

INTERNAL MOBILITY CHILDREN AND THE FACTORS IMPACT ON THE HEALTH OF THE ELDERLY LEFT BEHIND IN VIETNAM

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Abstract. *The study aims to shed a light on the impact of the internal migration children and other factors on the physical and mental health of the old-age parents left behind. By the data of Vietnamese Aging Survey in the year 2011 (VNAS 2011), the study applied logistic regression models in order to analyze the impact of the internal migration children and other factors on the elderly's health in terms of (1) poor mental health; (2) self-rated health; (3) chronic diseases; (4) illness; (5) treatment sought for diseases/illness; (6) activities of daily living; and (7) body function limits. The logistic regression models' independent variables are having at least one child internally migrate, age, gender, living arrangement, residential region, education level, as well as the household's income. The study proves that in general, in Vietnam the old-age parents' physical and mental health is not impacted by their internal migration children. However, the male elderly are more likely to have poor mental health than the female elderly as their children domestically migrate. The study further investigates that the physical and mental health of the elderly are relevant to other factors, namely the household's income; gender; age; residential region; living arrangement or education level.*

Keywords: *old-age people, internal migrants, physical health, mental health, population, Vietnam.*

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1. Literature review

According to UNFPA (2011) [15], the proportion of old-age population of Vietnam, which includes the people at the age of 60 or more, has been increasing faster than other population cohorts. The rapidly aging speed has been taking place in the context of low-middle income and social status, which has posed a great challenge to the system of social security such as pension and health care of developing countries namely Vietnam. On the other hand, the high rate of aging people combining with the mass flow of adult people from rural to urban areas have significantly impacted on every aspect of the left-behind elderly's lives of Vietnam. Based on the General Statistics Office of Vietnam and UNFPA (2016) [14], during the period of 1989-2014, the number of domestic migrants doubled, particularly from 1,3 million to 2,6 million. The migration of working-age children from rural to urban areas has made the living arrangement of the elderly left behind remarkably changed. Previously, in the traditional families, the old-age people lived dependently on their children and/or they were taken care by their children. However, the migration of working-age children has led the left-behind elderly's lives to vulnerability.

The children migrants have had a great effect on the left-behind elderly's health, which were paid attention by a large number of international researchers. They have approached the issue in a variety of methods as follows:

In terms of financial supports, Xiang Biao (2006) [16], Giles và Mu (2006) [6]; and John Knodel et al (2007) [7] argued that the mobility children created a better financial condition for their old-age parents to access to health-care services.

With regard to the self-rated health (SRH), activities of daily living (ADLs), body function limits, as well as other physical and mental health aspects, John Knodel et al (2007); Antman (2010) [4]; Kuhn et al (2011) [12]; Ramesh et al (2011) [11]; and Antman (2013) [4] analysed that the children migration was dependently associated with the left-behind elderly's health.

In respect of the old-age parents's mental health, HAI in Moldova (2010) [5]; Erika Arenas et al (2011) [2]; and Chun-Wing Tse (2013) proved that although the migration children gave a good financial support for their old-age parents to utilize health-care services or to seek the treatment for their illness or diseases and was not the cause for their parents' chronic diseases or poor physical health, it had a negative impact on their old-age parents.

In Vietnam, the impact of mobility children on the health of old-age parents left behind has been nearly ignored recently. The study aims to shed a light on the impact of internally migration children on the left-behind elderly's health in terms of (1) poor mental health; (2) self-rated health; (3) chronic diseases; (4) illness; (5) treatment sought for diseases/ illness; (6) activities of daily living; and (7) body function limits.

2. Analyzing the impact of interally mobility children and other factors on the left-behind elderly of Vietnam

2.1. Data

The author applied the data from the Vietnam Aging Survey (VNAS) of 2011 [15] to analyze the impact of the migration children and other factors on the left-behind elderly's health. The survey was done according to the Survey of Population and Housing of Vietnam in 2009, as a result the sample was representative for the population aged from 50 and over residing in both rural and urban areas of Vietnam. The survey collected more than 4000 people aged 50 ore more, which consisted of 2,789 people at the age of 60 and over with 1,106 males and 1,683 females. Besides, there were 2,050 old-age people living in rural areas and 739 ones in urban areas.

VNAS 2011 contained the socio-demographic information of the elderly. Particularly, they are: (1) the information of demographic characteristics namely the place of birth, living area, ancestor worship, marital status religion, literacy; (2) the living arrangement of households including the number of mobility children, the children's career, maternal/ paternal grandchildren, the number of children living in the same household and/or outside the household; (3) the contribution of the old-age people to their families and communities; (4) housing condition; (5) the past and present jobs, as well as the imcome paid by those; (6) assets, the total household income, and the sources of income support for their daily lives, which containing the remittances sent by the migration children; (7) aspects of social lives; (8) citizen right understanding; and (9) the physical and mental health status of the elderly in terms of self-rated health; all health

symptoms during 30 days before the survey (such as headache, dizziness, vomiting, diarrhea, etc.); chronic diseases; activities of daily living; body function limits; assistant in case of body function limits; health insurance; illness during the 12 months preceding the survey; treatment sought for disease/illness, as well as paying for disease treatment during the 12 months preceding the survey.

2.2. Methodology

Before analyzing the impact of migration children and other factors on the health of elderly left behind, the author applied the Chow test to differentiate the cohorts of the elderly living in rural area and those living in urban area, the female elderly and the male elderly. If the null hypothesis (without any difference between the elderly living in rural area and those living in urban area, the female elderly and male elderly) is rejected, individual models were run for each cohorts of the elderly, and vice versa.

Then, in order to assess the impact of internal migration children and other factors on the health of the elderly left behind, logistic regression models were applied. Assuming that the old-age person i ($i = 1, 2, \dots, N$, in which N is the total number of old-age people) with migration child(ren) was considered to have poor physical and mental health status ($P_i=1$). The probability of the elderly with migration children having the poor physical and mental health status was determined as follows:

$$P(p_i = 1) = \beta_i X_i + \varepsilon_i \quad (1)$$

In which, X_i is representative for the respondents' individual characteristics with or without the migration children; β_i is relevant coefficients; ε_i is error terms.

From the model, odds ratios (OR) are calculated as $P_i/(1-P_i)$. For each variable, a reference group is chosen, as a result OR of larger than 1 means the treated group is more likely to be poor in physical or mental health than the reference group, and vice versa.

The variables of the logistic regression models have been chosen according to Kuhn et al (2011) [12], John Knodel et al (2007) [7] and Ramesh et al (2007) [11] as follows:

- **The dependant variables.** They are nominal variables, which include all medical matters of the old-age parents left behind.

1) Poor mental health: items defining at least one out of symptoms of poor mental health suffered by the old-age parents during the survey preceding month are (i) feeling stress; (ii) feeling unhappy/ down; (iii) feeling hopeless; (iv) feeling useless; or (v) feeling lonely. In the regression model, two categories have been created: the 1st one considered as 'Yes' with 'at least one symptom of poor mental health' and the other of 'No' with 'no symptom of poor mental health'. If the 'No' category is selected as the reference group, OR is expected to be more than 1 for the treated one.

2) Self-rated health-SRH: in the regression model, there are two categories of 'Good' and 'Poor' answered by the old-age people for their general health status. If the 'Good' category is

chosen to be the reference group, OR is expected to be more than 1 for the other.

3) Chronic disease: this is defined that the elderly experienced at least one of following diseases: hypertension, heart disease, cancer, stroke, diabetes, or paralysis. In the model, there are two categories: the 1st one considered the 'No' consists of the elderly with no chronic disease; the other called the 'Yes' includes the old-age parents with at least one out of chronic diseases. If the 'No' category is selected as the reference group, the OR is expected to be higher than 1 for the other.

4) Illness during the 12 months preceding the survey: the author only explored whether the old-age parents get the symptom of illness during the 12 months preceding the survey or not. In the logistic regression models, there are two selected categories, which are the 'Yes' with the elderly get ill and the 'No' with the ones have no ill symptom. If the 'No' is selected to be the reference group, OR is expected to be higher than 1 for the other.

5) Treatment sought during the 12 months preceding the survey: the study only consider the old-age parents with at least one symptom of illness or disease during the 12 months preceding the survey treated by the medical doctor. In the logistic models, there are chosen categories, which are the 'No' with the ones getting ill or disease untreated by the medical doctor and the 'Yes' with the elderly experiencing illness or disease treated by the medical doctor. If the 'No' is selected to be the reference group, OR is expected to be higher than 1 for the other.

6) Activities of daily living-ADLs: the study only mentions the old-age parents having difficulty in carrying out at least one out of activities of daily living such as: eating; getting dressed; bathing/washing; getting up; getting to and using the toilet. There are two categories selected in the models, which are the 'No' consisting of the elderly without any difficulty in the above activities and the 'Yes' with the ones having a problem with at least one out of the above activities. If the 'No' group is selected to be the reference, OR is expected to be larger than 1 for the other.

7) Function limits: the old-age parents getting into trouble with carrying out at least one out of following activities: walking from 200 metres to 300 metres; lifting up or carrying something as heavy as 5kg and over; crouching or squatting; using fingers to grasp or hold things; walking up and down a set of stairs; standing up when sitting down; extending their arms above shoulder level. There are two sub-groups selected in the models, which are the 'No' including the elderly without any difficulty in the above activities and the 'Yes' consisting the ones experienced a problem with at least one out of the above activities. If the 'No' group is selected to be the reference, OR is expected to be larger than 1 for the other.

- The independent variables:

1) With the domestic migration adult children: the study focuses on the elderly with the adult children living in the provinces outside their residential provinces. This variable is a nominal variable considered as the main explanatory variable of the models. There are two categories in the regression models, which are «1 if having at least one migration child» and «0 if having no migration child». If the '0' group is selected as the reference group, the OR of the treated group is expected to be more than 1.

2) Additional variables used as the control variables of the models include age; gender; marital status; education; residential region; household size and income as follows:

* Age: there are three sub-groups of old-age parents, which are the 1st one consisting of people aged from 60 to 69; the 2nd one including people aged from 70 to 79 and the people at the age of 80 and over belonging to the last one.

If the 1st sub-group is selected to be the reference group, the OR are expected to be higher than 1 for the two others. The main reason for this is that the older the elderly are getting, the more vulnerable they are likely to be as their adult children migrate.

* Gender: the gender has an impact on the potential gap in the probability of having at least one symptom of illness or disease of the elderly. If the female sub-category is selected to be the reference group, the estimated odd ratio for the male one is expected to be higher than 1. This can be explained that the female old-age people are often likely to be vulnerable and in poor health as their adult children migrate.

* Marital status: the old-age parents are divided into three sub-groups, which consists of the married, the widows and the 'other' of divorced or single elderly. The married is considered to be the reference group. The estimated ORs for the others are expected to be higher than 1. The main reason for this is that the widows, divorced or single elderly often have to take care and work for themselves, as a result their health status is more likely to be poor as their children live far from them.

* Education: the study focuses on four sub-groups: (i) the first one consists of the elderly who do not completed the primary-school level; (ii) the second one includes the old-age parents who only finished the primary-school level; the third one gathers the elderly who achieved the secondary-school level; and the last one consists of the old-age people who get the high-school level and over. The first category is selected as the reference. The estimated ORs are expected to be more than 1 for the others. This can be explained that the elderly with higher education level were more likely to have paid jobs at their working age and get pension upon their retirement. Therefore, the high-education-level elderly often have a better living standard than their counterparts, which will make their health better.

* Residential regions: In Vietnam, the living standard in rural areas is much lower than in urban areas. As a result, on one hand the elderly in rural area are less likely to enjoy a good medical service. On the other hand, the old-age people in rural area often have to work harder for their living, so their health is often poorer than their counterpart in urban area. If the rural old-age parents are chosen to be the reference, the OR for the urban elderly are expected to be lower than 1 for the other.

* The household size: the old-age parents living in large household with more than one child, in which one or more children leaving their hometown to urban area to earn for living, while the other(s) live nearby or co-reside with their parents, are more likely to have better health than the lonely. This can be explained that they are looked after and financially supported by the left-

behind children. If the lonely old-age parents are selected to be the reference, the OR is expected to be less than 1 for the others in the logistic regression models.

* The elderly household income during the period of 12 months preceeding the survey: the elderly living in the households with higher income are more likely to be in good health. There are three sub-groups in the regression model, which are the 1st one containing the elderly households with the income less than 10 million Vietnamese dong (VND); the 2nd one consisting of the households with the income ranging from 10 million VND to less than 100 million VND; and the last one of the elderly families with the income from 100 million VND and over. If the 1st one is chosen as the reference, the ORs for the others are expected to be less than 1.

3.3. Empirical results

Chow test. Table 1 shows the Chow test results for every mental and physical health variables. There is no difference between the female and male elderly or between the elderly living in rural area and those living in urban area in terms of chronic diseases, treatment sought, activities of daily living and function limits, because the null hypothesis is not rejected.

Table 1. Chow test for the elderly living in rural area and those living in urban area; the male and female elderly

Variables	The elderly living in rural area and those living in urban area			The male and female elderly		
	Chi2	Prob>c hi2	Conclusio n	Chi2	Prob>c hi2	Conclusion
Self-rated health (SRH)	29,3	0,00	Ho is not rejected	7,1	0,9	Ho is not rejected
Poor mental health	18,34	0,145	Ho is not rejected	20,31	0,088	Ho is rejected
Chronic disease	6,45	0,93	Ho is not rejected	19,2	0,12	Ho is not rejected
Illness during the 12 months preceeding the survey	21,49	0,063	Ho is not rejected	16,05	0,25	Ho is not rejected
Treatment sought for the illness/ disease	9,46	0,737	Ho is not rejected	14,81	0,319	Ho is not rejected
Activities of daily living (ADLs)	7,2	0,89	Ho is not rejected	7,7	0,86	Ho is not rejected
Function limits	7,8	0,85	Ho is not rejected	7,5	0,87	Ho is not rejected

(Source: the results estimated by the software STATA)

However, table 1 shows the Chow test results of some variables as follows:

- For self-rated health: there is a discrimination in general health rated by the old-age people living in the rural and those living in the urban, while no difference exists in self-rated

health between the female and male cohorts;

- In terms of poor mental health: the female group is different from the male one in the symptom of poor mental health. However, table 1 shows no difference in the symptom between the elderly in the rural and those in the urban;

- With regards to illness during the 12 months preceding the survey: table 1 presents a discrimination in the symptom of illness caused for the old-age people living in the rural and those living in the urban, while no difference exists in the symptom between the female and male cohorts.

Logistics regression results for Chronic disease; Treatment sought; ADLs; Function limits. Table 2 expresses the results with the significant levels of: $p \leq 10\%$, $p \leq 5\%$ và $p \leq 1\%$ as follows:

Table 2. The regression results for Chronic disease; Treatment sought; ADLs; Function limits

Variables	Chronic diseases (OR)	Illness (OR)	Activities of daily living-ADLS (OR)	Function limits (OR)
Age				
60-69 (reference)	-	-	-	-
70-79	1,47***	1,35	1,62***	1,95***
80+	1,35***	0,84	3,03***	4,59***
Gender				
Female (reference)	-	-	-	-
Male	0,74***	0,93	0,76***	0,42***
Residential region				
Rural (reference)	-	-	-	-
Urban	1,12	0,81	0,78**	1,05
Living arrangement				
Living with at least one child (reference)	-	-	-	-
Lonely	1,36	0,87	0,78	0,94
Living with only spouse	1,25	0,76	0,76*	1,08
Other	0,94	0,65	0,60***	1,04
With internal migration children				
No (reference)	-	-	-	-
Yes	1,04	0,99	0,94	1,02
Education level				

No school enrolment or not completed the primary school (reference)	-	-	-	-
Finished the primary school	1,22	1,39	1,01	1,16
Finished the secondary school	1,47***	0,91	1,03	0,94
Finished the high school and over	1,69***	1,17	1,04	0,69**
The elderly household income during the 12 months preceeding the survey				
Less than 10 million VND (reference)	-	-	-	-
From 10 million to less than 100 million VND	1,13	2,11***	0,60***	0,61***
More than 100 million VND	0,91	2,12*	0,47***	0,37***
Sample size	2789	1155	2789	2789
Log likelihood	- 1588.1979	-421.14395	-1749.8744	-1513.275
Pseudo R²	0,0113	0,0262	0,0621	0,1154

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$,

(Source: the results estimated by the software STATA)

- In terms of chronic diseases: table 2 shows that the older the people are getting, the high probability they have to contract at least one symptom of chronic diseases. This result is also consistent with UNFPA (2011). However, the male elderly and the elderly with high education level are less likely to get it than their counterparts. Table 2 proves that the internal migration children have no impact on their old-age parents' chronic disease symptoms.

- For treatment sought for illness/ disease during the 12 months preceding the survey: Table 2 proves that the higher income the elderly households have, the more likely the elderly are treated by medical doctors for their illness or diseases. The result also shows that the internal migration children are independent on the elderly's seeking treatment for their illness or diseases.

- With regard to activities of daily living (ADLs): The older the elderly are getting, the more likely the old-age people are difficult in carrying out at least one out of activities of daily living. Table 2 further illustrates that the male elderly are less likely to be difficult in doing at least one out of these activities than their counterpart. Moreover, the results also prove that the urban elderly are less likely to have problem with implementing at least one out of these activities than the rural elderly. Table 2 adds that the elderly living with their spouse are less likely to be difficult in carrying out daily activities than the others, which is consistent with UNFPA (2011). Otherwise, the results illustrate that the higher income the elderly households have, the more likely the elderly are less likely to have problem with daily activities. However, the results show

that the internal migration children do not have any effect on the elderly's ADLs.

- In terms of function limits: Table 2 expresses that the elderly belong to the younger-age categories are less likely to have function limits than the other. The results also prove that the male elderly and those living in the households with higher income are less likely to face with function limits than their counterpart. However, table 2 also shows that the elderly's function limits are not impacted by their children's internal migration.

Logistic regression results for variables of self-rated health; poor mental health; and illness during the 12 months preceeding the survey.

In terms of self-rated health: Chow test proves that there is a difference between the self-rated health of the old-age people living in the rural and those in the urban, while no distinction exists in the self-rated health of the male and female elderly. As a result, the author analyzes the impact of the internal migration children on the self-rated health of the elderly left behind through 2 following steps.

Step 1. Two individual logistic regression models are applied to discover the effect of the internal migration children on the elderly's self-rated health. The results are shown in table 3. Table 3 contains the individual regression results of self-rated health for the sample of the elderly living in the urban and the sample of the elderly living in the rural:

Table 3. The individual regression results of SRH for the elderly living in the urban and those living in the rural

Self-rated health (SRH)	Rural (OR)	Urban (OR)
Age		
60-69 (reference)	-	-
70-79	1,23	1,29**
80+	1,30	1,25*
Gender		
Female (reference)	-	-
male	0,85	0,76**
Living arrangement		
Living with at least one child (reference)	-	-
Lonely	0,68	1,46
Living with only spouse	1,10	0,96
Other	0,36***	1,08
With internal migration children		
No (reference)	-	-
Yes	1,00	0,97
Education level		
No school enrolment or not completed the primary school (reference)	-	-

Finished the primary school	0,83	0,73**
Finished the secondary school	0,46***	0,73**
Finished the high school and over	0,49***	0,49***
The elderly household income during the 12 months preceeding the survey		
Less than 10 million VND (reference)	-	-
From 10 million to less than 100 million VND	1,07	0,64***
More than 100 million VND	0,79	0,32***
Sample size	2049	739
Log likelihood	-1139.3426	-475.57422
Pseudo R²	0,0465	0,0499

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$,

(Source: the results estimated by the software STATA)

Table 3 shows that there are 739 elderly living in the urban and 2049 old-age people living in the rural. The results prove that two urban categories of the elderly aged from 70 to 79 and those aged 80 and over rated their health poorly. Moreover, the urban male elderly rate their health better than the urban female elderly do. The higher education level the elderly achieved, the better they rate their health in both rural and urban areas. Table 3 further expresses that the urban elderly living in the households with higher income rate their health better than the others do. In general, in both rural and urban areas, the internal migration children are insignificantly in their old-age parents' self-rated health.

Step 2. A common logistic regression model is used to investigate the issue of both the female and male elderly. Table 4 shows the common logistic regression results of self-rated health for both the female and male elderly.

Bảng 4. The common logistic regression results of self-rated health for both the female and male elderly

Self-rated health (SRH)	OR
Age	
60-69 (reference)	-
70-79	1,28**
80+	1,26**
Gender	
Female (reference)	-
Male	0,78***
Residential region	
Rural (reference)	-
Urban	0,67***
Living arrangement	
Living with at least one child (reference)	-
Lonely	1,26
Living with only spouse	1,00

Other	0,76
With internal migration children	
No (reference)	-
Yes	0,97
Education level	
No school enrolment or not completed the primary school (reference)	-
Finished the primary school	0,76**
Finished the secondary school	0,63***
Finished the high school and over	0,51***
The elderly household income during the 12 months preceeding the survey	
Less than 10 million VND (reference)	-
From 10 million to less than 100 million VND	0,70***
More than 100 million VND	0,47***
Sample size	2788
Log likelihood	-1629.9769
Pseudo R²	0,0524

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$, (Source: the results estimated by the software STATA)

Table 4 proves that the older the elderly are getting, the poorer they rate their health. However, the results further show that the male elderly rate their health better than their counterpart. The old-age people living in the urban have a better self-rated health than those living in the rural, because the living standard in the urban is higher than in the rural. Table 4 highlights that the elderly with higher education level have better the self-rated health than the others. The elderly living in the households with higher income rate their health better than the others. However, in general, the self-rated health of the old-age parents left behind is not impacted by the internal mobility children.

With regard to poor mental health: Chow test shows there is a difference in poor mental health between the female and male elderly, while no gap exists between the elderly living in the rural and those living in the urban about the symptom of poor mental health. As a result, the study analyzes the impact of the internal migration children on the left-behind elderly's poor mental health in two steps.

Step 1: Two individual logistic regression models are applied to analyze the effects on the symptom of poor mental health of the male and female elderly. The results are shown in table 5.

Table 5. The individual logistic regression results for the poor mental health of the male and female elderly

Poor mental health	Male (OR)	Female (OR)
Age		
60-69 (reference)	-	-
70-79	0,91	1,52***
80+	1,13	1,65***
Residential region		
Rural (reference)	-	-
Urban	1,23	0,81
Living arrangement		
Living with at least one child (reference)	-	-
Lonely	4,09***	2,41***
Living with only spouse	0,62	0,52***
Other	0,88	1,19
With internal migration children		
No (reference)	-	-
Yes	1,49**	0,95
Education level		
No school enrolment or not completed the primary school (reference)	-	-
Finished the primary school	0,67**	1,02
Finished the secondary school	0,48***	0,72
Finished the high school and over	0,56**	0,63
The elderly household income during the 12 months preceding the survey		
Less than 10 million VND (reference)	-	-
From 10 million to less than 100 million VND	0,56***	0,59***
More than 100 million VND	0,37**	0,29***
Sample size	1026	1546
Log likelihood	-436.00451	-880.51235
Pseudo R²	0,0728	0,0937

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$,
(Source: the results estimated by the software STATA)

Step 2: A common logistic regression model is used to analyze the impacts on the poor mental health of both the urban and rural elderly. The results are presented in table 6.

Table 6. The common logistic regression results for the poor mental health of the elderly left behind

Poor mental health	OR
Age	
60-69 (reference)	-
70-79	1,27**
80+	1,47***
Gender	
Female (reference)	-
Male	0,64***
Residential region	
Rural (reference)	-
Urban	0,92
Living arrangement	
Living with at least one child (reference)	-
Lonely	2,70***
Living with only spouse	0,56***
Other	1,10
With internal migration children	
No (reference)	-
Yes	1,08
Education level	
No school enrolment or not completed the primary school (reference)	-
Finished the primary school	0,87
Finished the secondary school	0,61***
Finished the high school and over	0,63**
The elderly household income during the 12 months preceeding the survey	
Less than 10 million VND (reference)	-
From 10 million to less than 100 million VND	0,59***
More than 100 million VND	0,33***
Sample size	2572
Log likelihood	-1324.1347
Pseudo R²	0,1049

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$, (Source: the results estimated by the software STATA)

Table 5 and table 6 show that the internal migration children are not relevant to the poor mental health of the elderly left behind in general. However, the male elderly are more likely to get the poor mental health than the female elderly.

Besides, the elderly at the older ages are more likely to have the poor mental health than their partners, but the female elderly's mental health is poorer than the male elderly's. Moreover, the

results prove that the elderly living alone are more likely to get the poor mental health than the others. However, the female elderly living with their husbands have much better mental health.

Additionally, the results investigate that the high education level the elderly achieve, the less likely they are in poor mental health. However, the male elderly are less likely to get the symptom of poor mental health than their partners. The results also confirm that the elderly living the the households with higher income are less likely to be in poor mental health than the others.

When it comes to illness during the 12 months preceding the survey: Chow test shows that there is a distinction in the symptom of illness of the old-age people living in the rural and those living in the urban caused by the internal migration children, while no difference exists in the symptom between the female and male cohorts. Therefore, the study analyzes the impact of the internal migration children on the left-behind elderly's illness during the 12 months preceding the survey in two following steps.

Step 1. The author apply two individual models in order to investigate the factors impacting on the symptom of illness of the elderly living in the rural and those living in the urban as their adult children migrate. The results are shown in table 7.

Table 7. Logistic regression results for the illness during the 12 months preceding the survey of the elderly living in the rural and those living in the urban

Illness during the 12 months preceding the survey	Rural (OR)	Urban (OR)
Age		
60-69 (reference)	-	-
70-79	1,43***	1,37
80+	1,55***	1,69**
Gender		
Female (reference)	-	-
Male	0,81**	0,78*
Living arrangement		
Living with at least one child (reference)	-	-
Lonely	1,09	1,04
Living with only spouse	0,78	1,85**
Other	0,89	1,14
With internal migration children		
No (reference)	-	-
Yes	0,93	0,94
Education level		
No school enrolment or not completed the primary school (reference)	-	-
Finished the primary school	1,05	0,74
Finished the secondary school	1,31*	0,59**

Finished the high school and over	0,89	0,67*
The elderly household income during the 12 months preceding the survey		
Less than 10 million VND (reference)	-	-
From 10 million to less than 100 million VND	0,69***	1,12
More than 100 million VND	0,60**	0,69
Sample size	2050	739
Log likelihood	-1374.4649	-460.04114
Pseudo R²	0,0212	0,0414

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$,
(Source: the results estimated by the software STATA)

Step 2. A common logistic regression model is used for both the male and female elderly to shed a light on the impacts on the elderly's illness during the 12 months preceding the survey. The results are presented in table 8.

Table 8. Common logistic regression results for the illness during the 12 months preceding the survey of both female and male elderly

Illness during the 12 months preceding the survey	OR
Age	
60-69 (reference)	-
70-79	1,39***
80+	1,56***
Gender	
Female (reference)	-
Male	0,81**
Residential region	
Rural (reference)	-
Urban	0,80**
Living arrangement	
Living with at least one child (reference)	-
Lonely	1,12
Living with only spouse	0,93
Other	0,96
With internal migration children	
No (reference)	-
Yes	0,93
Education level	
No school enrolment or not completed the primary school (reference)	-

Finished the primary school	0,97
Finished the secondary school	1,06
Finished the high school and over	0,83
The elderly household income during the 12 months preceeding the survey	
Less than 10 million VND (reference)	-
From 10 million to less than 100 million VND	0,78***
More than 100 million VND	0,55***
Sample size	2789
Log likelihood	-1845.4009
Pseudo R²	0,0246

Note: * with the significant level $p \leq 10\%$; ** with $p \leq 5\%$; and *** with $p \leq 1\%$,
(Source: the results estimated by the software STATA)

Table 7 and table 8 illustrate that in general, the elderly at older age are more likely to be ill than the others. The results further prove that the male elderly or the elderly living in the urban are less likely to be ill than their counterparts. The results also add that the urban elderly with high education level or the elderly living in the households with higher income are less likely to be ill than their counterparts. However, table 7 and table 8 show that the internal migration children are independent on the illness of the old-age parents left behind.

4. Conclusion

In general, in Vietnam the old-age parents' physical and mental health is not impacted by their internal migration children. However, the male elderly are more likely to have poor mental health than the female elderly as their children migrate. The study further investigates that the physical and mental health of the elderly are relevant to other factors, namely the household's income; age; residential region; living arrangement or education level.

Firstly, the older the elderly are getting, the more likely they are infected with chronic diseases, have difficulty in carrying out daily activities, facing with function limits or poor self-rated health.

Secondly, the study analyzes that the income also plays an important role in seeking treatment for the illness or diseases of the elderly left behind, which is confirmed by UNFPA (2011) that the elderly living in the households with low income are less likely to be treated as they get ill/ disease. The study further confirms that the elderly living in the households with high income are less difficult in carrying out daily activities. The households with high income also make the elderly less likely to face with function limits or the risk of poor mental health or illness. In general, the elderly living in the households with high income often rate their health much better.

Moreover, the results additionally illustrate that the gender is one of important factor affecting the health of the elderly as their children migrate. Particularly, the female elderly are

more likely to contract the chronic diseases, to have difficulty in doing daily activities, as well as to have poor self-rated health than their counterparts.

Furthermore, the study further sheds a light on the impact of the education level on the elderly's health. Specifically, the elderly with high education level are more likely to contract the chronic diseases than their counterparts. However, the results prove that the elderly with high education level have better self-rated health and lessen the risk of poor mental health than their counterparts.

Lastly, residential region and living arrangement also play a critical role in the elderly's health as their children migrate internally. Particularly, the elderly living in the urban have better self-rated health and are less likely to get ill than the elderly living in the rural. However, the elderly living alone are more likely to have poor mental health than the others and those living with their spouse are less likely to be difficult in carrying out daily activities.

REFERENCE

1. Chun-Wing Tse. Migration and Health outcomes of left-behind elderly in Rural China, 2013. ULR: <http://ssrn.com/abstract=2440403>
2. Erika Arenas and Jenjira Yahirun. Left Behind: The Effects of Offspring's Migration on Parental Mental Health in Mexico. 2011.
3. Francisca M. Antman. Elderly care and intrafamily resource allocation when children migrate. 2010.
4. Francisca M. Antman. How Does International Migration Affect the Health of Elderly Parents Left Behind? Evidence from Mexico. Working Paper, 2013.
5. HelpAge International and UNICEF. Staying behind: the effects of migration on older people and children in Moldova, 2010.
6. John Giles and Ren Mu. Elder Parent Health and the migration decision of Adult children: Evidence from rural China. IZA DP No. 2333, 2006.
7. John Knodel et al. Migration and intergenerational solidarity: Evidence from Rural Thailand. UNFPA Thailand. Papers in population aging No.2, 2007.
8. Khuon Chandore. Impact of migration on older age parents: Preliminary findings from two communes of Battambang province, Cambodia, 2010.
9. Le Bach Duong and Nguyen Thanh Liem. From Rural to Urban: The socio-economic impacts caused by the migration of Vietnam. Labor Publishing House, 2011.
10. Magali Barbieri. Doi Moi and the Elderly: Intergenerational support under the strain of reforms. Paper prepared for presentation at the 2006 Population of America Association Meeting, Los Angeles, 2006.
11. Ramesh et al (2011). Impact of migration children on health and health care -seeking behavior of elderly left behind.

12. Randall Kuhn et al. The effects of Children's migration on Elderly Kin's Health: A counterfactual approach. *Demography*, 2011, No48. – pp.183-209.
13. The General Statistics Office of Vietnam and United Nations Population Fund (UNFPA). The 2014 Vietnam Intercensal Population and Housing Survey. Migration and Urbanization in Vietnam. Vietnam News Agency Publishing House Hanoi, 2016.
14. The General Statistics Office of Vietnam and United Nations Population Fund (UNFPA). The Survey of Migration of Vietnam in the year of 2004: Migration and Health. 2005. ULR: http://vietnam.unfpa.org/sites/asiapacific/files/pub-pdf/DidanvaSuckhoe_GSO1206_v.pdf
15. The United Nations Population Fund (UNFPA). Aging population and the old-age people of Vietnam: The patterns, forecast and some resolutions [Electronic resource]. - 2011. URL:[http://vietnam.unfpa.org/sites/asiapacific/files/pub-pdf/Ageing%20report VIE 27.07%20\(1\).pdf](http://vietnam.unfpa.org/sites/asiapacific/files/pub-pdf/Ageing%20report%20VIE%2027.07%20(1).pdf)
16. Xiang Biao. How far are the left-behind left behind? A preliminary study in Rural China. *Population, Space and Place*, 2006. – pp.179-191.