which is significant effect to the self-assessment health status and mental health. Moreover the community property is in 1% of the statistical level on mental health which is also significant. Community public facilities are objects and equipment that serve the residents of the community, which plays the role in coordinating the relationship between the resident and the community. What’s more is that they are also an important embodiment of the image management of the community and the living quality to the residents. Community public facilities mainly includes the health facilities, resting facilities, recreation facilities, transport facilities, information board and etc., the more the public facilities of the community are completed, the residents can get more comprehensive development, no matter in physical or psychological. Human’s overall development will bring a healthy psychology to allude thus it will lead to a better self-assessment health outcome as well as the positive emotional states. The surrounding environment of the community includes the natural environment and humanistic environment. The pollution, air quality and distribution of the surrounding factories in the natural environment of the community all have an impact on the self-assessment of health. Values, interpersonal communication, artistic atmosphere and literary atmosphere in the community's humanistic environment all exert influence on residents' mental health. The security situation around the community not only ensures the smooth operation of other systems in the community, but also provides security for the personal safety of the residents in the community. The better the security situation around the community is, the more the residents' sense of security and happiness will be improved where the residents will realize that they live in a safe environment and eliminate their restlessness, anxiety and other bad emotions. In this way, it will improve the evaluation of their health and mental health. According to Maslow’s hierarchy of needs theory, emotional needs are a higher-level need. Due to the differences in the family background, economic strength, education level, living habits and etc., different neighborhood relationship will form such as intimate, general, and tense, and their basic attitudes towards things around them. Neighborhood relationship can not only reflect the community residents' sense of identity and belonging to the community, which is their feelings and affections towards the

community, but also reflect residents' mental outlook and moral level. A harmonious neighborhood relationship and a strong affection for the community can create a pleasant comfortable and imperceptible living atmosphere, so that the residents of the community live in a positive and healthy state. In addition of that, the nature of the community also has significant relationship with mental health. The residents in the neighborhood committees has better mental health than the people of the village's. This may be due to the public facilities and the surrounding environment of the neighborhood community, such as public security situation is superior to the village committee. The above aspects are the significant factors that affect mental health, so the nature of the community is positively related to the mental health.

Then, the impact of community environment on physical health: the security situation and community nature around the community showed positive significance to physical health at the 1% statistical level. The public security situation around the community is in the general, good or better conditions, it is not easy to have chronic diseases, while if it is inversely in the very good or good condition, it will have more morbidity. This may be because the overly strict security will give the residents living in it with a sense of pressure and tension, resulting in excessive anxious feelings and psychological hints. If they are always in such a high-pressure state which will eventually lead to the anxiety, depression and other chronic diseases. The people who belong to the neighborhood committee have a higher incidence of chronic diseases, while the people who belong to the village committee have a lower incidence. The reason is that compared with the rural residents, urban residents have a higher average income but with a disordered diet structure, and tend to have chronic diseases for their unhealthy diet. While rural residents have a fixed diet structure and are access to a safer food source. In addition, compared to the rural acquaintance society, the modern urban community is more closed and the communication between people is less. Sometimes the emotional requirement cannot be satisfied, which may lead to illness over time.

TABLE I. VARIABLE DEFINITION

Explained Variables		Variable Code	Explanation
Self-assessment Health		y_1	Higher value represents the healthier level (1=unhealthy, 2=normal, 3=relatively healthy, 4=healthy, 5=very healthy)
Chronic disease within half year		y_2	0=No, 1=Yes
Depression		y_3	Higher values represents better mood (1=most the time(5-7days), 2=sometimes(3-4days), 3=rarely(1-2day), 4=never(less than 1 day))
Explanatory Variable			
Individual Residence	Water for Cooking	x_1	0 refers to unhygienic water source , 1 refers to hygiene water sorce (0= river or lake water, well water, rain water, pit water, pond water/mountain spring, etc, 1= tap water, bottled water/pure water/filtered water)
	Fuel for Cooking	x_2	0 refers to the non-efficient energy, 1 refers to the efficient energy (0= firewood, coal, canned gas/liquefied gas, others, 1= natural gas/pipeline gas, solar energy/biogas, electricity)
	Property Right	x_3	0= family members own partial of the rights, 1= family members with the whole ownerships
	Residence Type	x_4	0 refers to normal residence, 1refers to the luxury residence(0= bungalows, courtyard houses, apartments, others, 1= villa、terraced house、house)
	Decoration Level	x_5	There are 7 categories in the original data and the higher the value is, the higher the degree is. Convert it into a binary variable: 0=1, 2, 3 and 4, respectively indicating simple decoration, messy household, less appliance, and crowded housing, 1=5, 6 and 7, respectively indicating luxurious decoration, clean household, rich household appliance, and enough space
	Cleaniness	x_6	
	Household appliance and Furniture	x_7	
	Crowdedness	x_8	
	Construction Year	x_9	continuous variables, data range from1910 to 2016
	Collections of Book	x_{10}	continuous variables, data range from 0 to 42830
Residence Environment	Public Facility	x_{11}	0=normal, bad 1=satisfied
	Surrounding Environment	x_{12}	
	Security Situation	x_{13}	0=normal, safe 1=very safe
	Neighborhood Relationship	x_{14}	
	Affection to the community	x_{15}	0=normal, not much feelings 1= with great feeling
	Community Nature	x_{16}	0= village committee and the infrastructure is relatively backward 1=neighborhood committee and the infrastructure is better
Control Variables			
Participant Age		x_{17}	continuous variables, data range from 16 to 95
Participant Gender		x_{18}	0=Female, 1=Male
Marital status		x_{19}	0= single, divorced, widowed, 1= with spouse(married)、cohabitation
Highest Academic Degree		x_{20}	The original data were divided into 7 categories: illiterate/semi-literate, elementary school, junior high school, senior high school/technical school/vocational high school, junior college, university undergraduate, master,

Explained Variables	Variable Code	Explanation
		doctor. Convert it into a binary variable: 0= illiterate/semiliterate, indicating not having received education, 1= the other six categories, indicating having received education
Income Level at local	x_{21}	The original data were divided into 5 categories and the higher the value is, the higher the income relatively to the local. Convert it into binary classification variables: 0=1, 2, 3, which means lower wages, 1=4, 5, which means higher wages

TABLE II. MODEL ESTIMATION RESULTS1 (N=9288)

Dependent Variables Independent Variables	Self-assessment Health(y_1)		Chronic disease within half year(y_2)		Depression(y_3)	
	Regression Coefficient	***Standard Deviation***	***Regression Coefficient***	***Standard Deviation***	***Regression Coefficient***	***Standard Deviation***
Water for Cooking	0.0871***	-0.025	-0.0222	-0.0349	0.110***	-0.0269
Fuel for Cooking	0.00486	-0.0241	0.0439	-0.0338	0.0206	-0.0261
Property Right	0.141**	-0.0714	-0.0831	-0.0995	0.0477	-0.0774
Residence Type	-0.0498**	-0.0245	0.0338	-0.0343	0.0608**	-0.0266
Decoration Level	0.00302	-0.0361	-0.0202	-0.0502	-0.0185	-0.0392
Cleanliness	0.0496	-0.0341	0.0517	-0.0473	0.0606*	-0.0368
Household appliance and Furniture	0.0820**	-0.0356	-0.00765	-0.0499	0.0235	-0.0387
Crowdedness	0.00199	-0.0244	-0.0234	-0.0341	-0.026	-0.0264
Construction Year	0.000182	-0.00097	0.00222*	-0.00133	0.00301***	-0.00104
Collections of Book	-0.000541	-0.000433	0.000226	-0.000609	0.000483	-0.00047
Participant Age	-0.0212***	-0.000856	0.0251***	-0.00126	0.00289***	-0.000915
Participant Gender	0.252***	-0.0229	-0.228***	-0.032	0.277***	-0.0247
Marital Status	-0.0366	-0.031	0.0940**	-0.0445	0.121***	-0.033
Highest Academic Degree	0.122***	-0.0267	-0.0307	-0.0361	0.0979***	-0.0287
Income Level at local	0.222***	-0.0372	-0.133**	-0.0533	0.107***	-0.0409
	N =9288 Log likelihood= -13709.71 LR $chi^2(15)$=1004.00 Pseudo R^2=0.0353		N =9288 Log likelihood= -4321.7537 LR $chi^2(15)$=521.29 Pseudo R^2=0.0569		N =9288 Log likelihood= -9466.8475 LR $chi^2(15)$=243.52 Pseudo R^2=0.0127	

[a.] Note: ***、**、*respectively represent statistically significant at the level of 1%、5% and 10%

TABLE III. MODEL ESTIMATION RESULTS2 (N=9288)

	Self-assessment Health(y_1)		Chronic disease within half year(y_2)		Depression(y_3)	
	Regression Coefficient	**Standard Deviation**	**Regression Coefficient**	**Standard Deviation**	**Regression Coefficient**	**Standard Deviation**
Public Facility	0.132***	-0.0267	-0.00927	-0.0372	0.0836***	-0.0291
Surrounding Environment	0.189***	-0.0268	-0.0255	-0.0374	0.112***	-0.0293
Security Situation	-0.147***	-0.0411	0.191***	-0.0549	-0.222***	-0.0432
Neighborhood Relationship	-0.257***	-0.096	0.167	-0.127	-0.404***	-0.0969
Affection to the community	0.154***	-0.0254	-0.0418	-0.0355	0.235***	-0.0271
Community Nature	0.0409	-0.0262	0.109***	-0.0361	0.167***	-0.0288
Participant Age	-0.0236***	-0.000848	0.0246***	-0.00124	-0.0000587	-0.000902
Participant Gender	0.246***	-0.023	-0.221***	-0.0321	0.285***	-0.0248
Marital Status	-0.0336	-0.031	0.102**	-0.0444	0.122***	-0.0329
Highest Academic Degree	0.151***	-0.0268	-0.0451	-0.0363	0.0902***	-0.0289
Income Level at local	0.195***	-0.0373	-0.128**	-0.0536	0.0948**	-0.0412
	N =9288 Log likelihood= -13611.99 LR chi^2 (11)=1199.44 Pseudo R^2=0.0422		N =9288 Log likelihood= -4311.1001 LR chi^2 (11)=542.60 Pseudo R^2=0.0592		N =9288 Log likelihood= -9369.47 LR chi^2 (11)=438.27 Pseudo R^2=0.0229	

[b.] Note: ***、**、*respectively represent statistically significant at the level of 1%、5% and 10%.

V. Conclusions and Suggestions

This paper concludes the significant residential factors that affects health on the basis of the empirical analysis from self-assessment health, physical and mental health at the two different levels of the individual residence conditions and community environment.

The following policy suggestions are based on the above analysis results: (1) It shall improve the capacity of city pipe network for water distribution, increase water supply area, adjust the pattern of water supply, guarantee water quality, further improve the management of urban water supply and realize the city tap water pipeline coverage in the surrounding area as soon as possible, to solve the problem of insufficient water supply and ensure the safety of the broad masses of the providing water, reduce the disease. (2) The government shall undertake the main role of the investment for public residence and increase the fiscal expenditure on the housing part through preferential policies to attract private capital and focus on perfecting the system of low-rent housing, strengthen urban planning. Therefore it will alleviate the settlement matters of rural migrant workers into the city. Then it will be able to solve the housing difficulties of the low-income families, help more families own their flats which will enhance their sense of belongings, security and happiness; (3) It shall strengthen the publicity of residence health and safety. Relevant health departments should play their leading role and popularize the knowledge of living health and safety prevention in order to enhance the sense of responsibility and ownership of the residents, which can help them maintain the household cleaning and sanitation, prevent them from the electrical accidents and jointly build a clean and beautiful living environment. (4) According to the old and shanty towns with large population density and backward infrastructure, deteriorated surrounding environment and severe safety problems, the government should vigorously plan it for the purpose of perfecting the urban functions and promote urban development, stand on the people's vital interests as the starting point, strengthen the relocation work to improve the system. Depend on that it will make the full advantage of the land resources, promote urbanization development in a healthy and scientific way. (5) It shall balance the urban and rural development, strengthen rural infrastructure construction, and keep narrowing the gap between the urban and rural areas. Therefore, it will show the contributions of the social development more equitable for the people. At the same time, paying more attention of the important connection role of neighborhood and village committees that they shall organize various community activities so the community residents will feel more senses of belonging and cohesion.

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