Pro-Poor
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Policy
Initiative

Household Expenditure on Food of Animal Origin: A Comparison of Uganda, Vietnam and Peru

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A Living from Livestock

PPLPI Working Paper No. 43

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PREFACE

This is the 43rd of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Livestock is vital to the economies of many developing countries. Animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. For low income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock and livestock products in developing countries, though starting from a low base, is growing rapidly.

Three countries were selected for the study, namely Uganda, Vietnam and Peru. The paper investigates the proportion of household budget spent on livestock products and its variation across urban and rural areas, income quintiles and across countries. In the first step of the analysis the countries were analyzed individually and in a second step the findings were compared across countries and tested econometrically.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author, PPLPI and the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization (FAO).

Disclaimer

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Keywords

Animal source food, rural populations, urban populations, income quintiles, household expenditures.

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EXECUTIVE SUMMARY

Introduction

Livestock contribute to the livelihoods of an estimated 80percent of the world's rural poor by providing a small but steady stream of income and food. On the income side, livestock raises farm productivity, increases assets, provides a form of insurance to withstand shocks and creates employment opportunities. On the consumption side, livestock plays an important role in improving the nutritional status of low income households by addressing micro and macro nutrient deficiencies. While poverty is a multidimensional phenomenon, a large part of being poor is linked to (not) having access to adequate food and nutrition which is intrinsically related to household work opportunities and household members' health.

Over the last few decades, the rise in population growth and incomes and the consequent shift toward larger urban areas have coincided with significant shifts in household dietary patterns and a growing demand for products of animal origin, although differences in the consumption of animal products between the developed and developing world remain large. Individuals in developed countries typically consume three to four times the meat and five to six times the milk when compared to individuals in developing countries.

In this context, this paper investigates household consumption patters of animal food products, which include milk, eggs meat and fish, and aims to corroborate theoretical expectations with empirical findings. The focus of the paper will be to assess what proportion of the household budget is spent on livestock products and how this may vary with income both within and across the countries. Three countries were selected for the study, namely Uganda, Vietnam and Peru. The reason for this is twofold: firstly these countries belong to the group of PPLPI focus countries and secondly they have recent and comprehensive micro level data available. In the first step of the analysis the countries were analyzed individually. In the second step the findings were compared across countries and then tested econometrically.

Expenditure Patterns by Countries

The analysis is descriptive in nature and compares food expenditure shares and breakdown across location and income quintiles within and across countries. All consumption sources are included in the food consumption expenditure aggregate, specifically purchases, home production consumption and food gifts.

Uganda

Rural households spend less but the distribution of expenditure across quintiles is more homogenous compared to urban households. The food expenditure share reduces as income rises and overall rural households use a larger share of their household budget for food consumption. The livestock product share of food expenditure is lower in the urban areas but urban households nevertheless consume more livestock products. For example the poorer urban households consume approximately one-and-a-half times the amount of meat compared to rural households. As income increases the absolute expenditure on livestock products increases and the differences between urban and rural areas reduce. Households consume more fish compared to meat but spend a smaller part of the household budget on fish consumption. As income increases the share of expenditure on fish reduces.

Vietnam

Households in rural areas have lower expenditure levels and higher food budget shares compared to urban areas. As income increase the discrepancies in expenditure levels between urban and rural households increase while the food budget shares reduce. Urban households spend more on livestock products and consume 1.5 times the amount of livestock products consumed by rural households. In the case of livestock products, both in rural and urban areas, the expenditure levels, the consumption levels per capita and the food budget share increase as income increases. The pattern is slightly different in the case of fish. In urban areas across income quintiles, expenditure levels increase, shares reduce and quantities per capita slightly reduce. In rural areas, expenditure levels, food expenditure shares and quantities consumed increase as income increases.

Peru

Urban households are significantly wealthier than rural households, spending approximately 2.5 times as much as the rural households while the household sizes are similar across locations. As income increases, household expenditure increases as does the divide between urban and rural expenditure levels. Urban households spend more on livestock products and consume more meat per capita than rural households. Expenditure on livestock products in urban areas amounts to a smaller share of the total food budget compared to the rural areas. Generally, households spend less on fish and much smaller quantities of fish are consumed per capita per year, although, even in the case of fish, urban households consume more than rural households.

Comparisons Across Countries and Econometric Analysis

In the cases of Uganda and Vietnam which fall in the same income level group, when comparing rural areas, the expenditure levels and shares for livestock are similar. The levels vary with increasing income, as is the case for the rural Peruvian households where per capita expenditure is higher and the food expenditure share decreases by approximately a half. Rural households in Uganda spend Int$ 64 and 9.5 percent of the food budget on livestock products, Int$ 55 and 11.1 percent in Vietnam and Int$ 79 and 9.6 percent in Peru. Quantities of meat consumed in the rural areas of Peru are roughly double the amounts consumed in rural Uganda and Vietnam.

When comparing the urban households of the three different countries, the trends are similar but the livestock food share is lower for urban Peruvian households compared to the urban households of Uganda and Vietnam which instead use comparable shares of their food expenditure for livestock products. Further, the amount of meat consumed in urban areas in Peru is considerably higher, approximately treble, that in the equivalent areas in Uganda and Vietnam.

The results obtained with an econometric analysis of household expenditure on livestock products as a function of household income level, household size, urban or rural location and country dummies show that these characteristics are statistically significant and positive, confirming theoretical expectations. *Ceteris paribus*, the model predicts that a one percent increase in household income would yield a 0.5 percent increase in livestock products' expenditure; as the household size grows by one percent, livestock products expenditure will increase by 0.3 percent; as a household moves from a rural to an urban area, the livestock expenditure level would increase by 0.35 percent. Finally the country effects show that, on the margin, households in Uganda and Vietnam consume more livestock products compared to Peruvian households which may be a consequence of differences in household preferences.

Conclusions

The empirical analysis confirms theoretical expectations and finds that:

- Wealthier households consume more livestock products and therefore have more diverse food consumption patterns. This finding is maintained by area location, within each country and across countries.
- Income disparities within urban areas are larger, nevertheless households living in urban areas consume more livestock products compared to rural area households.
- In rural areas, livestock represent both a consumption and a capital good since households consume livestock goods but also hold livestock. Nonetheless, although the rural and poorer households use a larger share of their household budget for food consumption, they consistently consume smaller amounts of livestock products. This shows that the poorer rural households do not manage to gain access to livestock nutrients, although they may be producing them or holding livestock themselves. Thus, policies need to be put in place to ensure that rural households can consume more livestock products. Policies that aid productivity increases or allow more market integration will consequently enable these poorer households to consume more livestock products without hindering their own assets and livelihoods.
- In the cases of Uganda, Vietnam and Peru, trends in fish consumption are not as clear as those for livestock products and tend to be country specific.

INTRODUCTION

Livestock contribute to the livelihoods of an estimated 80percent of the world's rural poor (LID, 1999) by generating income and providing food for consumption. On the income side, livestock raises farm productivity, increases assets, provides a form of insurance to withstand shocks in times of distress, can provide draught power and creates employment opportunities. On the consumption side, livestock plays an important role in improving the nutritional status of low income households by addressing micro and macro nutrient deficiencies.

Although poverty is a multidimensional phenomenon, an important dimension of poverty relates to the (non-)access to adequate food and nutrition. Adequate nutrition plays a key role within the livelihoods of households since it is intrinsically related to household work capacity and household members' health. Proper nutritional intake allows individuals to be healthier, more resilient to illnesses and thus more able to work (Rae, 1998; Deaton, 2000). Animal source foods which include meat, milk, eggs and fish, when integrated in the human diet provide high-quality, complete and readily digestible protein and energy. Indeed animal source foods supply micronutrients which include iron, zinc, vitamin A, B12 and calcium. Furthermore, meat, through its content of heme iron, when eaten in conjunction with plant foods, enhances the absorption of zinc and iron and therefore has the potential to address common macro and micro nutrient deficiencies. Consequently the inclusion of animal source foods in the diet of the household promotes growth, cognitive function and health improvements (Neumann, 2006).

Differences in the consumption of animal products between the developed and developing world are large and people in developed countries typically consume three to four times the meat and five to six times the milk compared to people in developing countries. However, in the developing countries over the last few decades, the growth in incomes and the shift toward larger urban areas have coincided with significant shifts in household dietary patterns and a growing demand for products of animal origin and per capita meat and milk consumption and the percent of calories and protein from livestock-derived food generally have increased over time across regions. By and large, GDP per capita is considered to be positively related to the consumption of animal source food products. The study by Delgado *et al,* (1999), using data of 78 developing and developed countries, illustrates how per capita meat consumption increases with increasing per capita income.

It is important to note though that the link between income rise and nutritional intake improvement is debated in the literature and that empirical evidence is somewhat contradictory. There is a large body of literature that discusses the shifts in household dietary patterns subsequent to income rise, stemming also from the work on consumer demand by Deaton and Muellbauer (1980). When analyzing the relation between income growth and improved nutrition, two effects take place: (a) on the one hand as income rises households shift from consumption of some food groups to others, from staples to animal products for example, and (b) income increase is also followed by a switch to higher quality goods or brand goods within the same food group (Sadoulet and de Janvry, 1995). Thus, the debate in the literature is whether the income elasticity of calorie intake is perhaps not as high as the income elasticity of food expenditure or even not significantly different from zero.

Two viewpoints on this issue can be found in the literature. On the one hand authors like Behrman and Deolalikar (1987) maintain that there is little or no relation between income and increases in nutritional intake since their empirical estimation finds a calorie elasticity close to zero. If this were the case the implications for development policy would be severe since policies would no longer be effective. On the other hand, Submaramanian and Deaton (1996) and Thomas and Strauss (1997) argue that a

positive relation between income and nutrition exists even though the food expenditure elasticity might be larger than the elasticity of calorie intake.

Basic economic theory suggests that a rational consumer will choose what to consume based on the commodities' prices the individual or household is faced with. Thus generally poorer individuals or households will tend to consume cheaper goods such as staples and will not always have access to animal products (Sadoulet and de Janvry, 1995). This paper aims to assess what proportion of the household budget is spent on livestock derived food products and how this varies with income both within country and between countries. The analysis presented in this paper will primarily be of a descriptive nature. Thus at first the total food and livestock derived food shares of household budgets are computed. Secondly, fish expenditure shares are calculated and compared with the livestock budget shares. Thirdly, within the country, the food expenditure shares are investigated by location diversification and by income quintile. Finally, the main results are compared across selected countries.

Three countries were selected for the study, namely Uganda, Vietnam and Peru. The reason for this selection is twofold. First, over time these countries became the focus countries of the Pro Poor Livestock Policy Initiative (PPLPI) for its regional activities[1] and the project has compiled a large amount of information for these countries. Second, these countries were chosen based on the availability of comprehensive and recent micro level data, namely the living standard measurement surveys (LSMS).

The paper proceeds as follows. The following section provides a broad economic overview of the three countries. In the third section food consumption patterns in the countries are analyzed individually and details of the datasets used are presented. In the fourth section the findings for each individual country are summarized, compared and analyzed econometrically. The final section draws the conclusions. Detailed tabulations of some results and other calculation details as stated throughout the text are contained in annexes.

[1] More information on the PPLPI and its focus regions may be found at the following address http://www.fao.org/ag/againfo/projects/en/pplpi/home.html

ECONOMIC OUTLOOK BY COUNTRY

The analysis presented in this paper compares consumption patterns of animal derived food products across three countries, namely Uganda, Vietnam and Peru. This section provides information on the economic performance of the three countries of interest in order to gain an understanding of the respective current economic environment. To this purpose some key economic indicators were selected from the latest issue of the World Development Indicators (WDI 2006) and tabulated for the period ranging from 1999 to 2003, the period that covers the three LSMS used in the analysis.

Table 1: *Selected economic indicators for Vietnam, Peru and Uganda.*

Variable and Country	1999	2000	2001	2002	2003
Uganda					
GDP per capita (constant 2000 USD)	239	244	250	259	262
GDP per capita, PPP (constant 2000 International $)	1,191	1,244	1,279	1,317	1,334
Annual GDP per capita growth (%)	4.6	2.1	2.7	3.3	1.2
Agriculture value added (% of GDP)	38.4	37.3	36.4	31.0	32.4
GINI index	43.0	..	..	..	..
Vietnam					
GDP per capita (constant 2000 USD)	377	397	419	444	471
GDP per capita, PPP (constant 2000 International $)	1,908	2,012	2,119	2,244	2,375
Annual GDP per capita growth (%)	3.4	5.4	5.6	5.8	6.2
Agriculture value added (% of GDP)	25.4	24.5	23.2	23.0	22.5
GINI index	..	..	..	37.0	..
Peru					
GDP per capita (constant 2000 USD)	2,020	2,046	2,018	2,084	2,136
GDP per capita, PPP (constant 2000 International $)	4,661	4,723	4,631	4,803	4,976
Annual GDP per capita growth (%)	-0.8	1.3	-1.4	3.3	2.5
Agriculture value added (% of GDP)	10.0	10.3	10.2	10.3	10.1
GINI index	..	..	..	54.6	..

Source: World Development Indicators, 2006

As reported in the WDI fact sheets, Vietnam and Uganda belong to the low income country group while Peru is classified as a lower middle income country. These differences in wealth group classification are portrayed in the income levels of the three countries as described in Table 1[2]. In Peru, GDP per capita, expressed in constant 2000 USD, ranges from 2,020 USD in 1999 to 2,136 USD in 2003. In Vietnam, the corresponding figure was 377 USD in 1999 and 471 USD in 2003. The levels of GDP per capita in Uganda varied from 239 USD in 1999 to 262 USD in 2003. Thus people in Peru earn much higher incomes than people in Vietnam and Uganda, for which the values are much closer. However, in order to account for different purchasing power levels across the countries, GDP per capita is also converted to purchasing power

[2] In order to compare incomes across the three countries, GDP per capita is reported in constant 2000 USD and in constant 2000 International dollars for the years ranging from 1998 to 2003.

parity (PPP) equivalents, expressed in constant 2000 international dollars. In PPP terms, the level of per capita GDP in Peru is still approximately 2.5 times as high as per capita GDP in Vietnam and 4.0 times that in Uganda. Vietnam's PPP adjusted GDP per capita is nearly double that of Uganda.

Per capita GDP growth rates across the three countries follow different trends. The growth rates in Vietnam range from 3.4 percent in 1999 to a maximum of 6.2 percent in 2003, thus Vietnam exhibits high levels of growth as seen in many Asian countries. The lowest growth rate of 3.4 percent occurred in 1999. Peru experienced political turmoil between 1999 and 2003, as a consequence witnessing some years of negative growth. GDP per capita growth rates range from a minimum of -0.8 percent in 1999 to a positive rate of 2.5 percent in 2003. In Uganda, growth rates of per capita GDP have been lower and less stable than in Vietnam, peaking at 4.6 percent in 1999 but declining to 1.2 percent in 2003.

The contribution of the agricultural sector to the countries' economies is reported as agriculture value added in percent of GDP. The agriculture sector is an important component of the Ugandan economy. In 1999, the contribution of agriculture to the Ugandan economy was 38.4 percent, declining to 32.4 percent in 2003. In Vietnam, the contribution of agriculture to the national economy varied from 25.4 percent in 1999 to 22.5 percent in 2003, slowly but steadily declining in this period. The share of GDP from agriculture in Peru is much lower compared to the other two countries: agriculture contributed 10.0 percent of GDP in 1999, slightly rising to 10.1 percent in 2003, with little variation over the 1999 to 2003 period.

The Gini Index, a measure of income distribution, is available for all three countries although at different points in time[3]. For 1999, Uganda reports a Gini index of 43.0 while in 2002, Vietnam and Peru report a Gini index of 37.0 and 54.6 respectively. According to these values income is most equally distributed in Vietnam compared to the other countries, while Peru, the wealthiest country among the three, displays the most uneven income distribution.

In summary, the picture drawn from these selected economic indicators depicts Uganda as the country with the lowest per capita income but also as an economy with moderate but relatively constant GDP per capita growth and a marked decline in the share agriculture in the country's GDP. The per capita GDP of Vietnam lies between that of Uganda and Peru. Vietnam derives a larger share of its GDP from agriculture than Peru and has witnessed much higher per capita income growth rates over the study period. Peru is the wealthiest country across the group with per capita income being 2.5 and 4.0 times as high as that of Vietnam and Uganda respectively and has the lowest contribution of the agricultural sector. However, per capita growth rates have been volatile and at times negative between 1999 and 2003 and although Peru is the wealthiest country among the three, it also has the most uneven income distribution.

[3] In order to provide a more complete overview of poverty we searched for poverty measures but these were not available for the countries and years under investigation. The only poverty measurements found were for Peru in 2002 that reports a poverty gap at 1 USD a day (PPP) of 4.4 percent and a poverty gap at 2 USD a day (PPP) of 13.4 (WDI, 2006).

EXPENDITURE PATTERNS BY COUNTRY

The analysis presented focuses on household consumption patterns of livestock derived food products and fish and investigates variations in these across Uganda, Vietnam and Peru. All consumption sources are included in the food consumption expenditure aggregate, specifically purchases, home production consumption and food gifts. In order to allow for purchasing power differences and differences in years across the country datasets, the local currency units were converted to constant 2000 international dollars (Int$)[4]. Details of the LSMS datasets used for each country, the local currency unit conversion factors and the items included within the specific food groups are given in the annex sections. All aggregates presented are annual amounts unless stated otherwise.

The analysis is descriptive in nature and compares food expenditure shares and breakdown across locations (rural and urban) and income quintiles. The first part of the analysis explores the countries individually and provides details of household expenditure patterns for each case. Expenditure on livestock products is compared to expenditure on fish, as an alternative source of high value protein. In addition to the levels and shares of food, livestock and fish, the quantities of different livestock products (meat, milk, and eggs) and fish consumed within households are also computed.

Within each country section, initially the overall sample results are listed. Subsequently data is broken down by urban and rural location and lastly by income quintile in order to capture differences in expenditures across locations and income groups. The country results are presented in the following order: Uganda, Vietnam and Peru.

In the second stage of the analysis, discussed in the following section, the main results from each of the countries are compared and then tested econometrically.

Uganda

Whole Sample

Uganda is classified as a lower income country[5] and the sample data used for the analysis was gathered between 1999-2000 in the national household survey UNHS I. The survey collected information from 10,696 households, 2,352 (22 percent) of which located in urban areas and 8,344 (78 percent) in rural areas[6].

Based on the UNHS I, total annual household expenditure in Uganda (Table 2) is Int$ 5,464. and Int$ 1,262 in per capita terms. Annual per capita food expenditure is Int$ 656, which accounts for 58.4 percent of the total expenditure.

Annual per capita expenditure on livestock derived food products is Int$ 89 equivalent to 10.3 percent of food expenditure (or 6 percent of the total expenditure). Fish expenditure on average is less than half the average annual livestock expenditure per capita, namely Int$ 35.

[4] Throughout the text Int$ will be used to represent the common base currency of constant 2000 International dollars.

[5] Country classification groups reported here are as per the classification used in the World Development Indicators 2006.

[6] More details of the households' breakdown are given in the appendix section.

Table 2: *Overview of annual expenditures (Int$) and shares (percent).*

Total Household Expenditure	Total per capita Expenditure	Food Expenditure per capita	Food Share	Livestock Expenditure per capita	Livestock Share		Fish Expenditure per capita
					Total	Food	
5,464	1,262	656	58.4	89	6.0	10.3	35

Source: Uganda UNHS I, 1999-2000.

Urban-Rural Breakdown

Total expenditure: Total per capita expenditure is Int$ 2,903 in urban areas and Int$ 957 in rural areas, approximately a third of the urban area expenditure. Household sizes are smaller in urban areas compared to rural areas, 4.4 members in urban areas and 5.4 members in rural areas (Table 3).

Food expenditure: Overall, households in urban areas spend Int$ 1,219 per capita and year on food while rural area households spend Int$ 551 per capita, less than half the average urban per capita food expenditure level. In urban areas food expenditure accounts for 48.1 percent of the budget while in rural households it accounts for 60.3 percent.

Table 3: *Household variables for Uganda in urban and rural locations.*

Variable	Unit	Urban	Rural
Household size	Persons	4.4 (2.9)	5.4 (3.0)
Total per capita expenditure	Int $	2,903 (3,367)	957 (1,101)
Per capita food expenditure	Int $	1,219 (1,106)	551 (581)
Food share of total expenditure	%	48.1 (16.0)	60.3 (15.3)
Per capita expenditure on livestock	Int $	200 (336)	64 (123)
Share of food expenditure	%	14.4 (13.5)	9.5 (13.0)
Meat share of livestock expenditure*	%	53.1 (36.3)	60.1 (42.4)
Egg share of livestock expenditure	%	7.1 (19.0)	3.7 (15.6)
Milk share of livestock expenditure	%	39.8 (35.6)	36.2 (41.5)
Per capita meat consumption	kg	16.0 (28.5)	7.2 (16.5)
Per capita expenditure on fish	Int $	60 (116)	31 (67)
Share of food expenditure	%	5.7 (7.2)	5.5 (9.3)
Per capita fish consumption	kg	16.0 (31)	11.6 (29.1)

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.

Expenditure on livestock products: Overall, on a per capita basis, urban households spend more than three times the amount spent on livestock products by rural households, respectively Int$ 200 and Int$ 64 (Table 3). Expenditure on livestock derived food accounts for 14.4 percent of food expenditure in the urban areas and for 9.5 percent of food expenditure in rural areas respectively. Overall, rural households spend 60.1, 3.7 and 36.2 percent of their livestock expenditure on meats, eggs and milk respectively, while the corresponding shares for urban households are 53.1, 7.1

and 39.8 percent respectively. Households in rural areas consume 7.2 kg of meat (products) per capita and year versus 16.0 kg in urban areas. Thus, differences in meat consumption between urban and rural households, although marked, are not as large as the respective differences in expenditure on livestock products. This may be explained either by relatively lower prices for meat in rural areas or by rural households consuming lower quality cuts (or a combination of both).

Expenditure on fish: Urban households spend approximately 1.5 times more on fish per capita compared to rural households. In urban areas, per capita expenditure on fish is Int$ 60 per year while in rural areas the equivalent expenditure is Int$ 31 per year. Annual per capita consumption of fish is 16.0 and 11.6 kg per year in urban and rural areas respectively. As seen with meat, differences in the amounts of fish consumed between urban and rural households are not as marked as differences in expenditure on fish.

Breakdown by Income Quintile

Total expenditure: The poorer rural households comprise on average 3.9 individuals, while the poorer urban households on average comprise 2.9 individuals. As income rises household sizes reach 5.4 and 7.6 individuals in the urban and rural areas respectively, constantly rising as income increases (Figure 1(a)).

Figure 1(a): *Average household size by income quintile, (Left = urban; right = rural).*

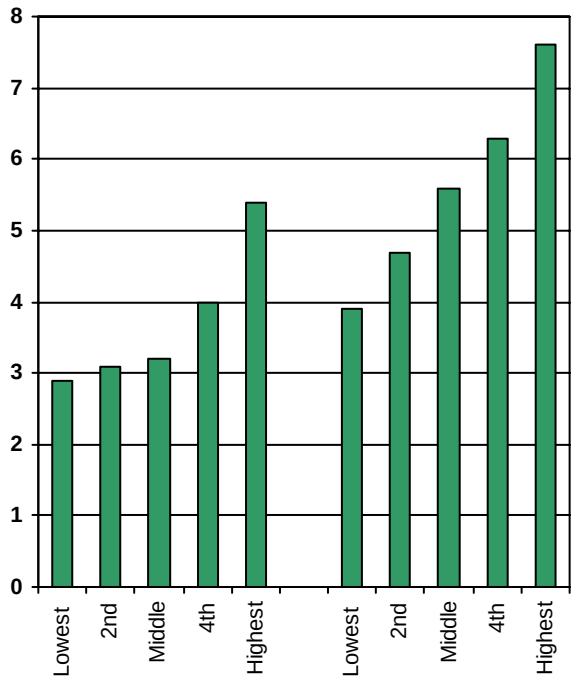
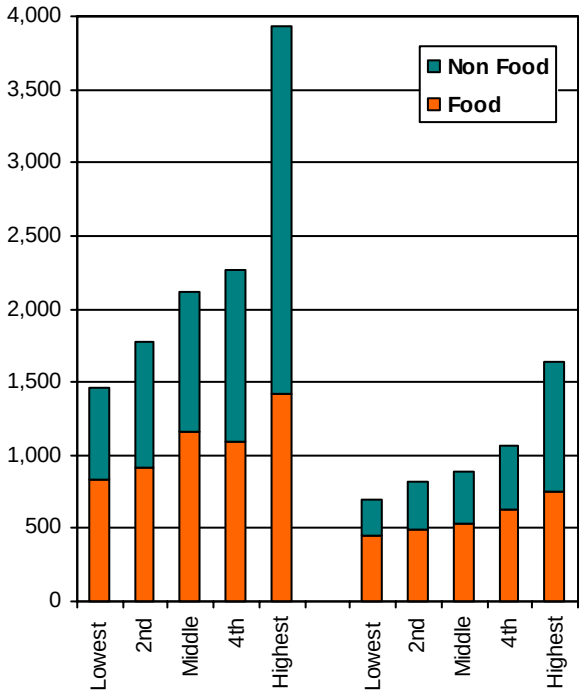


Figure 1(b): *Average per capita total and food expenditure by income quintiles (Int$), (Left = urban; right = rural).*



Source: Calculations by the author.

Differences in total per capita expenditure across quintiles and locations are considerable, as shown in Figure 1(b).[7] In rural areas, total per capita expenditure ranges from Int$ 694 for the poorest households to Int$ 1,663 for the wealthiest households. In urban areas the corresponding values are Int$ 1,461 and Int$ 3,932. Per capita expenditure levels in urban areas are approximately double the amount in rural areas, with discrepancies increasing as income quintile rises.

Food expenditure: Household food expenditure levels are significantly higher in the urban areas compared to the rural areas although rural households use a larger share of their household budget for food. In urban areas the poorest households spend 832 $Int on food while rural households spend 447 $Int. Expenditure levels reach the maximum of 1,423 $Int for the wealthiest households in the urban areas and 755 $Int for the rural areas. The per capita food expenditure share generally decreases as income rises and is lower in urban areas compared to rural areas where households use a large share of their total expenditure on food. The poorer rural households spend on average 61 percent on food. This share reduces to 54.2 percent for the wealthier rural households. In the case of urban households, the food expenditure share ranges from 52.1 percent in the lower income quintile to 42.9 percent for the wealthiest households (Figure 1(b) and 2(a))

Figure 2(a): *Share of income expended on different items by quintile in urban and rural areas, (Left = urban; right = rural)*

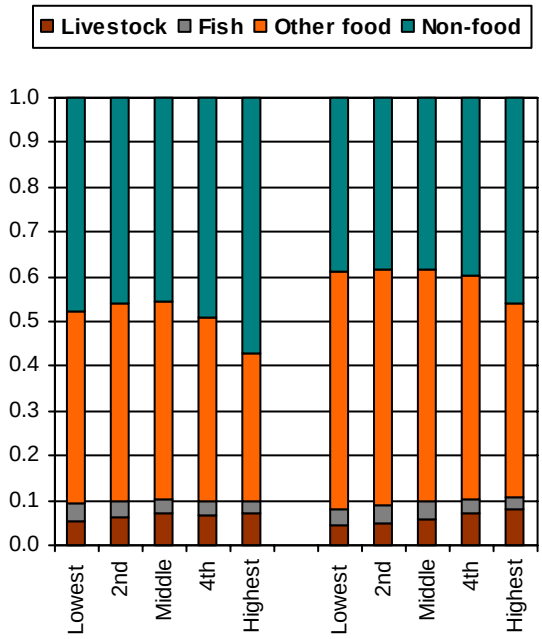
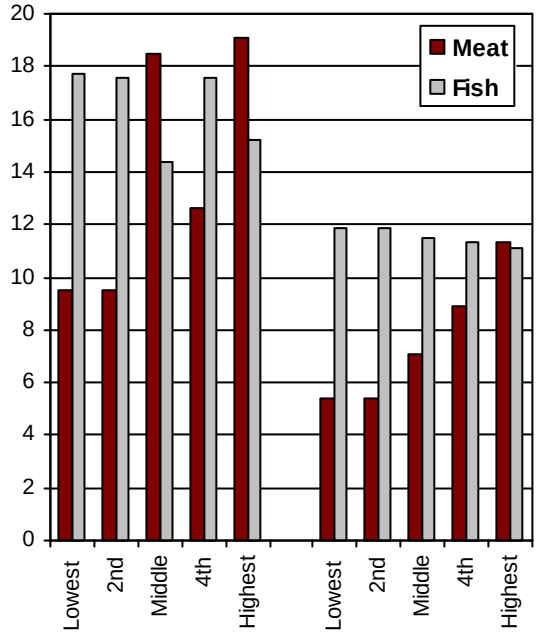


Figure 2(b): *Annual per capita consumption of meat and fish per capita(kg) by income quintile in urban and rural areas, (Left = urban; right = rural)*



Source: Calculations by the author.

Expenditure on livestock products: The poorest rural households spend Int$ 36 per capita per year on livestock derived food, which is on average 6.5 percent of their food expenditure (or 4.4 percent of total). The poorest urban households spend an average of Int$ 107, or 9.3 percent of their food expenditure (5.4 percent of total), on

[7] For further details of the expenditure amounts and shares the reader may turn to the complete tables included in the annex sections.

livestock products. Both absolute and relative expenditure levels (as proportion of food expenditure) on livestock products increase as income increases, reaching an average of Int$ 127 or 15.1 percent of food expenditure in rural areas and Int$ 243, or 17.2 percent of total expenditure, in urban areas. Per capita expenditure on livestock products in rural households is around half that of urban households across all income quintiles.

The poorer rural households consume on average 5.4 kg of meat per capita a year while urban households report an average consumption of 9.5 kg of meat per capita per year. As income increases, the consumption of meat increases, although urban area households always consume higher amounts per year. The wealthiest urban households reach a yearly per capita consumption of 19.1 kg of meat while the highest income rural households consume 11.3 kg of meat per head per year.

The poorest urban households on average spend 59.3 percent of their livestock budget on meat, 4.2 percent on eggs and 36.5 percent on milk, while the poorest rural households spend 65.6 percent on meat, 3.7 on eggs and 30.8 on milk. For the richest households the corresponding shares are 55.2, 6.6, and 38.2 percent in urban areas and 56.3, 4.8, and 38.9 percent in rural areas.

Expenditure on fish: For the poorest household group, fish expenditure represents 6.5 percent of total food expenditure or 3.9 of total expenditure in the urban areas. For the poorest rural households fish expenditure represents 5.5 percent of total food expenditure or 3.5 of total expenditure. As income increase, fish expenditure shares reduce to 5.3 percent of food expenditure or 2.4 percent of total expenditure in urban areas, while the wealthiest rural households spend 8.5 percent of food expenditure or 5.6 percent of total expenditure on fish. In urban areas, annual per capita fish consumption ranges from a minimum of 17.7 kg per person in the poorest households to 15.2 kg per capita in the highest income households. In rural households, fish consumption remains approximately constant across all income quintiles ranging from 11.9 kg per capita for the poorest households to 11.1 kg per capita for the wealthiest households.

Vietnam

Whole Sample

The total sample of the VHLSS II dataset collected in 2002 comprises 29,530 households of which 6,909 (23 percent) reside in urban areas while 22,621 (77 percent) live in rural areas.

Table 4: *Overview of household annual expenditures (Int$) and shares (percent).*

Total Expenditure	Total Expenditure per capita	Food Expenditure per capita	Food Share	Livestock Expenditure per capita	Livestock Share of		Fish Expenditure per capita
					Total	Food	
5,510	1,345	581	49.9	64	5.6	11.4	54

Source: Vietnam VHLSS 2002

In Vietnam (Table 4), total annual household expenditure is reported to be Int$ 5,510 and Int$ 1,345 in per capita terms. Per capita food expenditure amounts to Int$ 581 and overall households spend a little less than half of their budget on food reporting a

mean share of 49.9 percent. Mean annual expenditure on livestock products is Int$ 64 while the livestock product share out of the total household expenditure is 5.6 percent and 11.4 percent out of total food expenditure. In contrast, total per capita fish expenditure amounts to Int$ 54.

Urban – Rural Breakdown

Total expenditure As is generally the case, households living in urban areas are wealthier compared to rural area households. In Vietnam, households living in urban areas report spending approximately 2.5 times as much as households living in rural areas. In urban areas, per capita expenditure amounts to Int$ 2,498 while rural areas households spend on average Int$ 977 per year, (Table 5). Little difference is found in the average household size.

Food expenditure: Rural households dedicate a larger share of their expenditure to food, namely 52.6 percent compared to 41.3 percent in the case of urban households, although in per capita food expenditure is lower in rural households, ie. Int$ 478 in rural areas and Int$ 903 in urban areas (Table 5).

Expenditure on livestock products: Households living in urban areas spend approximately double the amount spent by rural households on livestock products, although the differences in the shares are smaller. In rural areas households spend 5.8 percent of their total budget and 11.1 percent of their food budget on livestock products and consume on average 6.7 kg of meat products per year. In urban areas, the share of expenditure on livestock products out of the total household budget and total food budget are 4.9 percent and 12.4 percent respectively.

Livestock products are divided into three main subgroups, namely meat products, eggs and fresh milk. Table 5 shows how total household livestock expenditure spreads across these three main livestock product groups. Households' expenditure on livestock products is mostly directed to meat and secondly eggs. Little is spent on milk. Overall urban households spend 81.9 percent on meat, 15.7 percent on eggs and 2.4 percent on milk.

Table 5: *Household variables in Vietnam in urban and rural locations.*

Variable	Unit	Urban	Rural
Household size	Persons	4.3 (1.7)	4.5 (1.8)
Total per capita expenditure	Int $	2,498 (1,908)	977 (572)
Per capita food expenditure	Int $	903 (541)	478 (221)
Food share of total expenditure	%	41.3 (12.8)	52.6 (12.2)
Per capita expenditure on livestock	Int $	117 (105)	55 (45)
Share of food expenditure	%	12.4 (6.3)	11.1 (5.8)
Meat share of livestock expenditure	%	81.9 (13.9)	84.1 (13.3)
Egg share of livestock expenditure	%	15.7 (12.7)	15.6 (12.9)
Milk share of livestock expenditure	%	2.4 (7.5)	0.3 (2.6)
Per capita meat consumption	kg	10.3 (9.1)	6.7 (5.7)
Per capita expenditure on fish	Int $	82 (76)	48 (51)
Share of food expenditure	%	9.6 (7.1)	9.7 (8.0)
Per capita fish consumption	kg	15.6 (15.0)	14.3 (19.2)

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.

Rural households spend 84.1 percent on meat products, a share marginally higher than that of urban households, 15.6 percent on eggs and 0.3 percent on milk, marginally less compared to urban households. Urban households consume on average 50 percent more meat per person and year amounting to 10.3 kg of meat products per year. Thus, urban households consume more meat while spending less of their total budget on livestock products.

Expenditure on fish: Per capita fish expenditure amounts to Int$ 82 in the urban areas and Int$ 48 in rural areas. Rural households use 5.1 percent of their total budget and 9.7 percent of their food budget on fish and consume 14.3 kg of fish on average per year. Urban households spend 4.1 percent and 9.6 percent of their total and food budget respectively and consume 15.6 kg of fish on average per person and year.

Breakdown by Income Quintile

Total expenditure Household size increases across income quintiles both in the urban and rural sample, but generally the average sizes in both urban and rural areas are not very different (Figure 3(a)). The marginal discrepancies in household size increase up to the middle quintile and then reduce back to the bottom income value. As shown in Figure 3(b), total household expenditure is higher in urban areas, increases with rising income levels as do the differences across rural and urban households. Urban households belonging to the bottom income quintile spend on average Int$ 1,384 while rural households spend Int$ 702, approximately double the rural expenditure level. The wealthier households spend Int$ 3,459 in urban areas and Int$ 1,489 in rural areas, less than half the expenditure level of urban households.

Figure 3(a): *Average household size by income quintile, (Left = urban; right = rural)*

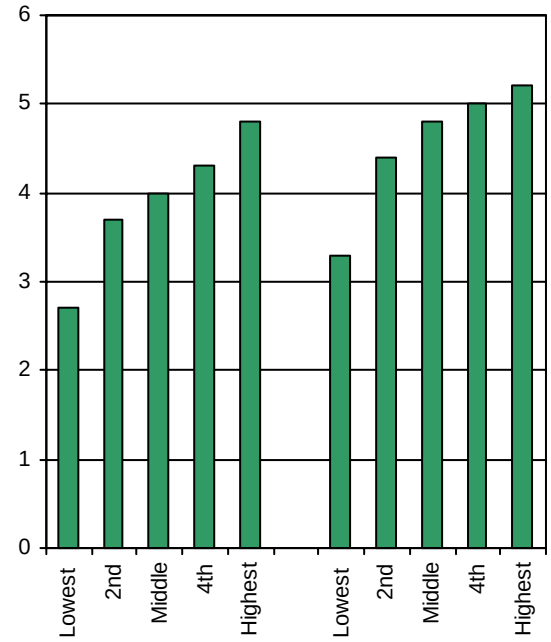
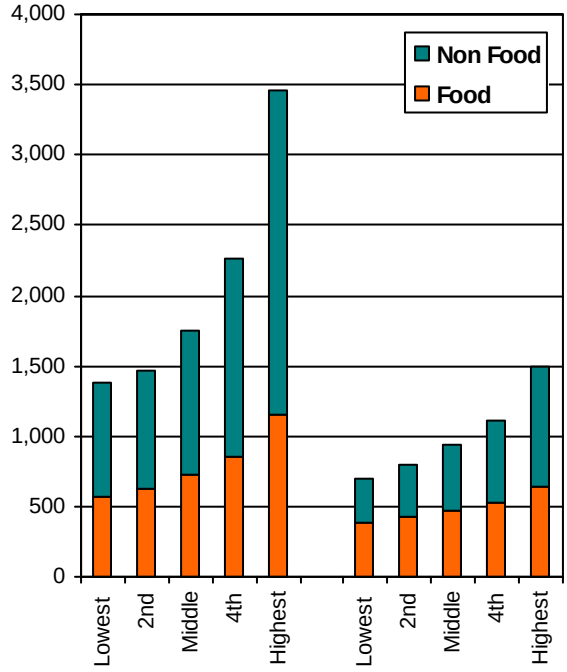


Figure 3(b): *Average total per capita expenditure by income quintile (Int$), (Left = urban; right = rural).*



Source: Calculations by the author.

Food expenditure: Households living in urban areas and belonging to the bottom income quintile spend Int$ 563 per capita per year and Int$ 1,148 in the top quintile.

In rural areas, the poorer households spend 385 Int$ per capita per year, while the wealthiest households spend Int$ 639 on food consumption, half of the amount spent in urban areas by the same quintile as shown in Figure 4(a). As income increases, the share of expenditure on food decreases, reducing from 47.9 to 36.8 percent in urban areas and from 57.6 to 45.6 percent in the rural areas.

Expenditure on livestock products: The amount spend by households on livestock products is larger in urban areas and increases as income rises (Figure 4(a)). The difference in the amount spent between urban and rural areas also increases and in the case of the wealthier urban households is approximately double the amount spent by the rural households. Urban and rural livestock food expenditure shares are similar but steadily increase as income increases. Households in urban areas consume more meat per capita compared to rural households and the differences across rural and urban areas increase slightly as income increases (Figure 4(b)).

Within livestock products, the bulk of the household budget is spent on meat. The poorest urban households use 76.5 percent of their 'livestock budget' while the wealthiest use 83.7 percent for meat. In the rural areas, the corresponding figures are 82.7 percent for the poorer households and 85.0 percent for the wealthiest households. Egg expenditure shares are 23.1 and 17.2 percent for the poorer urban and rural households respectively.

Figure 4(a): *Share of income expended on different items by quintile in urban and rural areas, (Left = urban; right = rural)*

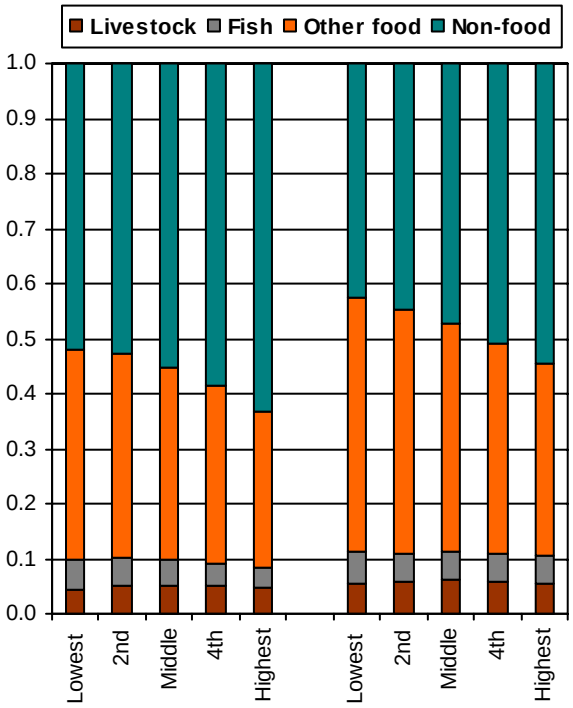
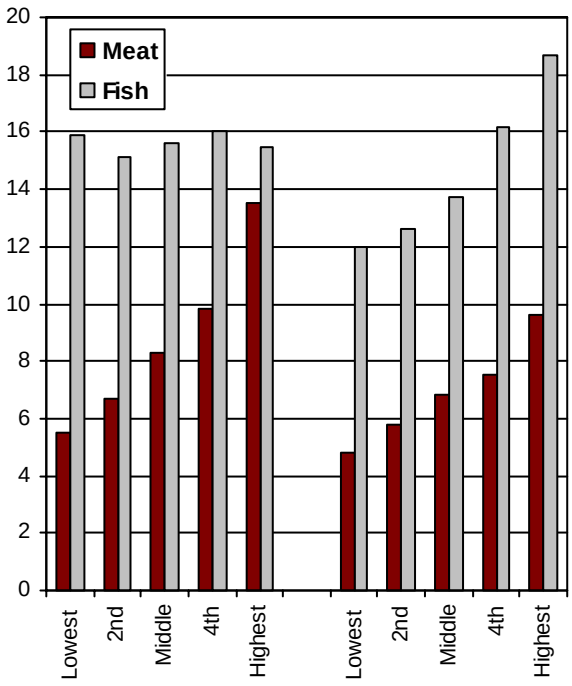


Figure 4(b): *Annual per capita consumption of meat and fish per capita (kg) by income quintile for rural and urban households, (Left = urban; right = rural).*



Source: Calculations by the author.

The richer urban and rural households respectively use 12.8 and 14.3 percent of their 'livestock budget' for egg consumption. The share spent on milk is considerably lower ranging from 0.4 and 0.1 percent respectively for the poorer urban and rural households to 3.5 and 0.7 percent for the richer urban and rural households.

Expenditure on fish: Fish expenditure increases as income rises while the proportion of the food budget spent on fish decreases as income rises (Figure 4(b)). In urban areas the amount of fish consumed per capita reduces is 15.9 kg per capita for the poorer households and 15.5 kg per capita for the wealthier households without any clear trend in relation to income. In the rural areas on the other hand, per capita consumption of fish rises from 12.0 kg per capita in the poorest households to 18.7 kg per capita in the case of the wealthier households (Figure 4(b)). Thus while rural lower income quintile households consume less fish compared to urban areas, the wealthier rural households consume more fish compared to their urban counterparts. When comparing fish and meat expenditure, we find that households generally spend more on meat compared to fish with the exception of the lowest income quintile. In this case, fish and livestock expenditure is the same in the rural areas while in the urban areas fish expenditure is higher. Households generally consume more fish than meat both in urban and in rural areas and across income quintiles.

Peru

Whole Sample

Peru is the wealthiest country within the group of countries analyzed and belongs to the lower middle income country group. The analysis presented here is based on the ENAHO household survey run in 2003. In this year 18,912 households were interviewed, of which 7,779 (41.1 percent) reside in rural areas and the remaining 11,113 (58.9 percent) in urban areas.

According to this survey, total household expenditure amounts to Int$ 40,198 per household per annum. On a per capita basis, total expenditure is Int$10,328 while total food expenditure is Int$ 2,258.

The share of household expenditure on food products is 25.6 percent, a lower percentage compared to the other countries. Households in Peru spend Int$ 136 on livestock products which accounts for 7.8 percent of total household food expenditure or for 1.6 percent of total household expenditure. In comparison, per capita fish expenditure is much less than expenditure on livestock products. Households on average spend Int$ 14 per capita per year on fish.

Table 6: *Overview of household annual expenditures (Int$) and shares (percent).*

Total Expenditure	Total Expenditure per capita	Food Expenditure per capita	Food Share	Livestock Expenditure per capita	Livestock Share of		Fish Expenditure per capita
					Total	Food	
40,198	10,328	2,258	25.6	136	1.6	7.8	14

Source: Peru ENAHO, 2003.

Urban - Rural Breakdown

Total expenditure The average size of households in rural and urban areas is the same. Urban households on average spend approximately 2.5 times as much as in total than rural households, as shown in Table 7. Peruvian households living in urban

areas report a total expenditure of Int$ 13,095 while households living in rural areas spend Int$ 5,177.

Food expenditure Per capita food expenditure in urban areas is also approximately double the amount in the rural areas. In urban areas households consume the food equivalent of Int$ 2,846 while in rural households they consume the equivalent of Int$ 1,164, less than half the urban expenditure. In terms of food shares, the urban and rural shares are close, 26.8 and 23.5 percent, respectively.

Expenditure on livestock products: As is generally the case, households living in urban areas spend more on livestock compared to rural households. The average per capita expenditure on livestock products in urban areas is Int$ 187 while rural households spend Int$ 79. The shares of livestock product expenditure in food and total expenditure in urban areas are 6.9 and 1.7 percent respectively. In the case of the rural areas the shares are respectively 9.6 and 1.5 percent. The actual consumption of meat in rural households is much less compared to urban households. Rural households consume on average 14.0 kg of meat per capita per year while urban households consume approximately 2.5 times this quantity, namely 34.6 kg per person per year. Most of the 'livestock budget' is spent on meat products. On average urban households spend 71 percent of the livestock budget on meat products, 0.5 percent on eggs and 3.5 percent on fresh milk. The rural households spend 49.6 percent on meat products, 0.1 percent on eggs and 4.4 percent on fresh milk[8].

Table 7: *Household variables in Peru for urban and rural locations.*

Variable	Unit	Urban	Rural
Household size	Persons	4.5 (2.1)	4.5 (2.4)
Total per capita expenditure	Int $	13,095 (12,044)	5,177 (3,978)
Per capita food expenditure	Int $	2,846 (1,861)	1,164 (1,064)
Food share of total expenditure	%	26.8 (13.3)	23.5 (14.2)
Per capita expenditure on lstk products	Int $	187 (148	79 (89))
Share of food expenditure	%	6.9 (15.5)	9.6 (37.2)
Meat share of lstk expenditure*	%	71.0 (22.3)	49.6 (35.8)
Egg share of lstk expenditure	%	0.6 (3.7)	0.1 (1.8)
Milk share of lstk expenditure	%	3.5 (10.0)	4.4 (13.1)
Per capita meat consumption	kg	34.6 (25.9)	14.0 (18.3)
Per capita expenditure on fish	Int $	18 (29)	9 (25)
Share of food expenditure	%	0.7 (1.3)	1.5 (18.7)
Per capita fish consumption	kg	8.3 (12.6)	4.0 (10.5)

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.

Expenditure on fish: In the case of Peru, expenditure on fish products is lower than the expenditure on livestock products. Overall expenditure on fish in urban areas is Int$ 18 and Int$ 9 in the rural areas. The food expenditure share on fish is 0.7 percent in urban areas and 1.5 percent in rural areas. The total expenditure share on fish is 0.2 percent both in rural and urban areas. The amount of fish consumed ranges from 8.3 kg per capita per year in urban areas to 4.0 kg per capita and year in rural areas.

[8] The Peruvian survey includes a number of other items of animal origin (eg. fresh cheese, yogurt and butter) which account for the remaining part of the household livestock shares. For more details refer to the annex.

Breakdown by Income Quintile

Total expenditure: Average household size increases with increasing income, as shown in figure 5(a). Furthermore, the differences in household size between rural and urban areas also increase as income increases and within each quintile, households in rural areas are larger compared to urban areas. Household expenditure levels are consistently lower for rural households compared to urban households across all income quintiles. In the case of urban households, per capita expenditure levels range from Int$ 6,380 to Int$ 19,798 across quintiles. For rural households, total expenditure varies between Int$ 3,845 and Int$ 11,647. As shown in Figure 5(b), differences in average income between urban and rural areas peak in the case of the higher income quintile.

Food expenditure: In the lower income quintile, per capita food expenditure in urban areas is Int$ 1,675 while in rural areas it is Int$ 864, approximately half the level of urban households. Furthemore, in the case of Peru the food expenditure shares remain consistently higher across all quintiles for the urban households[9], as shown in Figure 6(a). For the lower income households the average shares are 28.7 percent for urban households and 22.8 percent for rural households. In the case of the higher income quintile, the food expenditure share reduces to 22.0 and 20.8 percent in urban and rural areas respectively.

Figure 5(a): *Average household size by income quintile, (Left = urban; right = rural))*

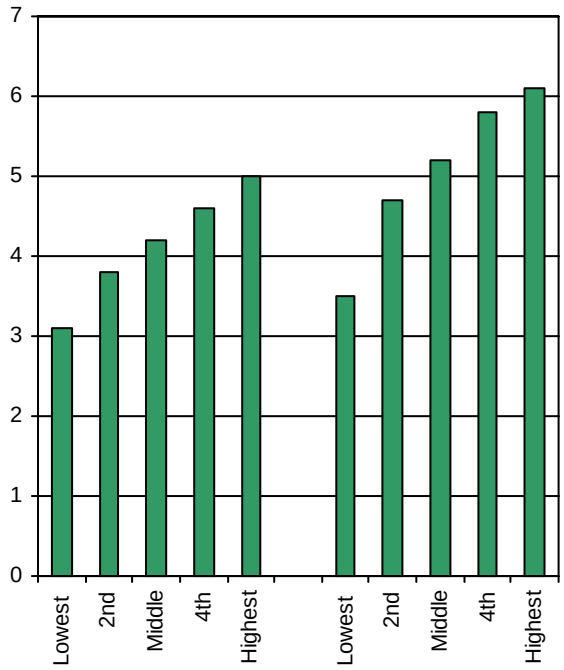
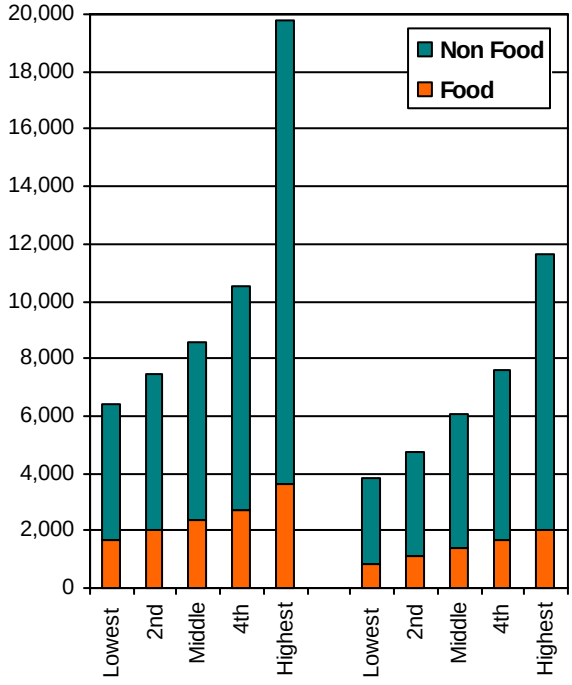


Figure 5(b): *Average total expenditure by income quintile (Int$), (Left = urban; right = rural)*



Source: Calculations by the author.

[9] In the case of Peru a much larger part of the household sample is from urban households compared to Uganda and Vietnam which belong to the lower income country group.

Expenditure on livestock products: Across all income quintiles, urban households spend more on livestock products compared to rural households and as incomes rise differences in expenditure levels increase. Poorer households spend 9.7 percent of their food budget on livestock products while urban households spend 5.6 percent of their food budget on livestock products. In the case of the urban households the share generally increases but in the rural case the trend is not that clear. The poorer households in the urban areas consume 2.2 times as much meat than the rural households. On average poor urban households consume 19.9 kg of meat per year while rural households consume 9.0 kg of meat per year. The disparity in consumption reduces slightly as households become wealthier, as shown in Figure 6(b). Households in rural areas consume 28.0 kg of meat per year while urban households consume 43.9 kg of meat per year, namely 1.6 as much.

Most of the household livestock budget is spent on meat both in the rural and urban areas of Peru. The shares spent on meat increase as income increases ranging from 68.9 to 71.8 percent in the urban areas and 43.0 and 63.4 percent in the rural areas. Households always spend less that 1 percent of their livestock budget on egg consumption while shares expended on milk range from 4.0 to 3.0 percent in the urban areas and 3.1 and 7.5 percent in the rural areas.

Figure 6(a): *Share of income expended on different items by quintile in urban and rural areas, (Left = urban; right = rural)*

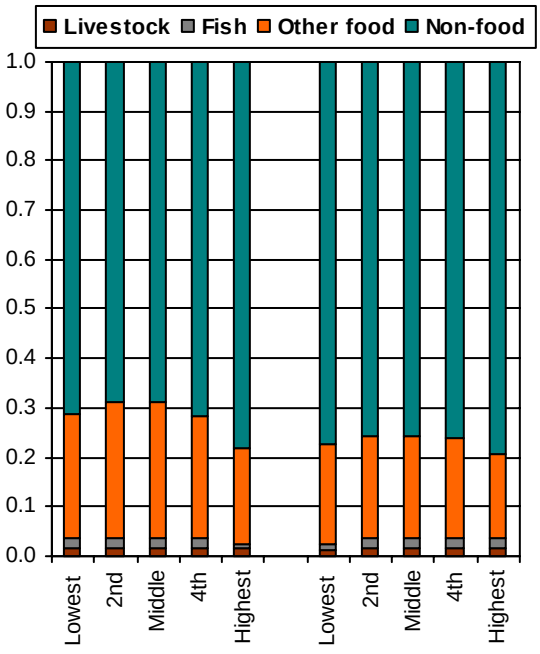
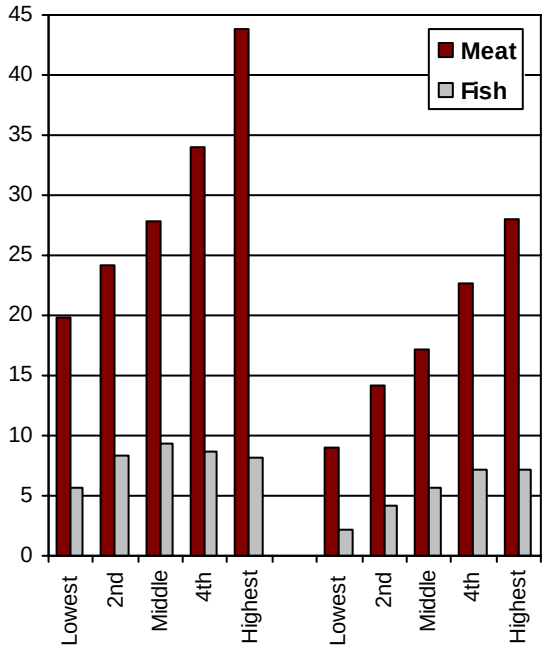


Figure 6(b): *Annual per capita consumption of meat and fish per capita (kg) by income quintile in rural and urban households$), (Left = urban; right = rural).*



Source: Calculations by the author.

Expenditure on fish: As far as expenditure on fish is concerned, households in urban areas spend more compared to rural areas. The lower income urban households devote 0.6 percent of their food expenditure on fish while the rural households use 1.5 percent for fish. In the case of the wealthiest households these shares reduce to 0.6 and 0.9 percent respectively. However, the picture is not very clear in the case of the middle income households. Lower income households consume 2.1 kg of fish per

capita per year in rural areas and 5.7 kg in urban areas, 2.7 times as much. Thus rural households are spending marginally more of their food expenditure on fish while consuming smaller quantities. Wealthier households in urban areas consume 8.1 kg of fish per year while in rural areas wealthier households consume 7.1 kg of fish per year.

In conclusion, overall Peruvian households consume much higher quantities of meat compared to fish across all income groups irrespective of location. In the case of the poorer households, the difference in quantities consumed between rural and urban areas is larger for meat than for fish. As income increases though, the disparity between rural and urban areas in quantities of fish consumed are much smaller than for meat.

COMPARISONS ACROSS COUNTRIES AND ECONOMETRIC ANALYSIS

Cross-country Comparisons

Uganda

Rural households spend less overall but the distribution of expenditure across quintiles is more homogenous compared to the urban households. The food expenditure share reduces as income rises and overall the rural households use a larger share of their budget for food consumption. The livestock product share of food expenditure is lower in the urban areas but urban households manage to consume more. For example the poorer urban households consume approximately double the amount compared to rural households. As income increases the expenditure on livestock products increases and the differences between urban and rural households reduce. Households consume more fish compared to meat but spend a smaller part of their budget on fish consumption. As income increases the share of fish expenditure reduces.

Vietnam

Households in rural areas have lower expenditure levels and higher food budget shares compared to urban areas. As income increases the discrepancies in expenditure levels between urban and rural areas increase while the food budget shares reduce. Urban households spend more on livestock products and consume 1.5 times the amount of livestock products consumed by rural households. In the case of livestock products, both in rural and urban areas, expenditure, consumption per capita, and the food budget share increase as income increases. The pattern is slightly different in the case of fish. In urban areas across income quintiles, expenditure increase, shares reduce and quantities per capita slightly reduce. In rural areas, expenditure levels, food expenditure shares and quantities consumed increase as income increases.

Peru

Urban households are significantly wealthier than rural households, spending approximately 2.5 times as much as rural households while the household sizes are similar across locations. As income increases, household expenditure increases as does the divide between urban and rural expenditure levels. Urban households spend more on livestock products and consume more meat per capita compared to rural households. Furthermore, expenditure on livestock products of urban households amounts to a smaller share of the total food budget compared to rural households. Generally less is spent on fish and much smaller quantities of fish are consumed per capita per year, although, even in the case of fish, urban households consume more than rural households.

Table 8 includes and compares some of the data from the previous country specific sections. In the cases of Uganda and Vietnam which fall in the same income level group, when comparing rural areas, the expenditure levels and shares for livestock are similar. The levels vary with increasing income, as is the case for the rural Peruvian households where per capita expenditure is higher and the food expenditure share decreases by approximately a half. Rural households in Uganda spend Int$ 64 and 9.5 percent of the food budget on livestock products, Int$ 55 and 11.1 percent in Vietnam and Int$ 79 and 9.6 percent in Peru. Quantities of meat consumed in the rural areas of Peru are roughly double the amounts consumed in rural Uganda and Vietnam.

When comparing the urban households of the three different countries, the trends are similar but the livestock food share is lower for urban Peruvian households compared

to the urban households of Uganda and Vietnam which instead use comparable shares of their food expenditure for livestock products. Further, the amount of meat consumed in urban areas in Peru is considerably higher than in the equivalent areas in Uganda and Vietnam.

Table 8: *Comparison of some key variables across countries.*

Variable	Unit	Uganda		Vietnam		Peru	
		Urban	Rural	Urban	Rural	Urban	Rural
Household size	Persons	4.4 (2.9)	5.4 (3.0)	4.3 (1.7)	4.5 (1.8)	4.5 (2.1)	4.5 (2.4)
Total per capita expenditure	Int $	2,903 (3,367)	957 (1,101)	2,498 (1,908)	977 (572)	13,095 (12,044)	5,177 (3,978)
Per capita food expenditure	Int $	1,219 (1,106)	551 (581)	903 (541)	478 (221)	2,846 (1,861)	1,164 (1,064)
Share of total expenditure	%	48.1 (16.0)	60.3 (15.3)	41.3 (12.8)	52.6 (12.2)	26.8 (13.3)	23.5 (14.2)
Per capita expenditure on livestock products	Int $	200 (336)	64 (123)	117 (105)	55 (45)	187 (148)	79 (89)
Share of food expenditure	percent	14.4 (13.5)	9.5 (13.0)	12.4 (6.3)	11.1 (5.8)	6.9 (15.5)	9.6 (37.2)
Quantity consumed of meat	kg	16.0 (28.5)	7.2 (16.5)	10.3 (9.1)	6.7 (5.7)	34.6 (25.9)	14.0 (18.3)
Per capita expenditure on fish	Int $	60 (116)	31 (67)	82 (76)	48 (51)	18 (29)	9 (25)
Share of food expenditure	percent	5.7 (7.2)	5.5 (9.3)	9.6 (7.1)	9.7 (8.0)	0.7 (1.3)	1.5 (18.7)
Quantity consumed of fish	kg	16.0 (31)	11.6 (29.1)	15.6 (15.0)	14.3 (19.2)	8.3 (12.6)	4.0 (10.5)

Source: Calculations by the author.

Econometric Analysis

The analysis carried out in the previous sections and the comparison above shows the relevance of some key factors in the determination of how much of their budget households decide to allocate for livestock products. Background economic literature and relevant theory suggests that as income increases and household preferences change, the demand for livestock products will tend to grow. This is substantiated by the descriptive analysis presented in the previous section. For all countries the descriptive statistics show that household livestock expenditure is higher for wealthier households and for households living in urban areas.

In order to investigate and quantify the relationship between expenditure on livestock products and these key household characteristics an econometric model is used. To this purpose a linear regression model is set up according to which livestock expenditure is a linear function of the household income level[10], the household location and the household size. Country specific effects are controlled for by including country level dummies. Peru, the country with the highest per capita income, is used as the base reference case and therefore dropped from the

[10] All expenditure and income levels are converted to PPP constant 2000 USD for values to be comparable.

regression. A log linear specification is chosen which allows for direct interpretation of the coefficients.

The results obtained with the regression of the household livestock expenditure level on the household income level, income size, urban or rural location and country dummies are reported in Table 9. As shown by the results, all regressors are statistically significant and are positive confirming theoretical expectations. The results show that a one percent increase in household income yields a 0.5 percent increase in livestock expenditure, ceteris paribus. This is the characteristic which mostly influences livestock product expenditure. As household size grows by one percent the livestock product expenditure increases by 0.3 percent. When a household moves from a rural to an urban area, expenditure on livestock products will increase by 0.35 percent. The country level dummies predict that on the margin households in Uganda and Vietnam expend more on livestock products compared to Peru. On average, households in Vietnam spend 0.05 percent more compared to Peruvian households, while Ugandan households spend 1.13 percent more than Peruvian households holding other factors constant. This result is somewhat counter intuitive due to the consumption levels of livestock products in Peru compared to Uganda and Vietnam but could be a consequence of differences in household preferences across the countries.

Table 9: *Regression results, dependent variable: Expenditure on livestock (log of Int$).*

Livestock Expenditure	Coef.	Std. Err.	t	P>t
Income	0.519	0.004	118.66	0.000
Location (Urban=1, Rural=0)	0.354	0.008	44.23	0.000
Household Size	0.300	0.007	42.45	0.000
Dummy Uganda	1.133	0.014	83.39	0.000
Dummy Vietnam	0.051	0.009	5.70	0.000
Constant	0.030	0.041	0.73	0.463

Number of observations = 52,477; Adj R-squared = 0.463

CONCLUSIONS

Recent literature has examined how the rise in population and incomes and the shifts toward larger urban areas have coincided with a significant shift in household dietary patters and a growing demand for products of animal origin.

This paper aimed to assess what proportion of the household budget is spent on livestock derived food products and how this varies with income both within country and between countries. Three countries belonging to the PPLPI hub countries groups, for which recent household level data was available were selected, namely Peru, Vietnam and Uganda.

Initially a descriptive based analysis was used to assess differences in consumption patters within the single countries. Secondly the main findings were compared across the countries and a simple econometric model was used to test the findings.

Theoretical expectations were confirmed by the country specific descriptive results, the comparison across countries and finally by the econometric analysis. In conclusion:

- Wealthier households consume more livestock products and therefore have access to a more diverse food consumption pattern. These trends are maintained by area location, within each country and across countries.
- Income disparities within urban areas are larger compared to the rural areas, nonetheless overall households living in urban areas consume more livestock products compared to rural area households.
- In the case of households living in the rural areas, livestock represent both a consumption and capital good. The rural and poorer households use a larger share of their household budget for food consumption but consistently consume smaller amounts of livestock products. Across countries, rural households spend comparable amounts of their household food budget on livestock products. Policies need to be put in place to ensure that the rural households gain access to more livestock products and are more integrated in the livestock market thus encouraging consumption of livestock products in rural areas. Thus policies that aid productivity increases will allow the achievement of higher consumption levels while ensuring that cash income levels do not decrease.
- In the cases of Uganda, Vietnam and Peru, fish consumption trends are not as clear compared to livestock patters and tend to be country specific. Thus each case should be addressed individually. In Uganda, meat consumption increases across income quintiles and fish consumption decreases, trends are clearer in the rural areas. In the case of Vietnam, as income increases meat and fish consumption increase in the rural areas while in urban areas as income increases meat consumption increases while fish consumption decreases. Overall fish consumption remains higher. In Peru, as income increases meat consumption increases in the urban area while fish trends are not clear. In the rural areas, meat and fish consumption increase. Overall larger amounts of meat are consumed compared to fish.

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ANNEX

Datasets and Food Consumption Products' Details

The datasets used in the analysis are listed in the tables below and discussed individually within each section (Table 10 and 11).

Table 10: *Data source, year and number of households per country.*

Country	Dataset	Year	Number of households
Vietnam	VHLSS	2002	29,530
Peru	ENAHO	2003	18,912
Uganda	UNHS I	1999-2000	10,696

Source: Country specific LSMS.

Table 11: *Number of households by income quintile.*

Income Quintile	Vietnam		Peru		Uganda	
	Urban	Rural	Urban	Rural	Urban	Rural
Bottom	630	5,264	848	2,932	234	1,898
2nd	934	4,980	1,570	2,212	261	1,883
Middle	1,218	4,691	2,284	1,501	355	1,784
4th	1,666	4,239	2,973	809	517	1,623
Top	2,461	3,447	3,458	325	985	1,156
Total	6,909	22,621	11,133	7,779	2,352	8,344

Source: Country specific LSMS.

Uganda

Uganda has also been collecting household level data. For the purpose of the analysis presented here the Uganda National Household Survey I (UNHS I) was used due to the data requirements (this year collected the data needed for the analysis). This survey was carried out in 1999-2000 and 10,696 households were used. The data source per country, the year of the survey and the number of households interviewed are summarized in Table 12.

Purchases (household and away from home), Consumption out of home produce and free produce. All include quantity and values.

Table 12: *Livestock products within each group for Uganda.*

Product Group	Products
Livestock	Beef, pork, goat meat, other meat and chicken
Fish	Fresh fish and dry/smoked fish
Eggs	Eggs
Milk	Fresh milk

Source: Uganda UNHS I, 1999-2000.

Vietnam

In the case of Vietnam, the Vietnamese Household Living Standard Survey of 2002 (VHLSS I) was used. This dataset was collected in 2002 and counts 26,530 households. The survey separates holiday season and normal year consumption. Items include all consumption: bartered or bought and self-made or received. All include quantity and values (Table 13).

Table 13: *Livestock products within each group for Vietnam.*

Product Group	Products
Livestock	Pork, buffalo meat, duck and other poultry, processed meat and other meat
Fish	Fresh fish, shrimp and other seafood
Eggs	Chicken and duck eggs
Milk	Fresh, condensed or powder milk

Source: Vietnam VHLSS, 2002.

Peru

The statistical office in Peru, the Istituto National de Estadistica e Informatica (INEI) is currently carrying out a very comprehensive living standards survey on a yearly basis. These surveys are called ENAHO (Encuesta Nacional de Hogares). The year used for the analysis was 2003 for which 18,912 households were interviewed.

All forms of consumption including: Purchases (household and away from home), Consumption out of home produce and free produce. All include quantity and values (Table 14).

Table 14: *Livestock products within each group for Peru.*

Product Group	Products
Livestock	Beef, pork, goat meat, poultry, alpaca meat, other meat and other meat products and subproducts
Fish	Fresh fish, tinned fish and seafood
Eggs	Chicken eggs, quail eggs and other eggs
Milk	Fresh milk and powder milk
Other	Fresh cheese, butter and yogurt

Source: Peru ENAHO, 2003

Currency Conversion Factors

Household expenditures collected in the household surveys are reported in local currency units and range from 1998 to 2003. Thus, in order to compare expenditures across countries and different years all money values are converted to 2000 constant international dollars accounting for purchasing power and time differences across the countries. The factors used are listed below (Table 15).

Table 15: *Economic conversion factors.*

Variable and Country	1998	1999	2000	2001	2002	2003
Vietnam						
Purchasing power parity conversion factor (LCU per international $)	2636.688	2762.451	2792.832	2783.726	2891.448	2990.525
Consumer price index (2000 = 100)	97.71699	101.7401	100	99.56846	103.3828	106.5915
Official exchange rate (LCU per US$, period average)	13268.00	13943.17	14167.75	14725.17	15279.50	15509.58
Peru						
Purchasing power parity conversion factor (LCU per international $)	1.460451	1.490448	1.51044	1.504124	1.482065	1.47591
Consumer price index (2000 = 100)	93.14684	96.37872	100	101.9771	102.1733	104.4825
Official exchange rate (LCU per US$, period average)	2.93	3.38	3.49	3.51	3.52	3.48
Uganda						
Purchasing power parity conversion factor (LCU per international $)	303.5507	299.7085	298.3583	308.6645	293.5531	317.2938
Consumer price index (2000 = 100)	91.44045	97.25144	100	102.004	101.6737	109.6353
Official exchange rate (LCU per US$, period average)	1240.31	1454.83	1644.48	1755.66	1797.55	1963.72

Source: World Development Indicators, 2006

Uganda Detailed Tables by Income Quintile

Table 16: *Total annual household expenditure (Int$), household size, food expenditure (Int$) and food expenditure share (percent).*

Quintile	Measure	Total Per Capita Expenditure		HH Size		Per Capita Food Expenditure		Share	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	1,461	694	2.9	3.9	832	447	52.1	61.0
	sd	1,449	940	1.8	2.4	902	836	19.6	18.1
2nd	Mean	1,781	823	3.1	4.7	921	498	54.1	61.7
	sd	1,592	711	1.8	2.4	828	468	14.1	13.9
3rd	Mean	2,122	881	3.2	5.6	1,155	535	54.3	61.8
	sd	2,023	655	2.1	2.5	1,208	409	13.8	13.0
4th	Mean	2,265	1,071	4.0	6.3	1,093	625	50.9	60.2
	sd	1,855	781	2.5	2.9	847	440	14.4	13.9
5th	Mean	3,928	1,632	5.4	7.6	1,423	755	42.9	54.2
	sd	4,332	2,128	3.3	3.9	1,213	536	15.4	15.7

Source: Calculations by the author.

Table 17: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for livestock.*

Quintile	Measure	Per Capita Livestock Expenditure		Livestock Share of Expenditure		Livestock Share of Food Expenditure		Per Capita Meat Quantity[11]	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	107	36	5.4	4.4	9.3	6.5	9.5	5.4
	sd	222	95	7.8	8.8	12.8	12.6	22.8	16.3
2nd	Mean	121	46	6.2	5.1	11.1	7.8	9.5	5.4
	sd	277	96	8.4	8.7	13.6	12.8	21.9	13
3rd	Mean	231	59	7.1	6.0	12.8	9.4	18.5	7.1
	sd	632	118	9.1	8.4	15.4	12.7	47.2	17.1
4th	Mean	152	85	6.7	7.0	12.9	11.6	12.6	8.9
	sd	208	139	7.4	8.0	12.7	12.5	19.4	18.1
5th	Mean	243	127	7.3	8.1	17.2	15.1	19.1	11.3
	sd	247	163	6.3	7.6	12.6	13.1	24.9	17.8

Source: Calculations by the author.

Table 18: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for fish.*

Quintile	Measure	Per Capita Fish Expenditure		Fish Share of Expenditure		Fish Share of Food Expenditure		Per Capita Fish Quantity[12]	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	82	28	3.9	3.5	6.5	5.5	17.7	11.9
	sd	176	64	5.8	6.6	9.7	10.3	30.8	32.6
2nd	Mean	49	31	3.4	3.7	6.3	5.9	17.6	11.9
	sd	84	78	5.0	6.1	8.8	9.8	36.2	30
3rd	Mean	48	30	3.0	3.6	5.8	5.7	14.4	11.5
	sd	73	62	3.9	6.4	7.2	9.3	26.4	27.7
4th	Mean	60	33	3.2	3.3	6.1	5.3	17.6	11.3
	sd	85	65	4.0	5.6	6.9	8.5	27.5	25.8
5th	Mean	63	34	2.4	2.6	5.3	4.9	15.2	11.1
	sd	132	60	3.4	4.4	6.5	7.8	32.9	27.5

Source: Calculations by the author.

[11] The variability of reported quantities of meat consumed was large therefore observations with a sample variance of more than 3 were excluded. This is equivalent to 99.7 percent of the sample.

[12] The variability of reported quantities of fish consumed was large therefore observations with a sample variance of more than 3 were excluded. This is equivalent to 99.7 percent of the sample.

Table 19: *Expenditure shares by livestock product* (percent).*

Quintile	Meat Aggregate Shares		Egg Shares		Fresh Milk Shares	
	Urban	Rural	Urban	Rural	Urban	Rural
1st	59.3	65.6	4.2	3.7	36.5	30.8
	41.9	44.2	17.8	17.2	40.5	43
2nd	47.5	62	5.9	3.3	46.6	34.6
	42.2	44.7	17.8	15.7	43.1	43.7
3rd	46.7	61	6.2	3.9	47.1	35.1
	40.5	42.6	20.4	16.8	41.3	41.8
4th	51.9	57.8	10.2	2.9	37.9	39.2
	38	41.7	22.7	12.4	37.8	41
5th	55.2	56.3	6.6	4.8	38.2	38.9
	32.8	39	17.1	16.3	31.3	38.3

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.

Vietnam Detailed Tables by Income Quintile

Table 20: *Total annual household expenditure (Int$), household size, food expenditure (Int$) and food expenditure share (percent).*

Quintile	Measure	Total Per Capita Expenditure		HH Size		Per Capita Food Expenditure		Share	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	1,384	702	2.7	3.3	563	385	47.9	57.6
	sd	1,193	357	1.4	1.6	316	159	14.2	11.5
2nd	Mean	1,468	797	3.7	4.4	622	421	47.2	55.4
	sd	1,179	387	1.4	1.5	340	161	12.4	11.4
3rd	Mean	1,754	935	4.0	4.8	728	472	44.9	52.9
	sd	1,160	458	1.4	1.6	424	186	12.6	11.4
4th	Mean	2,262	1,114	4.3	5.0	859	521	41.5	49.2
	sd	1,462	535	1.5	1.7	456	233	11.7	11.6
5th	Mean	3,459	1,489	4.8	5.2	1148	639	36.8	45.6
	sd	2,199	780	1.8	1.7	599	283	11.5	11.5

Source: Calculations by the author.

Table 21: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for livestock.*

Quintile	Measure	Per Capita Livestock Expenditure		Livestock Share of Expenditure		Livestock Share of Food Expenditure		Per Capita Meat Quantity	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	55	39	4.5	5.6	9.7	9.8	5.5	4.8
	sd	52	33	3.0	3.5	6.0	5.8	5.7	4.4
2nd	Mean	70	46	5.0	5.9	11.0	10.8	6.7	5.8
	sd	66	35	3.0	3.4	5.9	5.5	6.4	4.8
3rd	Mean	88	56	5.1	6.1	11.8	11.5	8.3	6.8
	sd	76	40	2.9	3.4	5.9	5.8	7.6	5.1
4th	Mean	108	61	5.0	5.7	12.3	11.6	9.8	7.5
	sd	88	44	3.1	3.2	6.3	5.6	7.8	5.8
5th	Mean	160	82	4.9	5.6	13.5	12.4	13.5	9.6
	sd	122	62	2.7	3.1	6.5	5.8	10.4	7.5

Source: Calculations by the author.

Table 22: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for fish.*

Quintile	Measure	Per Capita Fish Expenditure		Fish Share of Expenditure		Fish Share of Food Expenditure		Per Capita Fish Quantity	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	63	39	5.4	5.5	10.9	9.5	15.9	12.0
	sd	74	42	5.2	5.1	9.1	8.3	18.1	14.4
2nd	Mean	61	40	5.1	5.1	10.3	9.1	15.1	12.6
	sd	54	42	4.5	4.6	7.8	7.6	16.3	14.7
3rd	Mean	70	45	4.6	5.0	9.9	9.3	15.6	13.7
	sd	61	45	3.9	4.5	7.4	7.8	15.0	14.8
4th	Mean	77	54	4.1	5.1	9.5	10.2	16.0	16.2
	sd	63	51	3.4	4.5	6.6	8.0	14.7	30.1
5th	Mean	100	69	3.5	4.9	9.1	10.6	15.5	18.7
	sd	89	68	2.9	4.1	6.4	7.9	14.1	18.1

Source: Calculations by the author.

Table 23: *Expenditure shares by livestock product* (percent).*

Quintile	Meat Aggregate Shares		Egg Shares		Fresh Milk Shares	
	Urban	Rural	Urban	Rural	Urban	Rural
1st	76.5	82.7	23.1	17.2	0.4	0.1
	18.2	16.6	18.0	16.4	4.0	1.8
2nd	79.5	84.2	19.5	15.7	1.0	0.1
	16.6	12.7	16.2	12.6	4.7	1.5
3rd	80.9	84.1	17.2	15.6	1.9	0.3
	13.9	12.2	12.4	12.0	7.3	2.8
4th	82.5	84.7	15.4	15.0	2.2	0.3
	13.0	11.5	11.7	11.3	7.2	2.9
5th	83.7	85.0	12.8	14.3	3.5	0.7
	12.2	11.1	9.9	10.7	8.6	3.9

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.

Peru Detailed Tables by Income Quintile

Table 24: *Total annual household expenditure (Int$), household size, food expenditure (Int$) and food expenditure share (percent).*

Quintile	Measure	Total Per Capita Expenditure		HH Size		Per Capita Food Expenditure		Share	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	6,380	3,845	3.1	3.5	1,675	864	28.7	22.8
	sd	4,685	2,545	2.0	2.1	1,580	824	17.5	14.2
2nd	Mean	7,450	4,766	3.8	4.7	2,025	1,130	31.1	24.2
	sd	4,932	2,796	2.0	2.1	1,340	963	15.5	14.2
3rd	Mean	8,587	6,081	4.2	5.2	2,354	1,426	31.0	24.3
	sd	5,434	3,916	1.9	2.3	1,388	1,163	13.9	14.4
4th	Mean	10,516	7,577	4.6	5.8	2,694	1,660	28.5	23.8
	sd	6,534	4,598	2.0	2.5	1,547	1,161	12.3	13.8
5th	Mean	19,798	11,647	5.0	6.1	3,628	1,992	22.0	20.8
	sd	15,774	9,107	2.2	2.9	2,100	1,482	10.2	12.8

Source: Calculations by the author.

Table 25: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for livestock.*

Quintile	Measure	Per Capita Livestock Expenditure		Livestock Share of Expenditure		Livestock Share of Food Expenditure		Per Capita Meat Quantity	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	97	53	1.6	1.3	5.6	9.7	19.9	9.0
	sd	106	70	1.4	1.3	9.3	49.3	22.4	14.7
2nd	Mean	119	80	1.8	1.6	6.4	9.3	24.2	14.2
	sd	104	85	1.2	1.3	17.3	19.2	22.4	18.1
3rd	Mean	140	97	1.8	1.6	7.0	9.0	27.9	17.1
	sd	110	95	1.1	1.3	29.5	18.1	22.3	18.6
4th	Mean	171	123	1.8	1.7	6.5	11.4	34.0	22.6
	sd	118	97	1.0	1.2	9.6	51.4	23.6	20.7
5th	Mean	256	152	1.6	1.6	7.4	9.0	43.9	28.0
	sd	167	121	0.9	1.2	6.7	10.2	27.1	25.2

Source: Calculations by the author.

Table 26: *Total annual household expenditures (Int$), expenditure shares (percent) and quantities (kg) for fish.*

Quintile	Measure	Per Capita Fish Expenditure		Fish Share of Expenditure		Fish Share of Food Expenditure		Per Capita Fish Quantity	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1st	Mean	11	5	0.2	0.1	0.6	1.5	5.7	2.1
	sd	23	19	0.4	0.6	1.7	23.9	11.7	7.6
2nd	Mean	16	10	0.2	0.2	0.8	1.9	8.4	4.1
	sd	29	29	0.4	0.6	1.9	19.6	15.3	11.4
3rd	Mean	17	12	0.2	0.2	0.8	1.6	9.3	5.6
	sd	25	29	0.4	0.5	1.4	8.5	13.5	12.4
4th	Mean	17	14	0.2	0.2	0.6	1.2	8.6	7.1
	sd	23	27	0.3	0.4	0.9	4.0	12.3	12.2
5th	Mean	21	15	0.1	0.2	0.6	0.9	8.1	7.1
	sd	34	26	0.2	0.3	1.0	2.1	11.4	11.9

Source: Calculations by the author.

Table 27: *Expenditure shares by livestock product* (percent).*

Quintile	Meat Aggregate Shares		Egg Shares		Fresh Milk Shares	
	Urban	Rural	Urban	Rural	Urban	Rural
1st	68.9	43.0	0.3	0.0	4.0	3.1
	29.8	38.8	2.4	0.6	13.3	12.1
2nd	68.1	50.4	0.4	0.1	4.6	4.0
	27.1	35.3	2.9	2.6	13.0	12.6
3rd	70.2	52.4	0.4	0.1	3.9	5.8
	23.4	33.3	3.4	1.4	10.3	15.0
4th	72.1	59.4	0.4	0.3	3.6	6.6
	21.6	28.9	3.5	2.4	9.7	13.8
5th	71.8	63.4	0.9	0.1	3.0	7.5
	19.3	25.0	4.2	0.9	8.5	13.4

Source: Calculations by the author.
*Livestock shares are calculated on the sample of livestock products' consumers.