

## ORIGINAL COMMUNICATION

# Patterns of food consumption in Vietnam: effects on socioeconomic groups during an era of economic growth

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**Objective:** To identify if the nutritional status and improvements in Vietnam during the 1990s applied equally to the key vulnerable population groups (poor, rural, and ethnic minority) as it did to the nonpoor—largely in the urban areas.

**Design:** This study used cross-sectional analyses in the context of inequalities occurring in the diets of the poor and nonpoor that accompanied economic improvements during the Vietnam *Doi Moi* period.

**Setting:** During the *Doi Moi* period in Vietnam.

**Subjects:** A cross-sectional analysis was conducted on data using 23 839 individuals (4800 households) from the Vietnam Living Standard Survey (VLSS) in 1992–1993 and 28 509 individuals (6002 households) from the Vietnam Living Standard Survey in 1997–1998. Analysis for changes in food consumption was conducted on 17 763 individuals (4305 households) that were included in both surveys.

**Intervention:** None.

**Results:** After initiation of *Doi Moi* in 1986, the average Vietnamese person reached the dietary adequacy of 2100 kcal per day per capita in the early 1990s, but this did not improve during the next decade. The structure of diet shifted to less starchy staples while proteins and lipids (meat, fish, other protein-rich higher fat foods) increased significantly. Although the gap in nutrient intake between the poor and the nonpoor decreased, the *proportion of calories* from protein- and lipid-rich food for the poor is lower than for the nonpoor. The VLSS data showed that the increase of protein and lipid foods in total energy structure over the 5 y between the VLSS studies for poor households was 0.43% (CI = 0.33, 0.53) and 0.47% (CI = 0.41, 0.54) lower, respectively, than for nonpoor households ( $P < 0.0001$ ). Inequalities compared to the nonpoor were also found in both *quantity and quality of food consumption*. For example, poor households consumed (quantity) 127 kcal/day (CI = 119, 135) less from meat, and 32 kcal/day (CI = 27, 38) less from fats than nonpoor households ( $P < 0.0001$ ), and the proportion of calories consumed (quality) by poor households was 5.8% (CI = 5.4, 6.1) less from meat and 0.96% (CI = 1.2, 0.7) less from fats than by nonpoor households ( $P < 0.0001$ ).

**Conclusions:** Although the key vulnerable groups—rural, poor, and minority populations—showed improvements in diet, there still remains an inequity between these groups and the nonpoor of the population. In particular, the vulnerable groups consumed less of their daily consumption from the desirable high-quality proteins of animal foods and fats, and more from cereals and other starches—lagging the better-off populations in desired composition.

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### Introduction

During the 1990s, Vietnam undertook a rapid reform (*Doi Moi*) of its economic system. This reform was focused first on the agriculture sector, which experienced a marked increase in rice and other agricultural production (General Statistical Office, 2001). During this period of economic expansion, the food supply diversified. Many key products experienced marked decline in price, while real household income

increased and the rate of inflation decreased considerably. Linked with this was an important reduction in poverty but remarkably minimal change in malnutrition (World Bank, 1999; Bhushan *et al*, 2001; Glewwe *et al*, 2001).

Few studies have focused on food consumption and its trends in the context of poverty reduction targets (Doan, 1995; Tuyen *et al*, 2002). Others have shown that while the living standards of population have noticeably been improved, inequality has also increased and the gains from the structural reforms have not been equally shared, especially in health and education (World Bank, 1999; Bhushan *et al*, 2001; Thang & Popkin, in press).

There is limited dietary intake research in Vietnam and much of the knowledge comes either from food disappearance data or small surveys undertaken on unrepresentative samples of about 100 individuals. Vietnam appears to be undergoing a shift in the population's diet structure—including a decrease in carbohydrates, an increase in protein sources (ie, pork, poultry, and beef), and an increase in fruits and vegetables in harmony with the increase of food production (Food and Agriculture Organization of the United Nations, Vietnam Office, 1999). The percentage of total energy provided by food staples decreased in the same period (Hunt & Quibia, 2001). In the period 1990–1999, per capita meat consumption in Vietnam increased by 4.4% per year and reached 22.4 kg in 1999 (Tuyen *et al*, 2002). Data from a nutrition/health survey in selected regions of Vietnam show that a wide variety of edible vegetables species have been cultivated and contributed significantly to the overall micronutrients intake (Ogle *et al*, 2001). A study on child malnutrition showed that the price of meat and vegetables contributed significantly to the percentage of physically stunted and underweight children. It is also believed that products rich in protein increased because of both price decline and people's increased awareness of diet benefits (Thang *et al*, 2003).

With the hypotheses that the improvements in nutrition accompanying the overall economic improvements have not been equally beneficial and that the poor have not proportionately benefited, this study explored the disjuncture between the economic improvement and food consumption patterns as it applies to various population groups; examined the shifts in diets for the poor and nonpoor in Vietnam utilizing household food consumption data from two nationally representative surveys undertaken in 1992–1993 and 1997–1998; tried to understand the food consumption patterns and trends for Vietnam in the 1990s, and examined the role of poverty as it affected these patterns and trends.

## Methods

### Survey data

The Vietnam Living Standard Surveys (VLSSs) were conducted by the Vietnamese General Statistical Office (GSO) and are nationally representative of both urban and rural

sectors (General Statistical Office, 2000). The 1992–1993 survey was carried out in 240 rural hamlets and 60 urban blocks located in 150 communities throughout the country. The households were selected using a two-stage, self-weighting random sample—in principle giving every household in the country an equal probability of being selected. The total sample size of the 1992–1993 VLSS was 4800 households and 23 839 individuals (General Statistical Office, 1994). The 1997–1998 survey consisted of 6002 households and 28 509 individuals, of which 4305 households and 17 763 individuals were followed up from the 1992–1993 survey (General Statistical Office, 2000). Both of the VLSSs had multipurpose household and community components and collected comparable household food consumption and other related demographic and economic information.

This study focuses on the changes in the food consumption of 17 763 individuals residing in the 4305 households interviewed in both surveys.

The VLSSs estimated the food quantity consumed, over the 12-month period prior to the survey, by a household from either expenditures or home production using a standard array of 45 food items; additional data on special expenditures for holiday occasions were also collected. A food composition table (National Institute of Nutrition, 2001) developed to represent the mix of foods in each of these 45 food items was used to calculate macronutrient composition. A scale for the *adult equivalence energy requirement* (National Institute of Nutrition, 2001), based on the age, sex, and pregnant or breast-feeding status of an individual, was established by the Vietnam National Institute of Nutrition to standardize individual food consumption.

## Variables

The following variables were used for the analyses:

1. *Food intake measures*: The amount of foods consumed and their calories were treated as dependent variables to examine the *quantity* of food consumption and the trend of its changes over 5 y of *Doi Moi*. The structure of calories from the three main food groups consumed and from the three types of macronutrients intakes were treated as other dependent variables to examine the *quality* of food consumption and the trend of changes in quality of food consumption.

The 45 food items from the VLSSs were grouped into nine food groups. The nine groups of foods included (a) cereals and other starches, (b) meat, fish, tofu, and related protein-rich products (c) fats and oils, (d) soybean products, (e) vegetables, (f) fruits, (g) eggs, (h) milk and other dairy products, and (i) sugar and beverages. In this study, the *mass and calories of proteins and lipids* of each food group were calculated and presented in the form of food consumption per capita per day at adult equivalence. For the purpose of analysis, two forms of *calories* were calculated: (a) from each

of three main food groups (cereals and other starches; meat, fish, tofu, and related protein-rich products, and fats and oils) and (b) from the amount of macronutrients (carbohydrates, proteins, and lipids) intakes in all nine food groups.

1. *Socioeconomic and demographic status measures*: Our focus was on three inequality variables: (a) poverty status, (b) rural residence status, and (c) ethnic minority status. We would expect these three selected measures to reflect longer-term status of economic welfare (Strauss & Thomas, 1998) in Vietnam.

(a) *Poverty status*: In-depth expenditure measures were used to calculate household expenditures. There are two indicators to measure poverty status:

(1) *Food poverty*. The food poverty line was calculated on the basis of the cost of purchasing a minimum requirement of 2100 calories per person per day for an adequate diet. Below this line, total household expenditures are insufficient to purchase the minimum requirement of 2100 calories per person per day.

(2) *Overall poverty*. To determine the overall poverty line (enough expenditure for food but not enough for normal living), an additional factor was added for nonfood items. In Vietnam, the food poverty line was approximately 750 000 Dong in 1993 and 1 287 000 in 1998. The overall poverty line was set at 1 160 000 Dong in 1993 and 1 790 000 in 1998 (by the 1997–1998 survey, the exchange rate was: 1 USD = 12 000 Vietnam Dong). In this study, a household under the overall poverty line in 1993 was defined as *poor* (starting status), which we expected to influence the pattern and changes of food consumption over the study's 5-y period.

(b) *Rural resident status*: Focused on those who lived in rural areas. Rural and urban areas were classified as commune-based. Once a commune was classified as rural, people who lived in the commune were considered rural residents. Rural and urban classifications were not changed during the two surveys for the selected communes.

(c) *Ethnic minority status*: There are officially 53 ethnic groups within the nation. Ethnic minorities were defined as those who are not members of the dominant lowland ethnic Vietnamese, known as Kinh—which represents about 85% of the population and dominates socioeconomic affairs in Vietnam. This variable is considered a major one, since studies in inequalities in Vietnam indicate that ethnic minorities are among the most vulnerable groups (World Bank, 1999; Bhushan *et al*, 2001). This group was also a major concern of the government when the national program on poverty reduction and elimination of hunger focused on low-income households, people living in remote areas, and ethnic minority groups.

In this study, poor households, rural residents, and ethnic minorities were compared with nonpoor households, urban residents, and Kinh. These three inequality variables and their interaction—rural and poor as well as rural and minority were treated as independent variables.

## Analytical methods

An Intercooled Stata (version 7) analytical package developed by Stata Corporation (Stata Press, 2001) was used to calculate and convert food values into energy and macronutrients.

A linear regression model was used to identify if the nutritional status and improvements in Vietnam applied *significantly unequally* to the vulnerable populations as well as the level of inequity in the average per adult equivalent calories per day.

## Results

### Trend of changes in food consumption over 5 y between the VLSS studies

*Changes in quantity*. Table 1 describes the food consumption from the 1992–1993 survey and the changes over the subsequent 5 y to the 1997–1998 survey. Energy from animal foods increased but that of cereals and starches decreased. The main foods of the Vietnamese people in 1992–1993 were cereals, potatoes, rice, and other starches that contributed up to 85.9% of total energy intake while calories from other foods were low (i.e., only 6.8% of total calories are obtained from meats, fishes, tofu, and other protein-rich foods, and 2.4% from fats and oils). However, the sample survey in 1992–1993 shows that food consumption among the Vietnamese population had reached 2100 kcal per capita and the trend in food consumption changed rapidly in the subsequent 5 y. In the 1997–1998 survey, even though the total calories consumed per capita remained at about the same level as 5 y earlier (ie, a decrease of only 18 kcal or 0.1%), there was a remarkable increase in proteins and lipids (96 kcal or 4.7%) in the daily meals and the consumption of rice and other starches was reduced significantly (–128 kcal or 5.6%). Both the decrease in low-quality protein from cereal and starches and the increase in high-quality protein from animal food products are remarkable; however, the change in total energy (–18 kcal or 0.1%) and total protein (+1.8 g/day) is not significant. Likewise, the increase in calories and quantity of lipid from fats and edible oils is not significant and add only 8.7 g/day to the total fat amount.

The magnitude of changes and the differences in the trends in food consumption are presented in Table 2. During the 5 y period under study, the gap in nutrient intake between the poor and nonpoor became significantly narrower—which differs from other health indicators, which reveal an expansion of inequalities. Table 2 indicates a larger improvement of nutrient intakes from rich proteins and lipids for the rural, the poor, and the rural and poor vs the urban, the nonpoor, and the nonrural and poor. For example, the changes in the number of kcal/day from lipids between 1992–1993 and 5 y later increased from 287.1 to 333 (45.9 kcal/day increase) for the nonpoor, while they increased from 153.9 to 253.8 kcal/day (99.9 kcal/day increase) for the poor. These evidences show a significant improve-

**Table 1** Food consumption per capita average adult equivalence in 1992–1993 and changes over the next 5 y by food groups<sup>a</sup>

Food group	Food consumption per day per capita 1992–1993				Changes over 5 y (to 1997–1998)			
	kcal		Protein (g)	Lipids (g)	kcal		Protein (g)	Lipids (g)
	(kcal)	(%)			(kcal)	(%)		
<i>Starches</i>								
Cereals, potatoes, and other starches	1824	85.9	41.4	7.7	–128	–5.6	–2.1	–0.2
<i>Proteins</i>								
Meat, fish, shellfish, and tofu	144	6.8	14.3	9.6	43	2.1	3.4	3.3
Eggs	4	0.2	0.3	0.2	3	0.2	0.3	0.2
Soybean products	9	0.4	0.6	0.1	3	0.2	0.2	0.0
<i>Fats and edible oils</i>								
Other	51	2.4	0.7	5.2	47	2.2	0.1	5.2
<i>Other</i>								
Vegetables	28	1.3	2.4	0.0	–5	–0.2	–0.3	0.0
Fruits	24	1.1	0.4	0.1	3	0.2	0.1	0.0
Milk and other dairy products	3	0.1	0.2	0.2	2	0.1	0.1	0.1
Sugar and beverages	38	1.8	0.2	0.1	14	0.7	0.1	0.0
<b>Total</b>	<b>2129</b>	<b>100</b>	<b>60.5</b>	<b>23.0</b>	<b>–18</b>	<b>–0.1</b>	<b>1.8</b>	<b>8.7</b>

<sup>a</sup>n=17 763.**Table 2** Calories intakes (quantity) per day adult equivalence in 1992–1993 and changes over 5 y by poverty indicators

Population group	Calories (kcal/day)						n
	Carbohydrates		Protein		Lipids		
	1992–1993	Change	1992–1993	Change	1992–1993	Change	
<i>Poverty</i>							
Nonpoor	1697	–187.9	277.2	–15.2	287.1	45.9	7103
Poor	1659	–44.6	218.4	22.4	153.9	99.9	10 660
<i>Minority</i>							
No	1652	–99.4	243.2	8	211.5	81	14 931
Yes	1789	–113.2	234	3.6	183.6	63	2832
<i>Type of residence</i>							
Urban	1375	–83	240.4	0.8	277.2	57.6	3157
Rural	1738	–106	242	8.8	192.6	82.8	14 606
<i>Rural and minority</i>							
No	1640	–97.3	242.8	7.6	213.3	80.1	15 298
Yes	1882	–129.6	237.2	5.2	171	67.5	2465
<i>Rural and Poor</i>							
No	1665	–171.2	269.2	–10.4	273.6	52.2	7959
Yes	1681	–44.9	219.6	21.6	153	99	9804
<b>Total</b>							<b>17 763</b>
<b>Average</b>	<b>1674</b>	<b>–101.7</b>	<b>242</b>	<b>7.2</b>	<b>207</b>	<b>78.3</b>	

ment of nutrient intakes for the poor and other vulnerable groups during the *Doi Moi* period.

**Changes in quality.** Even though the quantity of food show a significant improvement, the quality of changes should be further examined. Table 3 shows the percentages of energy from carbohydrate, proteins, and lipids from daily meals as well as changes in energy contribution from these different macronutrients intakes. Table 3 shows that the

proportion energy from carbohydrates from a Vietnamese daily meal was 78.9% in 1992–1993 and this proportion declined to 74.1% in 1997–1998. The proportion of energy from protein in 1992–1993 (11.4%) increased only 0.3% over 5 y. The proportion energy from lipids in 1992–1993 (9.8%) increased 3.7% over 5 y. The table also shows that the poor, the minorities, and the rural population groups consumed more high carbohydrates but less protein and fat than the nonpoor, the Kinh (largest minority group), and the urban

**Table 3** Dietary energy structure consumed per day (quality) adult equivalence (%) in 1992–1993 and changes over 5 y by poverty indicators

Population group	Dietary energy structure consumed per day adult equivalence						n
	Carbohydrates		Protein		Lipids		
	1992–1993 (%)	Change (%)	1992–1993 (%)	Change (%)	1992–1993 (%)	Change (%)	
<i>Poverty</i>							
Nonpoor	75.0	–8.3	12.3	–0.7	12.7	2.0	7103
Poor	81.7	–2.2	10.8	1.1	7.6	4.9	10 660
<i>Minority</i>							
No	78.4	–4.7	11.5	0.4	10.0	3.8	14 931
Yes	81.1	–5.1	10.6	0.2	8.3	2.9	2832
<i>Type of residence</i>							
Urban	72.7	–4.4	12.7	0.0	14.6	3.0	3157
Rural	80.0	–4.9	11.1	0.4	8.9	3.8	14 606
<i>Rural and minority</i>							
No	78.2	–4.6	11.6	0.4	10.2	3.8	15 298
Yes	82.2	–5.7	10.4	0.2	7.5	2.9	2465
<i>Rural and poor</i>							
No	75.4	–7.8	12.2	–0.5	12.4	2.4	7959
Yes	81.9	–2.2	10.7	1.1	7.4	4.8	9804
Total							17 763
Average	78.9	–4.8	11.4	0.3	9.8	3.7	

**Table 4** Regression of the changes in energy structures over 5 y, with poverty variables

Population group	Percent changed kcal/day from carbohydrate			Percent changed kcal/day from protein			Percent changed kcal/day from lipid		
	Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>	Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>	Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>
Poor	–7.95	0.000	–11.28 –4.63	–0.43	0.000	–0.53 –0.33	–0.47	0.000	–0.54 –0.41
Rural areas	3.67	0.000	1.89 5.44	0.17	0.000	0.11 0.22	0.17	0.000	0.13 0.20
Minority	1.53	0.475	–2.67 5.73	0.09	0.170	–0.04 0.21	–0.01	0.758	–0.09 0.07
Rural and minority	3.73	0.107	–0.80 8.25	0.15	0.030	0.01 0.28	0.20	0.000	0.11 0.29
Rural and poor	–5.31	0.004	–8.87 –1.74	–0.09	0.101	–0.19 0.02	–0.04	0.214	–0.11 0.03
Constant	–4.75	0.000	–6.26 –3.24	–0.13	0.000	–0.18 –0.09	–0.01	0.474	–0.04 0.02

<sup>a</sup>Coefficient.

<sup>b</sup>Significance.

<sup>c</sup>Confidence interval.

residents. There were some increases in energy consumed (kcal/day) from protein and lipids for the poor and the rural population group. However, the increases were low.

The changes in macronutrients intakes shown in Table 3 were further examined by regression analysis. Coefficient and its significance of the changes in energy structure over the 5 y period for selected population groups are presented in Table 4. Even though the poor and rural populations gained more energy from protein and lipids (Table 2), changes in the proportion of calories from protein and lipids for each group were significantly different. Regression models show that the changes—decrease of calories consumed from carbohydrate, and increase protein and lipid for the poor—are significantly smaller (7.95, 0.43, and 0.47%, respectively) than for the

nonpoor ( $P < 0.0001$ ). In the meantime, regression analysis did not show negative changes for rural residents as suspected in our research hypothesis. The decrease of calories consumed from carbohydrates, and increase in protein and lipids for the rural residents are significantly larger (3.67, 0.17, and 0.17%, respectively) than for urban residents ( $P < 0.0001$ ). However, some negative differences in changes of macronutrients intake among poor people living in rural areas were found in regression.

### Current situation of food consumption

In this analysis, the current situation of food consumption was examined by looking at calories consumed per day adult

equivalence in 1997–1998. The *quantity* of calories obtained from the food groups of cereals, meats, and fats, as well as the *proportion (quality)* of calories from those three food groups, were analyzed.

### Quantity

The regression analysis shown in Table 5 indicates that the household poverty status significantly influenced food consumption and patterns. Poor households were more likely to eat more foods rich in starches and less in proteins and lipids. People living in rural areas or people belonging to an ethnic minority group were more likely to suffer from a lack of meats and fats. For example, the total energy from meats and fats that the poor population consume a day are 126.8 and 32.2 kcal/day less than consumed by the nonpoor; the total energy from meats that rural people consume a day are 31.1 kcal/day less than consumed by urban people; the total energy from meats and fats that the minority population consumes a day are 41.3, and 19.3 kcal/day less than that consumed by the Kinh. Minority populations, especially, not only eat less foods rich in proteins and lipids, but also less food rich in starches.

### Quality

The patterns of food consumption are clearer when the quality of the consumed food is examined. Table 6 presents the regression of the proportion of calories from the main foods among all food consumption per adult equivalence per day in 1997–1998 shown by poverty groups and selected demographic variables. Findings from this analysis showed significant differences in the patterns of food consumption. The factors of inequity—namely household poverty status and area of residence—all significantly influenced the structure of food consumption. People living in rural areas or living in poor households, were more likely to eat more starches but less meat other protein and lipid-rich foods than those living in urban areas or living in better-off households (Table 7).

### Discussion

This study addresses one of the important issues of public health in Vietnam—nutritional matter—and comes at an important time. In Vietnam, the national program on poverty reduction and elimination of hunger was mainly instigated for low-income households, people living in rural

**Table 5** Regression of the calories of consumption (quantity) per day adult equivalence in 1997–1998, with poverty variables

Population group	kcal/day from cereals				kcal/day from meat				kcal/day from fats			
	Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>		Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>		Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>	
Poor	38.9	0.026	4.7	73.0	-126.8	0.000	-134.6	-119.0	-32.2	0.000	-37.9	-26.6
Rural areas	464.5	0.000	451.2	477.8	-31.1	0.000	-34.1	-28.1	-0.3	0.790	-2.5	1.9
Minority	-150.9	0.000	-185.6	-116.3	-41.3	0.000	-49.2	-33.4	-19.3	0.000	-25.0	-13.6
Rural and minority	342.6	0.000	304.4	380.7	18.4	0.000	9.7	27.1	8.8	0.006	2.5	15.1
Rural and poor	-137.6	0.000	-174.0	-101.2	25.1	0.000	16.8	33.4	-4.5	0.143	-10.5	1.5
Constant	1303	0.000	1292	1313	256	0.000	253.5	258.3	113.1	0.000	111.3	114.8

<sup>a</sup>Coefficient.

<sup>b</sup>Significance.

<sup>c</sup>Confidence interval.

**Table 6** Regression of proportion (food structure/quality) of calories from main foods among consumption per day adult equivalence in 1997–1998, with poverty variables

Population group	Percent kcal/day from cereals				Percent kcal/day from meat				Percent kcal/day from fats			
	Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>		Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>		Coef <sup>a</sup>	Sig <sup>b</sup>	CI <sup>c</sup>	
Poor	11.62	0.000	10.97	12.26	-5.76	0.000	-6.10	-5.41	-0.96	0.000	-1.21	-0.72
Rural areas	8.34	0.000	8.09	8.59	-3.82	0.000	-3.96	-3.69	-1.11	0.000	-1.20	-1.01
Minority	1.63	0.000	0.98	2.29	-0.62	0.001	-0.97	-0.27	-0.23	0.069	-0.49	0.02
Rural and minority	1.99	0.000	1.27	2.71	-1.16	0.000	-1.55	-0.78	-0.71	0.000	-0.99	-0.44
Rural and poor	-4.50	0.000	-5.18	-3.81	2.14	0.000	1.77	2.50	-0.08	0.564	-0.34	0.19
Constant	69.82	0.000	69.62	70.02	13.94	0.000	13.84	14.05	6.13	0.000	6.05	6.20

<sup>a</sup>Coefficient.

<sup>b</sup>Significance.

<sup>c</sup>Confidence interval.

**Table 7** Inequities in food consumption: poor, rural poor, rural, and ethnic minorities

<i>Household type</i>	<i>Trends</i>	<i>Current calorie intakes (quantity of food)</i>	<i>Current food consumption (quality of food)</i>
Poor households (overall)	<p><i>Positive</i>            Decreased consumption of rice and other starches.            Increased consumption of meat, fishes, tofu, fats, and oils.</p> <p><i>Negative</i>            Increased kcal/day from protein and lipid in energy is significantly slower than the nonpoor.</p>	<p><i>Negative</i>            Consumed more rice and other starches than nonpoor.</p> <p>Consumed less meat, fish, tofu, fats, oils, and other protein- and lipid-rich foods, than the nonpoor.</p>	<p><i>Negative</i>            Consumed more energy from rice and other starches than nonpoor.</p> <p>Consumed less energy from meat, fish, tofu, fats, and oils than the nonpoor.</p>
Rural households	<p><i>Positive</i>            Increased consumption of meat, fish, tofu, fats, and oils.</p> <p><i>Negative</i>            Kcal/day from carbohydrate in energy structure decreased and decreased significantly slower than urban residents.</p>	<p><i>Negative</i>            Consumed more rice and other starches than urban residents.</p> <p>Consumed less meat, fish, tofu, fats, and oils than urban residents.</p>	<p><i>Negative</i>            Consumed more energy from rice and other starches than urban residents.</p> <p>Consumed less energy from meat, fish, tofu, fats, and oils than urban residents.</p>
Ethnic minorities	<p><i>Negative</i>            Unsure</p>	<p><i>Negative</i>            Consumed less meat, fish, tofu, fats, and oils than Kinh people.</p>	<p><i>Negative</i>            Consumed more energy from rice and other starches than Kinh people.</p>

and remote areas, and ethnic minority groups. This became more and more important, as it is understand that an improvement of people's health and reduction of poverty are closely related. Poverty rises from the deprivation of the most basic assets, including health. However, the use of health services is not random and households often make difficult decisions that are influenced by their income, access to credit, and the availability of services and their prices. This can lead to a vicious circle of poverty—the poor remain poor due to their low levels of health and at the same time they cannot afford to make investments in health care because of their poverty. Public health policies, therefore, can play a major role in helping the poor escape from this poverty trap.

Nutrition plays a very important role in welfare, and good nutrition is essential to providing good, long-term health of both children and adults. However, in Vietnam, nutrition has long been a concern of the government and despite significant gains in overall health status, malnutrition remains at quite high levels. Data from the United Nations Development Programme (UNDP) shows that Vietnam has a higher prevalence of childhood malnutrition than other countries with similar levels of human development (UNDP, 2000). There is a close link between the number of health problems directly associated with the lack of consumption of micronutrients—for example, anemia as a result of the low consumption of iron. Nutrition also plays an important role

in fighting infections and helping people recover from illness. The overall health status plays a role in nutrition, as a sick child will not have the same amount of energy for growth since they have to dedicate more energy to fighting infection. Nutrition and caloric consumption also play an important role in the capacity to work. It is possible for the poor to fall into a vicious circle over nutrition; without sufficient income, they have little opportunity to purchase sufficient food and thus will not be able to generate sufficient income. Indeed, the monetary indicator of poverty is primarily a measure of the household's ability to purchase a sufficient amount of food and maintain a minimum nutritional standard (Dasgupta, 1993). A better diet has evolved, but malnutrition still exists! Why would this happen? Have the diet improvements not evolved far enough to eliminate poverty? Is the diet still not including the proper food groups? These are the questions that are partly addressed in the study of food consumption in Vietnam.

The study showed both achievements and shortcomings in food consumption patterns in Vietnam during *Doi Moi* when examining both the trends of changes over the 5-year period between the VLSS studies (1992–1993 to 1997–1998) and the current situation of food consumption.

The analysis of the quantity of food consumption showed that the decline in poverty in Vietnam was linked to dietary

improvements among all economic groups. By the end of the 1990s, both poor and nonpoor households consumed more foods rich in proteins and fat than in the early 1990s, with the greater improvement seen among the poor. However, in Vietnam, 80% of the population live in rural areas and do farming. In urban areas, workers are the main group with low incomes. Physical demands of the poor are not the same as they are for the nonpoor. Given the fact that the poor are engaged in more strenuous occupations that use more energy than the nonpoor, the increase of food consumption may not meet the energy needed and probably is less than for the nonpoor. Nonetheless, while gains have accrued to the rural, poor, and minorities, their gains are still unbalanced and far behind the nonpoor, urban, and nonminority groups. These results are clearly related to inequality in food consumption and probably are factors in the limitation of improvements in malnutrition.

The analysis of the quality of food consumption showed that while the changes of rich protein and fat food intakes are significantly increasing, the increase in structure of calorie intake for the poorer people remains at a slower rate. Poor and rural households consume less meat, fish, tofu, fats, and oils than the nonpoor and urban households. Therefore, the composition of their energy intake from these foods also is less than that of urban residents.

The above analyses show positive evidences of the impact of *Doi Moi* on the changing of consumption patterns in Vietnam. Without a doubt, a large part of the progress in the elimination of Vietnam national hunger and poverty reduction is due to the spectacular growth in the national economy. While inequality increases for many health indicators (World Bank, 1999; Bhushan *et al*, 2001), this study reveals larger increases in food consumption (quantity) for the poor than for the nonpoor. Study results that reveal significant differences in energy structures between the poor and nonpoor show that the current status of food consumption and its gap (quantity and quality) between poor and nonpoor, however, remains a public concern.

Obviously, when a change in food consumption occurs for the whole country, there are two critical concerns: (a) the differences in the amount of calorie intake (quantity) and (b) the structure of food consumption (quality) among the poor and nonpoor, rural and urban residents, and the minority and nonminority population groups. The critical nutritional concerns indicate that poverty status is one of several critical factors that determine hunger and unbalanced food consumed by the population.

In short, the inequity in food consumption shown by examining the differences of both the poor and nonpoor in the decade of the 1990s is summarized as follows:

- (a) As a positive change, the poor decreased their consumption of rice and other starches and increased their consumption of meat, fish, tofu, fats, and oils—but at a significantly slower rate than the nonpoor.
- (b) However, on the negative side, although the poor increased their energy from protein- and lipid-rich foods, they did so at a significantly slower rate than the nonpoor. They also consumed more (quantity and quality) rice and other starches and less of their calories and energy from protein- and lipid-rich foods than the nonpoor. The trends for the rural household group were similar to the poor households. The ethnic minorities also had a negative trend, in that they consumed more (quantity and quality) rice and other starches and less of their calories and energy from protein- and lipid-rich foods than the larger Kinh group.

This study's results and findings may have an implication for the Vietnamese government to modify food policies. Understanding the food patterns and the trends of food changes will help Vietnam to take the necessary action to ensure food security—one of the basic causes of malnutrition. A modified policy on food redistribution between the different areas of residence (urban and rural), nutrition education (focusing on the vulnerable population groups), transportation improvements in rural areas and the like will contribute to the improvement of the nutrition status of the whole population. Distribution of household resources might be one of the obstructions for the improvement of food consumption, as the cost for health care (nonfood items) and education was so expensive for the poor (Bhushan *et al*, 2001). While income of poor households are still not sufficient to buy high-quality food, a nutritional education program is clearly important to change eating behaviors in rural areas and to help the poor to prepare a better meal with food available in their gardens, ponds, etc. Improvement of infrastructure, especially the roads in rural and remote areas can support food exchanges between regions, and reduce food prices. It may be difficult for the Government to significantly increase investments in all sectors in the short run. However, the equity impact of existing investments can be considerably improved by rationalizing allocations between subsectors within the health and by improving geographical targeting.

There are some limitations in this study:

- (a) The study was based on the two VLSS surveys in 1992–1993 and in 1997–1998 where food consumption data were not collected on individual diet. Therefore, control variables related to individual demographic factors that might influence food consumption patterns were not examined.
- (b) There were some appreciable increases for kcal/day from protein for the rural, and poor group groups, but these increases should be further analyzed relative to the changes among groups. For example, the effect of the poverty transition (from poor to nonpoor, from nonpoor to poor, or remaining in a poor/nonpoor status), the increase/decrease of family income, or price of food, on food expenditures and food consumption.



- (c) Other questions that need to be addressed are factors influencing the trends in both quantity and quality of food consumed in the *Doi Moi* period and the patterns of changes in the context of the urgent task facing the nation to eliminate hunger and alleviate poverty, such as eating behaviors, food and health education, etc.
- (d) The study showed a limitation, needing further study, to explore the relationship between food consumption and nutritional status, especially among poor groups, the differences in the distribution for the different SES groups in the average intakes, etc.

In conclusion, although the key vulnerable groups—rural, poor, and minority populations—showed improvements in diet, there still remains an inequity between these groups and the nonpoor of the population following the 5-y period of economic improvement. In particular, the vulnerable groups consumed less of the desirable high-quality proteins of animal foods and fats, and more was from cereals and other starches—lagging the better-off populations in desired composition.

Regression analyses did not show negative changes for rural residents as suspected in our research hypothesis. The decrease of calories consumed from carbohydrates, and the increases in protein and lipids for the rural residents are significantly larger (3.63, 0.16, and 0.17%, respectively) than for urban residents ( $P < 0.0001$ ). However, some negative differences in changes of macronutrients intake were found among the poor populations living in the rural areas.

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