

Changes of Food Expenditure and Food Consumption of People Living in Ba Vi District, Hanoi, Vietnam from 1999 to 2013

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Abstract

Background: During the nutrition transition period which began in the early 1990s in Vietnam, dietary intake had been changed significantly because of changes in lifestyle and living standard. **Objectives:** This paper aims to describe the trend for food expenditure and the frequency of meat consumption in households in Ba Vi district, Hanoi, Vietnam from 1999 to 2013. **Methods:** This is a longitudinal study conducted in Ba Vi district, Hanoi. Semi-annual, face-to face interviews were conducted by well-trained interviewers with 11,922 households to collect data of the household's income, spending for food and meat consumption. Chi-square test for trend was performed to evaluate the changes of food expenditure over the years. P-value under 0.05 was considered statistically significant. **Results:** There were ten times increase in household's mean income and five times increase in mean food expenditure from 1999 to 2013. The percentage of household food expenditure per total family expenditure was really high (55% in 2013). The percentage of rice expenditure per total food expenditure decreased dramatically from 59.9% in 1999 to 33.1% in 2013 while spending for other animal-based, high-protein food was an upward trend, particularly meat (10.7% in 1999 to 24.2% in 2013). The percentage of rice expenditure in well-off households was lower than poor households (55% vs. 61.8% in 1999 and 31.4% vs. 36.5% in 2013). However, the percentage of spending for meat in well-off households were much higher than that of poor households (>10%). **Conclusion:** Our finding indicated that mean income and food expenditure, particularly meat intake, of households had increased dramatically from 1999 to 2013. The increase of meat intake requires reallocation and direction of Vietnam public health funding and strategy.

Keywords

Vietnam, Income, Food Expenditure, Meat Consumption

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1. Introduction

Vietnam has been experiencing an economic transition period with marked and rapid economy development, from late 1990s to present. As the living standard improved and with increased income, Vietnamese people have paid more attention to other essential needs, especially the need for a healthy diet and nutrition. From early 1990s, dietary intake changed significantly as to changes of capita income and lifestyle [1]-[5]. Food expenditure and food consumption are important factors reflecting the households' food security and the quality of the diet, particularly [6]-[9].

In the period from 1990 to 1999, the average of protein consumption per capita had an annual average increase of 4.4% per year; and in 1999 it reached to a level of 22.4 kg protein per person per year, which nearly met the adequate nutrition recommendation for Vietnamese people recommended by Nguyen Cong Khan and Le Danh Tuyen [10] [11]. A study of Nguyen Minh Thang [12] *et al.* in 2004 showed the average dietary energy increased dramatically in the early 1990s to a recommended level of 2100 kcal per person per day. Additionally, there was a transition in Vietnamese people's nutritional intake from 5 years period 1992-1993 to 1997-1998 in which there was a decrease in starches intake and an increase in the intake of protein and fat [13] [14]. During this period, Nguyen Minh Thang [12] and Vietnam Household Living Standards Surveys in 2004 and 2006 [15] also found a disparity in the consumption of protein and fat between the rich and the poor. Similarly, study of Le Ngoc Dien in 2004 (used data taken from the Vietnam Living Standards Survey national cross-sectional study in 1997-1998) [13] also showed the division between the well-off people and the poor in foods choices for protein and fat food. These evidences showed that there had been nutrition transition in Vietnam during this time.

The trendy increase of protein consumption may increase the prevalence of chronic diseases and cancer [16] [17] [18]. Until now, there had been no longitudinal study that assessed the changes of food consumption over the period of the economic development in Vietnam. Hence, we conducted this study to collect information on food expenditure and food consumption and assessing its relationship with the economic status of households.

2. Methods

2.1. Study Design

This is a longitudinal study conducted in Ba Vi district, Hanoi, Vietnam. Biannual interviews, using paper based questionnaire to collect data of the household's income, food expenditure and food consumption, were repeatedly conducted by well-trained interviewers from Hanoi Medical University from 1999 to 2013 with 11, 922 households live in the region at the time of the interviews.

2.2. Study's Subjects

Households in Ba Vi District, Hanoi, Vietnam who agreed to participate in this study.

2.3. Study Setting

Data used in this manuscript were extracted from FilaBavi, a longitudinal health surveillance system in rural Viet Nam [19]. The surveillance was conducted in Bavi district of Hanoi, Vietnam. This is a rural district located in northern Vietnam, 60 km west of Hanoi capital. The district has a population of about 238,000 and covers an area of 410 km², including lowland, highland and mountainous areas. Agricultural production and livestock breeding are the main economic activities of the local people. A more detailed description of Bavi district and the FilaBavi can be found elsewhere [19].

2.4. Sample Size and Sampling

The sampling unit was hamlet or village sub-division (cluster) covering the range of geographical regions in the district. The households were selected randomly within each hamlet with probability proportional to its population size. The sample included 67 clusters with a total population of about 51,000 inhabitants, and an estimated 11,900 households in 1999.

2.5. Measurement

The household baseline survey was carried out at the beginning of 1999, collecting information at household

level. Re-censuses were conducted every two years. At the household level, information of the total household’s monthly income and expenditure were collected. Annual household’s economic status was assessed by the local authorities, based on the Vietnam Government’s guideline on household poverty classification [20]-[22].

2.6. Data Analysis

Data were analysed by STATA 10.0 (StataCorp, College Station, TX, USA). Descriptive statistic of frequency and mean/median with corresponding SD or range was performed. Chi-square trend test was performed to evaluate the changes of food expenditure through the years. It performs the nonparametric test for trend across ordered groups developed by Cuzick, which is an extension of the Wilcoxon rank-sum test. A correction for ties is incorporated into the test. A p-value under 0.05 was considered statistically significant

Ethical considerations: The study was granted ethical approval by the Scientific and Ethical Committee in Biomedical Research, Hanoi Medical University and The Research Ethics Committee at Umeå University (Sweden) in 1999. All human subjects in the study were orally asked for their consent before the interviews, and all had complete rights to withdraw from the study at any time without any threats or disadvantages

3. Results

Table 1 showed that average household’s annual income increased remarkably over the years, particularly from 2005 to the present. As of 2013, the average income rate had increased 10-fold compared to that of in 1999: 76,294.7 thousand VND in 2013 (equivalent 3633.1 USD) and 7,583.6 thousand VND in 1999 (equivalent 541.7 USD).

Corresponding to the trendy increase in income, food expenditure increased 5 times: from 8,069.0 thousand VND in 1999 to 42,343.6 thousand VND in 2013. In 1999 the money spent for food expenditure alone was 6.4% higher than total household income. However, the proportion of food expenditure decreased rapidly to 68.9% of total household expenditure in 2001. Since 2001, food expenditure against the total average income was fluctuated around 50% level.

The increased trends in average income and food s expenditure over the years were statistically significant at $p < 0.001$.

Figure 1 shows the proportion of spending for rice against the total of food expenditure decreased significantly from 59.9% in 1999 to only 33.1% in 2013. Meanwhile, the spending for protein rich foods, especially meat tended to increase in the same period. In 1999, only 10.7% of the food expenditure was spent for meat, 5% for fish and 1.4% for eggs. However, by 2013, the spending for these foods increased about 2.5 times (24.2%, 12.2% and 3.5%, respectively). The trend was statistically significant at $p < 0.001$.

The percentage of spending for vegetables also increased steadily over the years, from 8.5% in 1999 to 13.3% in 2013. Meanwhile, the percentage of other food expenditure (ripe fruit, candy, confectionary...) was stable, ranging around 13%.

Since 2009, the trend of each food expenditure against the total food expenditure decreased slowly and gradually became stabilizing from 2009.

Table 1. Average households’ annual income and food expenditure from 1999 to 2013.

| Year | # Household | Average income (1000 VND) | Average food expenditure (1000 VND) | Total food expenditures/ annual income (%) |
|------|-------------|---------------------------|-------------------------------------|--|
| 1999 | 11,922 | 7583.6 | 8069.0 | 106.4 |
| 2001 | 12,346 | 9251.8 | 6374.5 | 68.9 |
| 2003 | 12,048 | 12,332.6 | 6523.9 | 52.9 |
| 2005 | 12,278 | 21,185.7 | 10,741.1 | 50.7 |
| 2007 | 12,818 | 25,034.3 | 11,365.6 | 45.4 |
| 2009 | 12,935 | 45,819.6 | 21,260.3 | 46.4 |
| 2011 | 13,075 | 76,311.7 | 45,939.6 | 60.2 |
| 2013 | 13,060 | 76,294.7 | 42,343.6 | 55.5 |

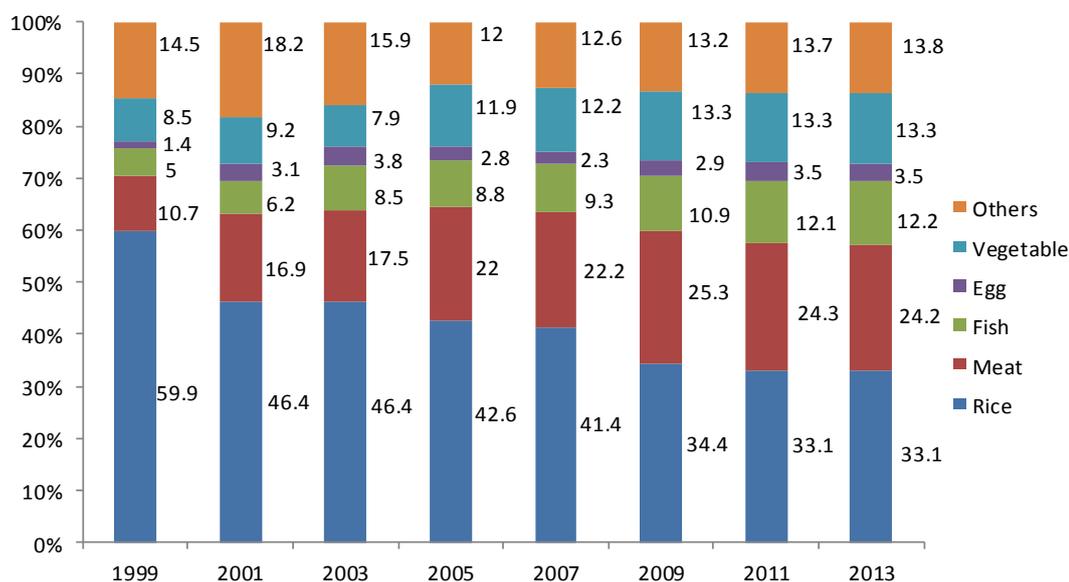


Figure 1. Percentage of spending on each type of food in total food expenditure of households from 1999 to 2013.

Contrast to the trendy increase of spending for rich-protein food in both well off and poor families, the proportion of money spending for rice has been decreased steadily in both groups. In recent years, the rates tended to gradually stabilize in the 2 groups. **Figure 2** also shows that from 1999 to 2013, the percentage of spending for rice in well-off households is always lower than that of poor households (in 2013: 31.4% and 36.5%, respectively). In contrast, the percentage of meat expenditure among the rich is higher than that of the poor households and the difference became bigger over the years (over 10%).

Table 2 shows that majority of household consumed meat at weekly interval, the proportion of household where meat was consumed only one time or less monthly was small. As of 2013, only 2.7% households consumed meat every day, 10% had meat 2 - 3 times/month, 1.8% had meat 1 times/month and 0.4% had meat less than 1 time/month.

4. Discussion

Our study found that together with the rapid growth of the country economy in Vietnam, the average households' income in Ba Vi had been increased 10 times from 1999 to 2013. Food spending had also increased about 5 times, especially protein rich food (meat, fish, and eggs). Data from the Economic Research Service (ERS) and Food Expenditure Series-United States Department of Agriculture (USDA) [23] showed that in low and middle income countries like Vietnam, the expenditure for food tended to increase markedly recently. The report indicated that in 2011, Vietnamese people spent approximately 35.9% of their incomes on food, higher than that of developed countries such as the UK (9.1%) or America (6.6%) [23]. Our study found much higher results, in 2011 food expenditure accounted for 60.2% of total income, yet in 2013 dropped slightly to 55.5%. This high proportion of income spending for food might indicate that spending for other essential needs such as education for children, health care accessibility and utilization might be low.

Our study also found a decrease in rice consumption and an increase in meat consumption, similar to the findings from review papers of Popkin B.M. (2012) [24], Rosegranta M.W. (1999) [25] and Soowon Kim (2000) [26]. The Vietnam Agribusiness Report 2011 and another study showed similar results of which consumption of poultry, pork, beef and veal increased significantly as incomes rised from 2006 to 2011 [27] [28]. The increase in meat consumption might be an indication of a possible occurrence of chronic, non-communicable diseases such as diabetes, cardiovascular diseases and cancers in the population (16), (17), (18). Rice expenditure in well-off households was often lower than that of poor households. In contrast, meat consumption was higher in the well-off households compared to the poor, with a sizable gap over the years (>10%). These results are similar to the findings of Nguyen Minh Thang (was conducted by analyzing the Vietnam Living Standard Survey (VLSS)

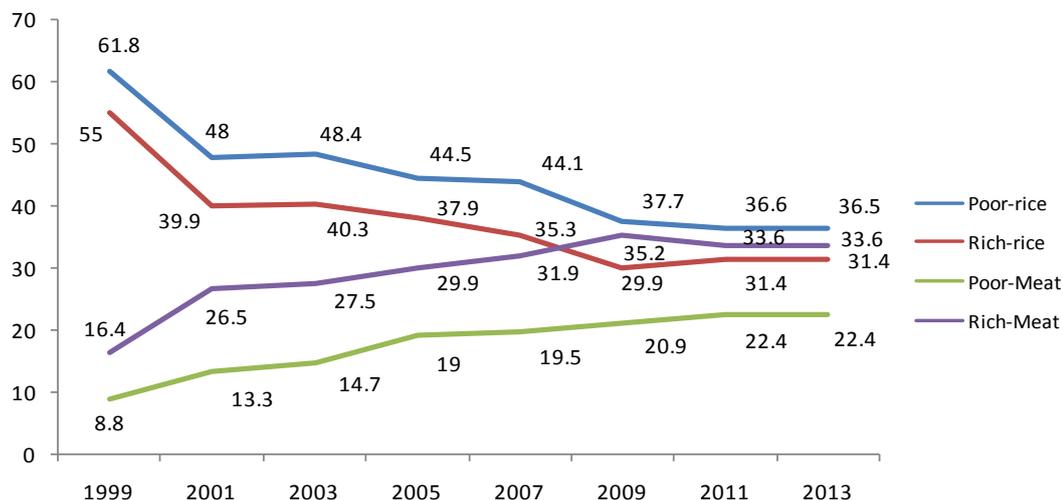


Figure 2. Proportion of rice expenditure, meat expenditure against the total food expenditure by household economic status from 1999 to 2013.

Table 2. Frequency of meat intake at the household level.

| Year | | Everyday | 3 - 6 times/week | 1 - 2 times/week | 2 - 3 times/month | 1 time/month | <1 time/month |
|------|---|----------|------------------|------------------|-------------------|--------------|---------------|
| 2003 | n | 418 | 3490 | 4682 | 2528 | 697 | 224 |
| | % | (3.5) | (29) | (38.9) | (21) | (5.8) | (1.9) |
| 2005 | n | 465 | 4916 | 4579 | 1727 | 379 | 155 |
| | % | (3.8) | (40.2) | (37.5) | (14.1) | (3.1) | (1.3) |
| 2007 | n | 576 | 6199 | 4545 | 1199 | 165 | 63 |
| | % | (4.5) | (48.6) | (35.7) | (9.4) | (1.3) | (0.5) |
| 2009 | n | 288 | 6477 | 4475 | 1320 | 258 | 98 |
| | % | (2.2) | (50.2) | (34.7) | (10.2) | (2) | (0.8) |
| 2011 | n | 345 | 6016 | 5059 | 1303 | 226 | 53 |
| | % | (2.7) | (46.3) | (38.9) | (10) | (1.7) | (0.4) |
| 2013 | n | 346 | 6011 | 5052 | 1298 | 229 | 52 |
| | % | (2.7) | (46.3) | (38.9) | (10) | (1.8) | (0.4) |

Test for trend: p > 0.05.

in 1992-1993 and in 1997-1998) and findings of Phuong Nguyen Van (2013) which investigated the different on food consumption between the rich and the poor [12] [27]. The study of Nguyen Minh Thang also showed that during 1990s, known as the period of transition toward market economy, there was a significantly increased in the consumption of protein-rich food and high-fat food in both quantity and the energy composition. Poor households or those living in rural areas consumed less protein-rich food or high-fat food, such as meat, fish, tofu, vegetable oil or animal fat than the non-poor households or those live in urban areas [12]. Our finding of an increase in the level of income per capita, together with the changes in food consumption, might indicate that quality of life of people in the studied areas had been improved.

Besides the benefits of changing dietary, the trendy increase in the consumption of protein-rich food are of particular concerns because it may increase the risk of obesity and other chronic, non-communicable diseases. Previous studies in developed countries such as the UK, U.S. and Latin Americas found that consumption of calories-rich food which mainly composed of protein and fat, especially red meat, increased the risk of chronic diseases such as gout, diseases of the pancreas type 2 diabetes, heart diseases [16] [17] [29], cancer (colon cancer, stomach cancer, kidney cancer [18] [30] and cardiovascular disease [16] [31].

Our study suggests a further study about changes of diseases structure in Vietnam in relation with changes in economic and eating patterns of Vietnamese people during this time period. Moreover, health education pro-

grams to enhance people awareness, attitude and practice of healthy diets should be developed and implemented to prevent above mentioned diseases.

Our study had several limitations. The study conducted in a mountainous district of Vietnam, therefore, generalizing the findings to other ecological region of Vietnam should be careful. Additionally, though interviews were conducted by experienced, well trained interviewers, inventory of previous monthly household income and food expenditure was a process which might involve recall bias. However, our study is the first ever large scale, longitudinal study to assess the situation of food expenditure in relation with household income from 1999 to 2013. Our study findings provide important suggestions regarding further studies of disease structure changing in Vietnamese people and development of public health interventions to raise population awareness and practice of healthy diet.

Competing Interest

All the authors of this article declare that there is no competing of interest regarding the publication of this article.

Authors' Contribution

Huong Thi Le, Chuc Nguyen Thi Kim contributed in the development of research protocol, data collection, data analysis; Phuong Le Hong, Thanh Nguyen Hoang, Xuan Le Thi Thanh and Giang Nguyen Thu did the data analysis and drafting the manuscript; Nga Thi Thu Vu provided significant contribution in drafting and finalizing the manuscript.

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References

- [1] Khoi, H.H. (2000) Discusses Some Nutritional Problems in the Transition Period. A Number of Research Projects on Nutrition and Food Safety and Hygiene. Medical Publishers, Hanoi.
- [2] Khoi, H.H. (2001) Nutrition in Transition. Medical Publishers, Hanoi.
- [3] Le, T.D., Le, B.M. and và Nguyen, C.K. (2003) Trends in Food Production and Food Consumption in Vietnam during the Period 1980-2000. *Malays Journal Nutrition*, **9**, 1-5.
- [4] Popkin, B.M. (2003) The Nutrition Transition in the Developing World. *Development Policy Review*, **21**, 581-597.
- [5] WHO/FAO (2003) Diet, Nutrition and the Prevention of Chronic Disease. Report of Joint WHO/FAO Expert Consultation. <ftp://ftp.fao.org/docrep/fao/005/ac911e/ac911e00.pdf>
- [6] Food and Agriculture Organization of the United Nations (2005) State of Food Insecurity in the World 2005.
- [7] United States Department of Agriculture (2005) Household Food Security in the United States. ERS Research Briefs. www.ers.usda.gov/publications
- [8] Mishra, V. and và Ray, R. (2009) Dietary Diversity, Food Security and Undernourishment: The Vietnamese Evidence. *Asian Economic Journal*, **23**, 225-247.
- [9] Godfray, H., Charles J., et al. (2010) Food Security: The Challenge of Feeding 9 Billion People. *Science*, **327**, 812-818.
- [10] Tuyen, L.D. and và Brica, N. (2002) Trends in Food Consumption and Main the Nutritional Status in Urban Vietnam. <http://www.fao.org/ag/ags/agsm/sada/asia/DOCS/DOC/Ledanh1.doc>
- [11] Khan, N.C. and Hoan, P.V. (2008) Vietnam Recommended Dietary Allowances 2007. *Asia Pacific Journal Clinical Nutrition*, **17**, 409-415.
- [12] Thang, N.M. and Popkin, B.M. (2004) Patterns of Food Consumption in Vietnam: Effects on Socioeconomic Groups during an Era of Economic Growth. *European Journal Clinical Nutrition*, **58**, 145-153. <http://dx.doi.org/10.1038/sj.ejcn.1601761>
- [13] Dien, L.N., Thang, N.M. and Bentley, M.E. (2004) Food Consumption Patterns in the Economic Transition in Vietnam. *Asia Pacific Journal Clinical Nutrition*, **13**, 40-47.

- [14] Nguyen, P.H., Strizich, G., Lowe, A., Nguyen, H., Pham, H., Truong, T.V., Nguyen, S., Martorell, R. and Ramakrishnan, U. (2013) Food Consumption Patterns and Associated Factors among Vietnamese Women of Reproductive Age. *Nutrition Journal*, **12**, 126. <http://dx.doi.org/10.1186/1475-2891-12-126>
- [15] Vietnam Household Living Standards Surveys in 2004 and 2006. truy cập ngày 17 July 2014. http://www.gso.gov.vn/default_en.aspx?tabid=483&
- [16] Renata, M., Sara, K.W. and Dariush, M. (2010) Red and Processed Meat Consumption and Risk of Incident Coronary Heart Disease, Stroke, and Diabetes Mellitus—A Systematic Review and Meta-Analysis. *Circulation*, **121**, 2271-2283.
- [17] Pan, A., Sun, Q., Bernstein, A.M., Schulze, M.B., Manson, J.E., Willett, W.C. and Hu, F.B. (2011) Red Meat Consumption and Risk of Type 2 Diabetes: 3 Cohorts of US Adults and an Updated Meta-Analysis. *American Journal of Clinical Nutrition*, **94**, 1088-1096. <http://dx.doi.org/10.3945/ajcn.111.018978>
- [18] Matos, E. and Brandani, A. (2002) Review on Meat Consumption and Cancer in South America. Mutation Research/Fundamental and Molecular. *Mechanisms of Mutagenesis*, **506-507**, 243-249. [http://dx.doi.org/10.1016/S0027-5107\(02\)00171-9](http://dx.doi.org/10.1016/S0027-5107(02)00171-9)
- [19] Chuc, N.T.K. and Diwan, V.K. (2003) FilaBavi, a Demographic Surveillance Site, an Epidemiological Field Laboratory in Vietnam. *Scandinavian Journal of Public Health*, **31**, 3-7. <http://dx.doi.org/10.1080/14034950310015031>
- [20] Ministry of Labor War Invalids & Social Welfare (2000) Decision 1143/2000/QĐ-LĐTĐ, November 1, 2000 on the Adjusted Poverty Line in 2001-2005.
- [21] Prime Minister of the Socialist Republic of Viet Nam (2005) Decision 170/2005/QĐ-TTg, 08/07/2005 on Issued Poverty Line in 2006-2010.
- [22] Prime Minister of the Socialist Republic of Viet Nam (2011) Decision 09/2011/QĐ-TTg, 30/01/2011 on Issued Poverty Line in 2011-2015.
- [23] The ERS Food Expenditure Series, truy cập ngày 14th May 2014. <http://www.ers.usda.gov/data-products/food-expenditures.aspx#26654>
- [24] Popkin, B.M., Adair, L.S. and Ng, S.W. (2012) Global Nutrition Transition and the Pandemic of Obesity in Developing Countries. *Nutrition Review*, **70**, 3-21. <http://dx.doi.org/10.1111/j.1753-4887.2011.00456.x>
- [25] Rosegranta, M.W., Leacha, N. and Roberta, V. (1999) Alternative Futures for World Cereal and Meat Consumption. *Proceedings of the Nutrition Society*, **58**, 219-234. <http://dx.doi.org/10.1017/S0029665199000312>
- [26] Kim, S., Moon, S. and Popkin, B.M. (2000) The Nutrition Transition in South Korea. *American Journal of Clinical Nutrition*, **71**, 44-53.
- [27] Nguyen, V.P. and Mergenthaler, M. (2013) Meat Consumption Patterns in Vietnam: Effects of Household Characteristics on Pork and Poultry Consumption. *53rd Annual Conference of the German Association of Agricultural Economists (GEWISOLA)*, Berlin, 25-27 September 2013.
- [28] Vietnam Agribusiness (2011) Report Q4. truy cập ngày 9 July 2014. <http://www.vietnam-report.com/wp-content/uploads/downloads/2012/02/B-VN-Agri-Q4-2011.pdf>
- [29] Ley, S.H., Sun, Q., Willett, W.C., Eliassen, A.H., Wu, K., Pan, A., Grodstein, F. and Hu, F.B. (2014) Associations between Red Meat Intake and Biomarkers of Inflammation and Glucose Metabolism in Women. *American Journal of Clinical Nutrition*, **99**, 352-360. <http://dx.doi.org/10.3945/ajcn.113.075663>
- [30] Kaluza, J., Åkesson, A. and Wolk, A. (2014) Processed and Unprocessed Red Meat Consumption and Risk of Heart Failure: Prospective Study of Men. *Circulation Heart Failure*, **7**, 552-557. <http://dx.doi.org/10.1161/CIRCHEARTFAILURE.113.000921>
- [31] Manjinder, S.S., Ian, R.W. and Kilim, M.P. (2001) Systematic Review of the Prospective Cohort Studies on Meat Consumption and Colorectal Cancer Risk—A Meta-Analytical Approach. *Cancer Epidemiology, Biomarkers & Prevention*, **10**, 439-446.