

FOOD AND NUTRIENT DEMAND IN INDONESIA

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FOOD AND NUTRIENT DEMAND IN INDONESIA

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**Abstract:** This study estimated and analyzed the impact of economic (price and expenditure) and demographic variables on food and nutrient demand in Indonesia using the data set collected from the national social and economic survey of household in Indonesian (SUSENAS) in 2011. A two- stage budgeting was applied using QUAIDS model.

The results of food demand in this study show that demand for high-value foods such as fish, meat, eggs and milks, vegetables, fruits, and oil and fats are very sensitive to price changes in both urban and rural households. Cereals as low-value food are less sensitive to price changes. Rural households are more sensitive to price change than urban households. The price elasticities of demand become less elastic in moving from the low to high income group in both urban and rural households. The expenditure elasticities are positive and large enough for the all 10 food groups in this study except the cereal category. The expenditure elasticities for rural households are more elastic than urban households. The expenditure elasticities become less elastic in moving from the low to high income group in both urban and rural households. This study also finds that most of demographic variables such region, quarter, household size, age of household head, education of household head and gender are statistically significant.

The results of nutrient demand in this study show that all expenditure nutrient elasticities are positive. Urban households are more elastic than rural households. The impact of income on nutrient intake is mostly for lower to middle income groups in both urban and rural households. The highest impact as a result of an increase in income on nutrient availability is fats, followed by protein, calories and carbohydrate in both urban and rural households. All nutrients expenditure elasticities increase in moving from high income families to low income families in both urban and rural households. Most price nutrient elasticities are negative. Price nutrient elasticities indicate that rural households are more elastic than urban households across income groups. Price mostly affects nutrient availability for lower income households in both urban and rural households.

## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION.....	1
Background .....	1
Study Objectives .....	5
Organization of the Study .....	6
II. FOOD AND NUTRIENT CONSUMPTION PATTERN IN INDONESIA .....	7
Food Consumption Patterns .....	7
Macronutrient Consumption Patterns .....	14
III. FOOD DEMAND IN INDONESIA .....	17
Introduction.....	17
Literature Review.....	20
Model Specification .....	23
AIDS and QUAIDS Model .....	24
Two-Step Estimation of A Censored System.....	28
Misspecification and Statistical Tests .....	31
Data Source and Description .....	32
Estimation Procedures and Statistical Tests .....	37
First-Stage Demand System .....	37
Second-Stage Demand System.....	38
All Areas.....	38
Urban Areas .....	40
Rural Areas.....	41
Empirical Results .....	43
First-Stage Demand System .....	43
Second-Stage Demand System.....	44
All Areas.....	44
Urban Areas.....	45
Rural Areas.....	49
Conclusion and Policy Implications .....	53

Chapter	Page
IV. NUTRIENT DEMAND IN INDONESIA .....	57
Introduction.....	57
Literature Review.....	59
Model Specification .....	61
Data Source and Description .....	63
Estimation and Results.....	65
All Areas.....	65
Urban Areas.....	66
Rural Areas.....	68
Conclusion and Policy Implications .....	69
V. SUMMARY AND CONCLUSIONS .....	71
REFERENCES .....	76

## LIST OF TABLES

Table	Page
Table II-1. Demographic Variables of Population, Indonesia, 1980-2010.....	82
Table II-2. Percentage of Monthly Average per Capita Expenditure by Commodity Group, Indonesia, 1999-2011 .....	84
Table II-3. Percentage of Monthly Average per Capita Expenditure, Urban and Rural Areas by Commodity Group, Indonesia, 2008-2010 .....	86
Table II-4. Monthly Average Expenditure on Food per Capita, Urban and Rural Areas by Province, Indonesia, 2008-2010 (Rupiah) .....	87
Table II-5. Average Daily per Capita Consumption of Calorie (Kilo Calorie) by Food Group, Indonesia, 1999-2011.....	88
Table II-6. Average Daily per Capita Consumption of Protein (grams) by Food Group, Indonesia, 1999-2011 .....	89
Table II-7. Average Daily Per Capita Consumption of Calorie and Protein by Province, Indonesia, 2008-2010 .....	90
Table III-1. Summary Statistics of Food Consumption, Indonesia, 2011 .....	92
Table III-2. Summary Statistics of Food Consumption, Stratum 1, Urban and Rural Areas, Indonesia, 2011 .....	93
Table III-3. Summary Statistics of Food Consumption, Stratum 2, Urban and Rural Areas, Indonesia, 2011 .....	94
Table III-4. Summary Statistics of Food Consumption, Stratum 3, Urban and Rural Areas, Indonesia, 2011 .....	95

Table	Page
Table III-5. Summary Statistics of Food Consumption, Stratum 4, Urban and Rural Areas, Indonesia, 2011 .....	96
Table III-6. Summary Statistics of Food Consumption, Stratum 5, Urban and Rural Areas, Indonesia, 2011 .....	97
Table III-7. Summary Statistics of Demographic Variables, Indonesia, 2011 .....	98
Table III-8. Parameters of the AIDS Demand, Food Demand, First-Stage Demand, Indonesia, 2011 .....	100
Table III-9. Misspecification Test for the AIDS, Food Demand, First-Stage Demand, Indonesia, 2011 .....	103
Table III-10. Marshallian Price and Expenditure Elasticities, the AIDS Model, First-Stage Demand, Indonesia, 2011 .....	105
Table III-11. Parameters of the QUAIDS Model, Second-Stage Demand, All Areas, Indonesia, 2011 .....	108
Table III-12. Parameters of the QUAIDS Model, Second-Stage Demand, Urban Areas, Indonesia, 2011 .....	110
Table III-13. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 1, Urban Areas, Indonesia, 2011 .....	112
Table III-14. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 2, Urban Areas, Indonesia, 2011 .....	114
Table III-15. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 3, Urban Areas, Indonesia, 2011 .....	116
Table III-16. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 4, Urban Areas, Indonesia, 2011 .....	118
Table III-17. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 5, Urban Areas, Indonesia, 2011 .....	120
Table III-18. Parameters of the QUAIDS Model, Second-Stage Demand, Rural Areas, Indonesia, 2011 .....	122
Table III-19. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 1, Rural Areas, Indonesia, 2011.....	124



Table	Page
Table III-20. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 2, Rural Areas in Indonesia, 2011 .....	126
Table III-21. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 3, Rural Areas, Indonesia, 2011.....	128
Table III-22. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 4, Rural Areas, Indonesia, 2011.....	130
Table III-23. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 5, Rural Areas, Indonesia, 2011.....	132
Table III-24. Wald and Likelihood Ratio Tests, Second- Stage Demand, Indonesia, 2011 .....	134
Table III-25. Misspecification Test for the QUAIDS of Food Groups, Second-Stage Demand, Indonesia, 2011 .....	136
Table III-26. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, All Areas, Indonesia, 2011 .....	138
Table III-27. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, All Areas, Indonesia, 2011 .....	139
Table III-28. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS, Urban Areas, Indonesia, 2011.....	140
Table III-29. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Urban Areas, Indonesia, 2011 .....	141
Table III-30. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Urban Areas, Indonesia, 2011 .....	142
Table III-31. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Urban Areas, Indonesia, 2011 .....	143
Table III-32. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Urban Areas, Indonesia, 2011 .....	144

Table	Page
Table III-33. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Urban Areas, Indonesia, 2011 .....	145
Table III-34. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Urban Areas, Indonesia, 2011 .....	146
Table III-35. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Urban Areas, Indonesia, 2011 .....	147
Table III-36. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Urban Areas, Indonesia, 2011 .....	148
Table III-37. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Urban Areas, Indonesia, 2011 .....	149
Table III-38. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Urban Areas, Indonesia, 2011 .....	150
Table III-39. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Urban Areas, Indonesia, 2011 .....	151
Table III-40. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Rural Areas, Indonesia, 2011 .....	152
Table III-41. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Rural Areas, Indonesia, 2011 .....	153
Table III-42. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Rural Areas, Indonesia, 2011 .....	154
Table III-43. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Rural Areas, Indonesia, 2011 .....	155

Table	Page
Table III-44. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Rural Areas, Indonesia, 2011 .....	156
Table III-45. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Rural Areas, Indonesia, 2011 .....	157
Table III-46. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Rural Areas, Indonesia, 2011 .....	158
Table III-47. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Rural Areas, Indonesia, 2011 .....	159
Table III-48. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Rural Areas, Indonesia, 2011 .....	160
Table III-49. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Rural Areas, Indonesia, 2011 .....	161
Table III-50. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Rural Areas, Indonesia, 2011 .....	162
Table III-51. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Rural Areas, Indonesia, 2011 .....	163
Table IV-1. Share of Nutrients Consumed by Household, Indonesia, 2011 .....	164
Table IV-2. Share of Nutrients Consumed by Households and Income Group, Urban Areas, Indonesia, 2011 .....	165
Table IV-3. Share of Nutrients Consumed by Household and Income Group, Rural Areas, Indonesia, 2011 .....	166
Table IV-4. Nutrient Elasticity, Indonesia, 2011 .....	167
Table IV-5. Nutrient Elasticity by Income Groups, Urban Areas, Indonesia, 2011 .....	168

Table	Page
Table IV-6. Nutrient Elasticity by Income Groups, Rural Areas, Indonesia, 2011 .....	169

## LIST OF FIGURES

Figure	Page
Figure II-1. Percentage of Food and Non-Food Expenditure to Total Expenditure, Indonesia, 1990-2011. ....	83
Figure II-2. Percentage of Low and High-Value Food Expenditure to Food Expenditure, Indonesia, 1999-2011. ....	85
Figure III-1. Household Utility Tree for Food Consumption Indonesia.....	91

# **CHAPTER 1**

## **INTRODUCTION**

### **Background**

Indonesia is an island country in South Asia extending 3,181 miles from east to west and 1,094 miles from north to south. Indonesia encompasses an estimated 17,508 islands, but only 6,000 of which are occupied. It consists of five main islands: Sumatra, Java, Kalimantan, Sulawesi and Papua. It has 33 provinces with approximately 240 million people in 2011. With this population, Indonesia is the fourth biggest populous country in the world. Java is the most developed island in Indonesia where the capital city of Indonesia, Jakarta, is located in Java. Java with 49,535.7 square miles is the smallest island among the five main islands. With a population of 135 million, Java is the home of 60 percent of the Indonesian population. As a result, Java is the most populous island in the world with density 2,756 /square miles.

Indonesia was colonized by Netherlands from 1602-1942 and Japan from 1942-1945. Under Netherlands colonization, Indonesia exported some products such as coffee, sugar, tea, tobacco, rubber, copra, tin and oil (Bevan et al, 1999). Because of systematic Netherlands exploitation, the wealth of Indonesian people was drained away to promote the economic development of the Netherlands (Booth, 1998). As a result, average annual economic growth rate over 1820-1900 was only 0.2 percent. GDP per capita was \$614 in 1820 and increased slightly to \$ 745 and \$977 in 1900 and 1913 respectively. On the

other hand, average annual growth rate in Netherlands at the same period was one percent and GDP per capita was \$1,561 in 1820, \$3,533 in 1990 and \$3,950 in 1913 (Booth, 1998).

After achieving independence in 1945, Indonesian economy deteriorated drastically as a result of political instability in the 1960s. In the mid 1960s the economy was in chaos with hyperinflation by approximately 1,000 percent annually, which resulted in severe hunger and poverty (Hollingsworth, 2007). The annual economic growth rate was only 1.7 per cent over 1950-1967 (Booth, 1998). Following the first President Soekarno's step down in 1967, the New Order administration under President Suharto focused on how to stabilize the economy and protect it against severe inflation. The New order administration brought a degree of discipline to economy with a balance government budget that quickly cut inflation down. In addition, the new government also stabilized the currency, rescheduled foreign debt, and attracted foreign aid and investment (Hill, 1996).

Oil exports have played a significant role in the Indonesian economy, especially during 1970s. An increase in the world oil price in 1974 and 1979 provided an export revenue windfall that contributed to sustained high economic growth rates, averaging over 7.7 percent from 1971 to 1981. However, falling oil prices during 1982-1986 period lowered the economic growth to an annual average of 4 per cent (Hill, 1996). To respond to falling oil prices, the Indonesian government focused on manufacturing sector with export market orientation. Cheaper labor and abundant natural resources gave Indonesia a comparative advantage in the manufacturing sector in the global market. Over the 1985-1992 period, non-oil manufacturing output grew on average by more than 11 percent

annually. Those non-oil manufacturing was mainly from labor intensive products such as textiles, clothing, and footwear as well as natural resource intensive products such as plywood, leather and cement. The rapid industrialization starting in the mid 1980s caused average annual economic growth rate of 6.7 per cent from 1987 to 1994 approaching those of the 1971-1981 period (Hill, 1996).

The high economic growth during 1970-1994 ranked Indonesia as one of the world's most rapidly developing economies of that period. Along with Malaysia and Thailand, Indonesia has been becoming a newly industrializing country following the "Four Tigers" consisting of Hong Kong, South Korea, Singapore, and Taiwan Province of China (World Bank, 1995). However, economic crisis triggered by depreciating rupiah sharply in the end of 1997 worsened the Indonesian economy. The Indonesian economy has been recovering since 2001. The economic growth was 3.6 percent in 2001 and increased to 6.4 percent in 2011 with an annual average economic growth rate of 5.15 percent during 2001-2010 (CBS, 2012). Even though current economic growth rate never has approached those experienced prior to the economic crisis, the Indonesian economic growth rates over that period were still higher than most of other fast growing countries. As a result, Indonesia was placed in the emerging market economy category and ranked as the largest economy in Southeast Asia (World Bank, 2012).

The high economic growth over 1970-1994 period caused Indonesia being moved from the low income category to the middle income category. GDP per capita was \$1,124 in 1996. It dropped drastically to be only \$459 in 1998 because of the economic crisis. However, after the economic recovery, Indonesian economy has moved towards the



middle income country. GDP per capita increased to \$1,859 in 2007 and became \$3,495 in 2011 (World Bank, 2012).

As the fourth biggest populous country in the world, Indonesia has also been experiencing rapid urban growth since mid-1980s. The urban population was only 22.4 percent in 1980 and it grew to 35.91 percent in 1995. The proportion of people living in urban areas increased to 48 percent in 2005 and it was more than 50 percent of total population in Indonesia since 2006 by 50.31 percent. Urban population is predicted to reach 60% by 2025 (CBS, 2011).

Economic growth and Urbanization has contributed to not only an increase in income but also drastic change in the composition of food demand in Indonesia. The higher incomes contribute to a greater demand for more expensive sources of calories such as meats, fruits, vegetables, and processed food products. The proportion of total calories derived from low-value sources of calories such as starchy roots, has declined, while the proportion of total calories derived from high values foods such as meats, fish/sea foods, fruit, vegetables and vegetable oil has increased during the 1961-2003 (Rada and Regmi, 2010).

Monthly average budget share of cereal and tuber to total food expenditure both urban and rural was 17.56 percent in 1999 but it dropped drastically to be 7.99 percent in 2011. Monthly expenditures for fish, meat, eggs and milks, vegetables, fruit and oil and fats as a high value food to total food expenditure were 22.12 percent in 1999 and decreased to be 17.37 percent in 2011. However, monthly average budget share of processed foods and beverage product to total food expenditure has increased steadily from 9.53 percent in 1999 to 13.73 percent in 2011. Average daily per capita

consumption of calorie also has increased from 1,849.36 kcal per person in 1999 to 1952.01 kcal per person in 2011. The contribution of cereals and tubers to total calorie consumption per person was dominant, accounting for 60.95 percent in 1999. However, it was only 49.31 percent in 2011. On the other had, the contribution of high-value foods to total calorie consumption such as fish, meats, eggs and milks, vegetables, fruit, oil and fats and processed foods and beverages was 28.24 and 39.02 percent respectively in 1999 and 2011 (CBS, 2011).

### **Study Objectives**

The general objective of this study is to identify the determinants of food and nutrient demand in Indonesia. The specific objectives of this study are:

1. The first objective of this study is to determine the effect of demographic factors, price and expenditure on the demand for major food groups in Indonesia. This study uses a demand system model approach to measure the impact of the exogenous variables on per capita food demand of Indonesian urban and rural households at different income categories.
2. The second objective of this study is to determine the effect of price and expenditure on nutrient demand for nutrient for Indonesian households. In this part of the study uses the direct method for estimating nutrient elasticities using information available from coefficient of the demand system estimated in the first part of this study. Given that consumption patterns and the subsequent nutritional intakes differ among subsets of households (rural vs. urban and households

belonging to different income category), this study estimates nutrient demand for different subset of households.

The Indonesian household survey data for 2011 are used to accomplish the objectives of this study.

### **Organization of the study**

An overview of the food and nutrient consumption patterns in Indonesia is given in the chapter 2. The analysis of demand for 10 major food categories in Indonesia is described in chapter 3. This chapter 3 begins with a problem statement including the significance and contribution of this study. The next section discusses model specification, data and estimation procedures and statistical test used in this study to estimate the Indonesian food demand. The final section of chapter 3 analyzes results. Chapter 4 analyzes nutrient demand in Indonesia. This chapter includes a section on the contribution of this study dealing with nutrient demand. Analysis of nutrient demand is presented in the last section of chapter 4. The summary and conclusions of food and nutrient study are given in the last chapter.

## **CHAPTER 2**

### **FOOD AND NUTRIENT CONSUMPTION PATRERN IN INDONESIA**

#### **Food Consumption Patterns**

Many factors influence consumption patterns in Indonesia such as per capita income, population, urbanization and demographic variables. As explained in the first chapter, rapid economic growth has led to an increase in per capita incomes. In the mid-1960s, per capita income was \$70 and it rose sharply to \$ 1,124 in 1996, but dropped sharply to below \$ 500 in 1998 due to the economic crisis in late 1997. However, the economy has recovered since 2001 and economic growth has been above 5%. As a result, per capita income was over \$ 2,000 in 2008 and rose to \$ 2,952 and \$3,495 in 2010 and 2011 respectively (World Bank, 2012).

Besides economic growth and rising per capita incomes, population has grown rapidly. The population growth in period 1980-1985 was 2.17 percent per year. The growth rate of the population declined and reached 1.84 percent per during 1985-1990 period. Population growth continued to decline to 1.08 per cent per year in 2005-2010 periods. As a result, the population has increased steadily. Total population was 150.8 million in 1980 and increased dramatically to 239.87 million in 2010 (United Nations, 2012). However, this population growth has been accompanied by better demographic variables such as the life expectancy and mortality rates. The mortality rate was 121 per

1,000 live births in 1980 and was only 35 in 2010. The life expectancy for female and male increased from 63 and 56 in 1980 to 71 and 67 in 2010 respectively (Table II-1).

The composition of population age has also changed dramatically (Table II-1). Population aged 0-14 years, 15-64 years and over 65 years were 61.98, 83.46 and 5.38 million or 41.0, 55.34 and 3.57 percent of the total population respectively. The amount of population was 64.85, 161.70 and 15.04 million or 27.04%, 67.41%, 6.27% of total population for 0-14 years, 15-64 years and over 65 years in 2010. This data shows that Indonesia is facing aging population. Also, as discussed in the previous chapter, Indonesia has experienced a rapid urbanization since 1980. Percentage of population living in urban and rural areas was 22.10 and 77.9 percent, respectively in 1980. However, in 2010 the number of people living in urban areas was 53.70 per cent, while those living in rural areas were 46.30 percent. These demographic variables and rapid urbanization definitely affect demand for food and nutrient in Indonesia.

The government of Indonesia conducts survey of household ever year. This survey is known as the national social and economic survey of households in Indonesia (SUSENAS). The objective of survey is to collect data on expenditure, income, education, health, and sociodemographic condition of Indonesian households. However, expenditure questions are collected every three years. Household expenditure data in Indonesia used this study are from the SUSENAS. Household expenditures in Indonesia can be classified into two major groups namely food and non-food expenditures. Food expenditures consist of 14 commodity groups encompassing cereals, tubers, fish, meat, eggs and milk, vegetables, legumes, fruits, oil and fats, beverage stuffs, spices, miscellaneous food items, prepared food, alcoholic beverages, and tobacco and betel.

Meanwhile, non-food expenditures includes 6 commodity groups encompassing housing and household facility, goods and services, clothing, footwear, and headgear, durable goods, taxes and insurance, and parties and ceremony.

Figure II-1 presents food and non-food expenditures over the period of 1990-2011. Food expenditures were relatively high as compared to non-food expenditures in 1990. Food and non-food expenditures were 60.36 and 39.64 percent respectively. Total annual food expenditures were higher than those non-food expenditures over period 1990-2005. However, food expenditures tend to decrease overtime and non-food expenditures tend to increase during the same period. Due to the crisis in late 1997, the food expenditures have increased and non-food expenditures decreased in 1999. This happens because during the economic crisis households have to survive by fulfilling on the basic needs such as food and reducing the expenditures on non-food. Non-food expenditures exceeded food expenditures in 2006, but spending on non-food experienced further decline in the period 2007-2011. However, non-food expenditure was slightly higher than food expenditure in 2011. Roughly speaking, figure II-1 shows the percentage of food expenditure decreases as the purchasing power of consumer increases. This indicates that food consumption in Indonesia has followed the pattern of Engel's law.

Table II-2 presents percentage of monthly average per capita expenditure on food and non-food items over the period 1999-2011. National food expenditure has fluctuated. Food expenditures were 55.3 percent of total expenditure in 1996 and rose sharply to 62.9 percent in 1999 due to the impact of the economic crisis in 1997. However, food

expenditures again decreased to 50.62 percent in 2009, increased slightly to 51.43 percent in 2010 and decreased slightly to 49.45 percent (CBS, various issues).

On average, the total specific food expenditures to total expenditure ranged from 1.29% for miscellaneous food items to 10.36% for cereals over the period 1999-2011. Cereals were dominant in total food expenditure at the beginning of that period, but percentage of expenditures on cereals decreased. Meanwhile, prepared foods and beverages have been increasing steadily and replaced cereals as the dominant food expenditures recently. Therefore, prepared foods and beverages are dominant in total food expenditures followed by cereals, tobacco and betel, fish, vegetables, and eggs and milks. Expenditure on tobacco and betel also contributes relatively high for monthly average per capita expenditure in Indonesia. The lowest food expenditure was for tubers which accounts for less than 1% of total expenditure. This is not surprising as tubers which include such items cassava and sago are a low-value staple food in the Indonesian diet.

Figure II-2 shows food expenditures on low-value foods such as cereal and tubers vs. high-value foods such as fish, meat, eggs and milk, vegetables, fruits and oil and fats over period 1999-2011. Expenditures on low-value food as percentage of total food expenditures were relatively high in 2009, but it tends to decrease overtime and it was less than 10 percent in 2011. Expenditures on high-value food as percentage of total food expenditure were more than 20 percent in 1999. It also tends to decrease over time too, but it was relatively stable over period 2006-2011 by 17 percent on average.

Household expenditures in urban and rural areas also have experienced a fluctuation in line with the national expenditure. Food expenditures in urban areas was

48.0 percent of total expenditure in 1996 and increased to 56.2 percent in 1999. Then, the food expenditures decreased to 45.69 percent in 2009 and again increased slightly to 46.52 percent in 2010. Household expenditures in rural areas were dominated by food expenditure. Food expenditures were 63.3 percent in 1996 and increased sharply to 70.2 percent in 1999 due to the economic crisis in 1997. Food expenditures decreased to 58.57 percent in 2009 and slightly increased to 59.19 percent in 2010 (CBS, various issues).

Table II-3 shows food expenditures in both urban and rural areas for 14 food groups during period 2008-2010. Expenditure for prepared foods and beverages and cereals were dominant for both urban and rural areas. However, expenditures for cereals in rural areas were higher than in urban areas while foods and beverage spending to be higher in urban than in rural areas. Spending on cigarettes was the third largest expenditures for both urban and rural areas. Rural households consumed more cigarettes than those urban households. Expenditures on high-value foods such as fish, eggs and milk, and vegetables were also quite high for urban and rural areas. However, fish and vegetable expenditures in rural areas were higher than urban areas. The expenditures on the eggs and milks were higher in urban areas compared to rural areas. Expenditures for meat and fruits in urban areas were higher than those in rural areas. On the other hand, expenditures for oil and fats were higher in rural than those urban areas.

There was also a gap between household food expenditures of low-income, medium and high nationally. Low, medium and high income household expenditures both urban and rural areas were Rp 272,540, Rp 723,014, and Rp 958,191 respectively in 2010. The percentage of food expenditure to total expenditure of each household was 68.3 percent, 58.2 percent and 38.9 percent in 2010. This means that food expenditure



dominates total expenditure of low income households. In fact, food expenditure of high income households was more than three times the food expenditures of low income households (CBS, 2011).

Food spending gap also has occurred in urban and rural areas. Food Expenditures of low, medium and high income households in both urban areas and rural areas were Rp 267,540, Rp 701,337, and Rp 952 960 respectively in 2010. The percentage of food expenditure to total expenditure of each income category was 66.1 percent, 55.2 percent and 38.3 percent in urban areas. On the other hand, in 2010 food expenditures of low, medium, and high income households in rural areas was to Rp 274,318 (69.1%), Rp 744,343 (41.2%) and Rp 966, 645 (60.25) (CBS, 2011). This indicated that food expenditures dominated total expenditures of low income households in both urban and rural areas. Although in this case, the food expenditures of low income households in rural areas were slightly higher than those of low income households in urban areas. In general, food expenditures of high income households was more than three times the food expenditures of low income households either urban or rural areas.

Table II-4 represents monthly average expenditure per capita on food in urban and rural areas by province over 3 year from 2008 to 2010. Indonesia consists of 33 provinces. We can divide the 33 provinces in six regions based food diet. The first region consists of the provinces located in the island of Sumatra encompassing, Aceh, North Sumatra (Sumatra Utara), West Sumatra (Sumatra Barat), Riau, Riau Islands (Kepulauan Riau), Jambi, South Sumatra (Sumatra Selatan), Bangka Belitung Islands, Bengkulu and Lampung. The second region consists of provinces located on the island of Java encompassing Jakarta, West Java (Jawa Barat), Central Java (Jawa Tengah), Banten,

Yogyakarta and East Java (Jawa Timur). The third region consists of Bali, West Nusa Tenggara (Nusa Tenggara Barat=NTB) and East Nusa Tenggara (Nusa Tenggara Timur=NTT). The fourth region is located in Kalimantan Island consisting of West Kalimantan (Kalimantan Barat), Central Kalimantan (Kalimantan Tengah), South Kalimantan (Kalimantan Selatan) and East Kalimantan (Kalimantan Timur). The fifth region is located on Sulawesi Island including North Sulawesi (Sulawesi Utara), Gorontalo, Central Sulawesi (Sulawesi Tengah), South Sulawesi (Sulawesi Selatan), West Sulawesi (Sulawesi Barat) and Southeast Sulawesi (Sulawesi Tenggara). Last region consists of North Maluku (Maluku Utara), Maluku, West Papua (Papua Barat) and Papua.

On average, food expenditure in urban areas in the province of Papua is the highest for 3 years, followed by East Kalimantan and Capital Special Region of Jakarta. The three lowest food expenditures are in West Nusa Tenggara, West Sulawesi and Central Java. In rural areas, the three highest food expenditures lay Bangka Belitung, Riau Islands and Aceh. While the three lowest food expenditures are Gorontalo, Southeast Sulawesi and West Nusa Tenggara. Based on region for urban areas, the highest average expenditure of food was region 6 with average expenditure Rp 326,813.2 per month and region 3 was the region with the smallest expenditure for food with monthly average expenditure Rp 234,659. Region 1, 2, 4 and 6 spent on food above national average. For rural areas, the highest expenditure on food per capita was Region 4 with monthly average expenditure Rp 242,439.7 and Region 5 was the lowest expenditure on food with average expenditure Rp 174,288.7 per month. Regions

spending on food above national average were region 1, 4 and 6. Above different level of food spending for each region will affect the demand for food in Indonesia.

### **Macronutrient Consumption Patterns**

A nutrient is a chemical substance that any organism needs in order to live and grow or it is a substance used in an organism's metabolism which must be taken in from its environment. Nutrients are used to build and repair tissues, regulate body processes and are converted to and used as energy for every organism, including human being (Whitney, Elanor and Sharon Rolfes, 2002). Nutrients can be classified as micro and macro nutrient. Micronutrients include such as iron, iron, cobalt, chromium, copper, iodine, manganese, selenium, zinc and molybdenum. On other hand, macronutrients consist of calorie, protein, fat, and carbohydrate, minerals, vitamins and water (Thomas, 1980).

Table II-5 shows average daily per capita consumption of calories (kcal) by 14 food groups over within 1999-2011. On average during those periods, the contribution of each food items to calories intake ranged from 0 kcal for tobacco and betel to 988.67 kcal for cereals. Average per capita consumption of calories fluctuated over that period. It has increased sharply from 1999 to 2005. I decreased in 2006, then it rose again in 2007 and finally has declined until 2011. Cereal was the largest contributor to calorie intake and was followed by oil and fats, prepared food and beverage and beverage stuffs. Although the contribution of cereals to the calorie intake were quite dominant, but it has decreased from year to year. While the contribution of prepared food and beverage to calorie intake has continued to increase. Contribution of high-value foods such as fish, meat, eggs and

milks, vegetables, fruits, oils and fats to calorie consumption continued to experience a steady increase. The contribution of tubers for consumption of calories has been coming down over that period.

Table II-6 presents average daily per capita consumption of protein (grams) by 14 food groups within 1999-2011. On average over those periods, the contribution of each food items ranged from 0 grams for tobacco and betel to 23.22 grams for cereals. Despite a sharp increase in the average protein consumption from 1999 to 2002, average per capita protein consumption was relatively stable during this period. Like calorie intake, cereal was the largest contributor to the consumption of protein and was followed by a fish, prepared food and beverage, and legumes. Contribution of meat, eggs and milks, and vegetables to protein intake as the high-value foods was steadily growing. While the contribution of other food groups to protein intake were relatively small by less than 1 gram per day.

Average daily per capita consumption of calories and protein by province period 2008-2010 is presented in Table II-7. On average over three year period, highest average daily per capita consumption of calories was Bali, followed by central Kalimantan, and West Sumatra. The three lowest average daily per capita consumption of calorie were North Maluku, Special province of Yogyakarta, and East Kalimantan. Bali was the highest average daily per capita of protein too, followed by Central Kalimantan, Riau Island. The three lowest daily per capita of protein were West Papua, Papua, and North Maluku. By region, region 3 consumed the highest calories with average daily per capita consumption 2,075.32 kcal and Region 6 consumed most low calorie with average daily per capita consumption 58.73 kcal. On overall, Region 1, 3, 4, and 5 consumed calorie

above the national average level. The highest average daily consumption of protein was region 3 having average daily consumption 58.73 grams and the lowest average daily consumption of protein was region 6 with average daily consumption 48.65 grams. Indonesia. For consumption of protein, Region 1, 3 and 4 consumed above the national average level. This different composition of calorie and protein for each region will influence the demand for nutrient in Indonesia.

## **CHAPTER 3**

### **FOOD DEMAND IN INDONESIA**

#### **Introduction**

The World Bank classifies economy into three categories, low, middle and high income based on GDP per capita. Furthermore, the middle income category can be subdivided to lower middle and upper middle income. The low income category is \$1,025 or less; the lower middle income category is \$1,026 - \$4,035; the upper middle income category is \$4,036 - \$12,475; and the high income category is \$12,476 or more (World Bank. 2012). The Indonesian economy moved from the low income category to the middle income category because of the high economic growth over 1970-1994 periods. GDP per capita was S517 in 1980 and increased to \$1,124 in 1996. Because the economic crisis hit Indonesian economy in 1997, GDP per capita decreased drastically to only \$ 459 in 1998. However, after the economic recovery since 2001, the Indonesian economy has moved toward the middle income category. GDP per capita was \$3,495 in 2011 (World Bank, 2012). Indonesia has also been experiencing rapid urban growth since mid-1980s. People living in urban areas were 50.31% in 2006. Therefore, the majority of Indonesia lives in urban areas since 2006.

Economic growth and urbanization have contributed to not only an increase in income but also a change in the demand composition for foods in Indonesia. The higher

incomes contribute to a greater demand for more expensive sources of calories such as meat, fruit, vegetables and processed food products (Seale et al., 2003). The total calories of low-value products such as starchy roots has been replaced by high-value foods such as meats, fish/sea foods, fruit, vegetables and vegetables oil during 1961-2008 (Rada and Regmi, 2010).

The rapid economic growth usually is accompanied by economic inequality. The Gini coefficients are widely used to measure income distribution. The Gini coefficients range between 0 and 1. Lower Gini coefficients represent a more equal distribution and higher Gini coefficients indicate more unequal distribution. The rapid economic growth with the poor favor strategy in Indonesia has been accompanied by less unequal distribution. Overall, for the 43 year from 1964 to 2007 the Gini Index barely changed. The Gini Index of household expenditure was 0.35 in 1964 and rose slightly to 0.37 in 2007 (World Bank, 2012). Even the Indonesian economy undergoing a major transformation, the Gini index fluctuated marginally with range of 0.32 to 0.37 over 1964-2007. The index Gini was relatively stable in the next two consecutive years in 2008 and 2009 by 0.37, but it increased slightly to 0.38 and 0.41 in 2010 and 2011 respectively (CBS, 2012). The stability of income distribution can also be illustrated through the share of the top 20 percent to the bottom 40 percent of consumer household expenditures. The ratio barely moved from 2.33 in 1964 to 2.08 in 2005 (Mishra, 2007). However, the ratio has increased in recent year. It was 2.39 in 2007 and became 2.51 in 2010 (CBS, 2011).

The Gini coefficient of urban areas was close to the national average. It was 0.34 in 1964, but increased to 0.36 in 1998 because of economic crisis and decreased to 0.32

in 2005 (Mishra, 2007). However, the index Gini of urban areas increased recently. It was 0.37 over 2007-2009 and rose to 0.38 and 0.42 in 2010 and 2011 respectively (CBS, 2012). By contrast, the Gini index of rural areas was 0.35 in 1964 and dropped to 0.25 in 1999. But it rose slightly to 0.27 in 1998 and then fell for couple years before it rose again to 0.27 in 2005 (Mishra, 2007). Like urban areas, the Gini index of rural areas tends to increase. It was 0.30 in 2008 and fell down to 0.29 in 2009 and rose to 0.32 and 0.34 in 2010 and 2011 respectively (CBS, 2012). The index Gini indicated that urban areas are higher unequal distribution income than those in rural areas. Moreover, rapid economic growth recently increased economic inequality both urban and rural areas. In fact, the national Gini level is primarily influenced by the urban Gini index because Indonesia's urban population increased rapidly over the last four decades.

Regarding this income growth, rapid urbanization and changes in consumption from low-value foods to high-value foods, it is important to estimate demand for food in Indonesia using current economic data. In addition, based on this the income inequality, it is important to estimate demand system for different income level instead of in aggregate level. First, price changes can have different impact on consumers' welfare. Because of consumption patterns varying according to income level, welfare effects also vary by income level as commodity prices change (Pinstrup-Andersen and Caicedo, 1978). Second, it is easy to incorporate the effect of income distribution into a demand system (Jensen, and Manrique, 1998). Finally, because of differences income distribution and consumption pattern in urban and rural and areas in Indonesia, it is also important to estimate demand for food by income group based on where households live either urban or rural areas.



## Literature Review

This subchapter discusses the previous empirical works of demand for food in Indonesia. Several previous demand studies have been conducted to examine food demand in Indonesia. The food demand studies mainly used the national social and economic survey of household in Indonesian (SUSENAS) conducted by Indonesian Bureau of Statistics across the country. There are more than 200 commodities in the SUSENAS data. Those previous studies aggregated food commodities into food groups based on their research purposes, Indonesian diet, nutrition content, policies purposes and other factors.

Alderman and Timmer (1979) using single demand equation examined demand for selected food crop commodities such as rice and cassava by income group as well as urban vs rural areas. They found that demand for rice was elastic and demand for cassava was inelastic. They also found that rice was a normal good for high income urban and rural households, Cassava was a normal good for low income urban households, but it was a luxury good for low income rural households. However, for high income urban and rural households, cassava was an inferior good. Tell and Johnson (1987) used linearized approximation almost ideal demand system (LA/AIDS) to investigate demand system for 6 food groups. They found that the demand for rice, palawija, fruits and vegetable and fish were inelastic, while the demand for beans, other meats and dairy products were elastic. Their findings also indicated that food demand for high income households was less responsive to changes in income than was food demand for low income households. In addition, the low income households were also more responsive to changes in price of some basic food products such as rice. Tabor et al, (1989) using

LA/AIDS and applying it to time series data for seventeen years examined the demand for eight commodities consisting rice, corn, cassava, peanut, mungbean, soybean, sugar and others. Their studies indicated that food staples are normal goods. Expenditure elasticities were higher for the higher valued foodstuffs than for lower valued foodstuffs. Deaton (1990) investigated the demand for eleven food commodities. Unlike previous studies, he improved earlier empirical works on Indonesian food demand by using appropriate price data regarding spatial variation in prices in household survey data. However, he examined demand for food only rural households in Java Island. His study found that price elasticity of staple food was inelastic while demand for vegetables and meat were elastic. Jensen and Manrique (1998) using LA/AIDS estimated food demand for eight commodity groups based on income group in urban areas. They classified households into income groups based on an analysis of homogeneity of variances of residuals resulted from Engel regression. Households with low income were responsive to income and price changes in rice and fish. Households with high income were not responsive to price changes in rice.

More recent empirical works on food demand studies in Indonesia were conducted by Hutasuhut et al. (2001), Moeis (2003), Widodo (2004), Fabiosa et al. (2005), and Pangaribowo and Tsegai (2011). Hutasuhut et al. (2002) using the LA/AIDS model investigated the demand for meats in West Java and Jakarta, Indonesian capital city. They found that demand for all meat products were inelastic. Moeis (2003), using LA/AIDS with two step estimations regarding missing observations, focused on the impact of the 1997/1998 economic crisis on demand for ten food groups and nutrient demand by comparing 1996 and 1999 SUSENAS data. He found that all household

suffered from price increases. Widodo (2004) using linear expenditure system (LES) estimated Indonesian food demand model using seven rounds of survey of living cost. His study indicated that household fruits demand was least responsive to changes in expenditure while household meat demand was most responsive to changes in expenditure. Using an incomplete demand system (LinQuad model), Fabiosa et al. (2005) estimated nine food group using 1996 SUSENAS data. They found that demand for meat and fish were highest price elasticity and demand for fruits and egg-mild were low price elasticity. Unlike other food demand studies using SUSENAS data set and LA/AIDS model, Pangribowo and Tsegai (2011) estimated eight food groups and applying it to data panel from Indonesia Family Life Survey (IFLS) using a quadratic almost ideal demand (QUAIDS) model. Their study indicated that the rich households consumed relatively more meats, snack and dried foods. By contrast, poor households consumed relatively more staple foods.

This study differs with the above previous studies. First, this study uses the latest data of national social and economic survey in Indonesia (SUSENAS) conducted in 2011. Second, this study uses all of the samples in the national household survey data. Most previous studies such as Alderman and Timmer (1979), Deaton (1990), Jensen and Manrique (1998), did not use all sample from SUSENAS, except for the study of Moeis (2003). Third, most previous studies on food demand in Indonesia used the LA/AIDS using a linear price index in their model except for Fabiosa et al. (2005) who used a LinQuad model and Pangribowo and Tsegai (2011) who used QUAIDS model. This study uses both AIDS and QUAIDS using a nonlinear price index. The advantage of

QUAIDS model allows for a non-linear relationship in the estimation of the Engel curve (Banks et al, 1996).

The objectives of this chapter are: (1) Estimating demand for food in Indonesia based on all areas, urban and rural areas using QUAIDS model; (2) Estimating demand for food in Indonesia based income groups for both urban and rural areas using QUAIDS model.

### **Model Specification**

This study consists of ten food groups encompassing of cereals, fish, meats, eggs and milks, vegetables, fruits, oil and fats, prepared foods and drinks, other foods and tobacco. However, a full demand system for these ten food groups needs to estimate a large number of parameters. Therefore, this study uses a two-stage budgeting approach in order to reduce the number of parameters to be estimated. The two-stage budget procedures to analyze the demand for ten food categories in Indonesia are shown in the figure III-1. In the first stage budgeting, total expenditures are allocated among food and non-food commodity. Food expenditures were then allocated among the ten foods in the second stage budgeting.

Weak separability is important for the multiple stage of budgeting in demand system analysis. If food is assumed to be weakly separable from non-food, then the consumer's utility maximization decision can be decomposed into several stages budget procedures (Deaton and Muellbauer, 1980). Because this study applies the two-stage budgeting procedure, in the first stage budgeting in the case demand for food ten food categories in Indonesia, this study estimates demand for goods consisting food and non-

food items. Then, this study estimates demand for ten food groups in the second stage budgeting.

### **AIDS and QUAIDS Model**

The almost ideal demand system (AIDS) developed by Deaton and Muellbauer (1980) is nested within a quadratic almost ideal demand system (QUAIDS) developed by Banks et al (1996). However, in most of the empirical demand studies using micro data, the QUAIDS model is more appropriate model than the AIDS model to explain household consumption behavior (Bank et al., 1996). Whether the QUAIDS or AIDS model properly suitable to demand for food in Indonesia needs to be tested. We can test both models to choose a model which is the appropriate in analyzing the demand for food in Indonesia. The QUAIDS model of demand for food can be written as:

$$(1) \quad w_i = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{X}{a(P)} \right) + \frac{\lambda_i}{b(P)} \left( \ln \left[ \frac{X}{a(P)} \right] \right)^2 + u_i$$

where  $i$  and  $j$  are goods consisting of 10 major food groups,  $w_i$  is the share of total expenditure allocated to the  $i$ th good for each household,  $p_j$  is the price of the  $j$ th good,  $X$  is the household expenditure on goods in the system,  $a(P)$  is the price index,  $b(P)$  is the Cobb-Douglas price aggregator,  $\gamma_{ij}$ ,  $\beta_i$ , and  $\lambda_i$  are parameters to be estimated, and  $u_i$  is an error term. The price index  $a(P)$  is defined as:

$$(2) \quad \ln[a(P)] = \alpha_0 + \sum_{i=1}^n \alpha_i \ln p_i + 0.5 \sum_{i=1}^n \sum_{j=1}^n \gamma_{ij} \ln p_i \ln p_j$$

The Cobb-Douglas price aggregator for household  $b(P)$  is defined as:

$$(3) \quad b(P) = \prod_{i=1}^n p_i^{\beta_i}.$$

Because the AIDS is nested with the QUAIDS, if  $\lambda_i = 0$  for all  $i$ , the QUAIDS collapses to the AIDS model. Therefore, the AIDS model of demand for food can be expressed as:

$$(4) \quad w_i = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{X}{a(P)} \right) + u_i$$

The household characteristics such as demographic variables also affect the demand for food. To incorporate those variables, the intercept in equation (1) for the QUAIDS model and equation (4) for AIDS model can be expressed as:

$$(5) \quad \alpha_i = \rho_{i0} + \sum_{k=1}^m \rho_{ik} d_k$$

where  $d_k$  is the  $k$ th demographic variables,  $k=1, \dots, m$  represent a total of demographic variables encompassing urban, household size, educational level of household head (years of schooling), age of household head, gender of household head, five region dummy variables (Sumatra versus non-Sumatra for region 1, Java versus non-Java for region 2, Kalimantan versus non-Kalimantan for region 4, Sulawesi versus non-Sulawesi for region 5, Papua versus non-Papua for region 6) and two quarter dummy variables (Quarter 2 and quarter 3).

The properties of demand theory can be imposed on equation (1) and equation (4) by restricting its parameters (Deaton and Muellbauer, 1980; Banks et al, 1996). These restrictions are known as adding-up, homogeneity and Slutsky symmetry. The adding-up restriction is imposed as:

$$(6) \quad \sum_{i=1}^n \rho_{i0} = 1; \sum_{i=1}^n \rho_{ik} = 0; \sum_{i=1}^n \gamma_{ij} = 0; \sum_{i=1}^n \beta_i = 0; \text{ and } \sum_{i=1}^n \lambda_i = 0.$$

Homogeneity is given by:

$$(7) \quad \sum_{j=1}^n \gamma_{ij} = 0 \text{ for any } i$$

Slutsky symmetry is imposed as

$$(8) \quad \gamma_{ij} = \gamma_{ji}, \quad i \neq j.$$

Expenditure variables in equation (1) and equation (4) might be endogenous variables leading to biased model parameter estimates. To correct for the endogeneity, this study follows procedure proposed by Blundell and Robin (1999). The first step is to estimate a reduced-form expenditure equation:

$$(9) \quad \ln X = \mathbf{I}\pi + \varepsilon$$

where  $X$  is total food expenditure on the studied food groups,  $\mathbf{I}$  is the set of explanatory variables consisting of total household expenditure, square of total household expenditure, prices of the studied goods, and demographic variables that are used in equation (5),  $\pi$  are parameter to be estimated and  $\varepsilon$  is error term. This study uses the national social and economic survey of households in Indonesia (SUSENAS). SUSENAS records household's income, but these income data have a lot missing income data. If income data are available, the data are unreliable (Moeis, 2008). SUSENAS 2011 contains 20.30% missing income data. Therefore, this study uses total household expenditure as a proxy for income (Eales et al., 1988; Teklu et al., 1988; Deaton, 1996; and Moeis, 2003).

The computed residual  $\hat{\varepsilon}$  from equation (9) and by assuming  $E(\varepsilon_i | \mathbf{I}, \varepsilon) = 0$  are augmented into equation (1) and equation (4) as follow:

$$(10) \quad u_i = \varphi_i \hat{\varepsilon} + \varepsilon_i$$

Following Bank et al (1996), the Marshallian price elasticities (uncompensated elasticity) are calculated as follows:

$$(11) \quad e_{ij}^u = \frac{1}{W_i} \left\{ \gamma_{ij} - \left( \beta_i + \frac{2\lambda_i}{b(P)} \left[ \ln \left( \frac{X}{a(P)} \right) \right] \right) \left( \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j \right) - \frac{\lambda_i \beta_j}{b(P)} \left( \ln \left[ \frac{X}{a(P)} \right] \right)^2 \right\} - \delta_{ij}$$

where  $\delta_{ij}$  is the Kronecker delta which is equal to 1 when  $i = j$  and is equal to 0 as  $i \neq j$

The expenditure elasticity can be calculated as:

$$(12) \quad e_i = 1 + \frac{1}{W_i} \left[ \beta_i + \frac{2\lambda_i}{b(P)} \ln \left( \frac{X}{a(P)} \right) \right]$$

Following Deaton and Muellbauer (1980), the Marshallian price elasticities of AIDS model can be calculated as follows:

$$(13) \quad e_{ij}^u = \frac{1}{W_i} \left[ \gamma_{ij} - \beta_i \left( \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j \right) \right] - \delta_{ij}$$

The expenditure elasticities under AIDS are given by

$$(14) \quad e_i = 1 + \frac{1}{W_i} \left[ \beta_i \right]$$

All price and expenditure elasticities are evaluated on the basis of parameter estimated and sample means of independent variables using equation (11), (12), (13) and (14). Standard errors of both price and expenditure elasticities are calculated using the delta method.

This study uses two-stage budgeting in estimating demand for 10 food groups in Indonesia. Therefore, elasticities of demand for ten food groups in the second state are conditional on total goods expenditure in the first-stage budgeting. Following Carpentier and Guyomard (2001), unconditional expenditure elasticity for the  $i$ th food group within the  $r$ th good group are defined as



$$(15) \quad e_i = e_{(r)i} e_{(r)}$$

Where  $e_{(r)i}$  is the conditional expenditure elasticity for  $i$ th food groups and  $e_{(r)}$  is the unconditional expenditure elasticity for the  $r$ th good group.

The unconditional Marshallian price elasticity within the  $r$ th food groups is given by

$$(16) \quad E_{ij} = e_{ij} + w_{(r)j} \left[ \frac{1}{e_{(r)j}} + E_{(r)} \right] e_{(r)i} e_{(r)j} + w_{(r)j} w_{(r)} e_{(r)} e_{(r)i} (e_{(r)j} - 1)$$

where  $E_{ij}$  is the unconditional Marshallian cross-price elasticity between  $i$ th food groups with the price of  $j$ th food groups,  $e_{ij}$  is the conditional marshallian cross-price elasticity  $e_{(r)j}$  is the conditional expenditure elasticity for  $j$ th food groups,  $E_{(r)}$  is the Marshallian own-price elasticity of the  $r$ th goods group,  $w_{(r)j}$  is the expenditure share of  $j$ th food groups in  $r$ th goods group, and  $w_{(r)}$  is share of total expenditure allocated to  $r$ th goods group.

### **Two-Step Estimation of A Censored System**

The survey about food consumption given to Indonesian households reported by SUSENAS asks for expenditure during the previous week. It likely happens that some households have zero expenditures during the survey period. The zero expenditures might be caused no preference for given commodity during survey period, infrequency of purchase and survey error. Because expenditure shares in the demand system cannot be negative and we have zero expenditures, this would imply that the dependent variables are the limited dependent variables or censored model. Therefore, estimation techniques

failing to consider this limited dependent variables cause biased estimation (Heien and Wessels, 1990). This study employs the consistent two- step estimation procedure for a system of equations with limited dependent variables as proposed by Shonkwiler and Yen (1999) in order to account for zero expenditure shares from missing values for exogenous variables. The first step is to estimate a probit regression to determine the probability of buying a given type of food. Following Pan, Monhanty, and Welch (2008), the Probit regression for food demand in Indonesia is:

$$(17) \quad \text{prob}(y_{it} = 1|Z_h) = \Phi(\mathbf{Z}'_h \boldsymbol{\tau}_i),$$

$$(18) \quad \text{prob}(y_{it} = 0|Z_h) = 1 - \Phi(\mathbf{Z}'_h \boldsymbol{\tau}_i)$$

where  $\mathbf{Z}_h$  is a vector of explanatory variables in probit regression and  $\boldsymbol{\tau}_i$  is the vector of associated parameters for the commodities in probit regression.

The explanatory variables in the first step include the logarithms of prices of the 10 studies food groups, the logarithms of total household expenditure both food and non-food, and demographic variables encompassing urban, household size, educational level of household head (years of schooling), age of household head, gender of household head, five region dummy variables (Sumatra versus non-Sumatra, Java versus non-Java, Kalimantan versus non-Kalimantan, Sulawesi versus non-Sulawesi, Papua versus non-Papua) and two seasonal dummy variables (quarter 2 and quarter 3).

This first-step probit estimation results in both the estimated standard normal probability density function (PDF) and the estimated standard normal cumulative distribution function (CDF). The next step includes cumulative distribution function and probability distribution function in the QUAIDS and AIDS model. Therefore, the QUAIDS and AIDS model used in this study are (Shonkwiler and Yen 1999):

$$(19) \quad w_i = \{\alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{X}{a(P)} \right) + \frac{\lambda_i}{b(P)} \left( \left[ \frac{X}{a(P)} \right] \right)^2 + u_i\} \Phi(\cdot) + \tau_i \varphi(\cdot) + \varepsilon_i$$

$$(20) \quad w_i = \left\{ \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{X}{a(P)} \right) + u_i \right\} \Phi(\cdot) + \tau_i \varphi(\cdot) + \varepsilon_i$$

where  $(\Phi)$  and  $(\varphi)$  are cumulative distribution function (cdf) and probability distribution function (pdf), respectively.

In conventional model without censoring, adding-up condition holds in the right-hand side of system equation (19) and (20). However, with censoring model, the right-hand side of system equation (19) and (20) does not add up to unity across all equations of the demand system. As a result, the error terms do not add up to zero. Thus, the adding-up condition does not hold in the system of equations (19) and (20) (Yen et al, 2002). Therefore, second step estimation of system equation (19) and (20) should be estimated on entire  $n$  equations in the demand system (Yen et al, 2002). In addition, incorporating  $\Phi$  and  $\varphi$  from the first-step estimation using probit model into the system of equation (19) and (20) in the second step estimation causes heteroscedasticity (Shonkwiler and Yen 1999).

The Marshallian price elasticities (uncompensated elasticity) of the QUAIDS model are calculated as follows:

$$(21) \quad e_{ij}^u = \frac{1}{W_i} \left\{ \gamma_{ij} - \left( \beta_i + \frac{2\lambda_i}{b(P)} \left[ \ln \left( \frac{X}{a(P)} \right) \right] \right) \left( \alpha_{ih} + \sum_{j=1}^n \gamma_{ij} \ln p_j \right) - \frac{\lambda_i \beta_j}{b(P)} \left( \ln \left[ \frac{X}{a(P)} \right] \right)^2 \right\} \Phi_i - \delta_{ij}$$

The expenditure elasticity of the QUAIDS model can be calculated as:

$$(22) \quad e_i = 1 + \frac{1}{W_i} \left[ \beta_i + \frac{2\lambda_i}{b(P)} \ln \left( \frac{X}{a(P)} \right) \right] \Phi_i$$

The Marshallian price elasticities (uncompensated elasticity) of the AIDS model are calculated as follows:

$$(23) \quad e_{ij}^u = w_i^{-1} [\gamma_{ij} - (\alpha_{ih} + \sum_{j=1}^n \gamma_{ij} \ln p_j)] \Phi_i - \delta_{ij}$$

where  $\delta_{ij}$  is the Kronecker delta (1 if  $i = j$  and 0 otherwise).

The expenditure elasticity of the AIDS model can be calculated as

$$(24) \quad e_i = 1 + w_i^{-1} [\beta_i] \Phi_i$$

### **Misspecification and Statistical Tests**

Misspecification tests are used to test normality, joint conditional mean encompassing no autocorrelation, appropriate functional form, parameter stability and joint conditional variance encompassing static and dynamic homoscedasticity and variance stability. To conduct a system misspecification test for multi-equation linear regression model, this study follows McGuirk et al. (1995). Since this study uses the multi-equation non-linear regression with cross section data, the system misspecification tests in this study are conducted to test only for normality and static homoscedasticity of demand system equation. The normality test for all equations in the system was conducted with Mardia Skewness, Mardia Kurtosis and Henze Zirkler test. The normality test for an individual equation in the system was performed with Kolmogorov-Smirnov test. The static homoscedasticity test was conducted with White's test.

In order to select between AIDS or QUAIDS models, statistical tests are performed. This study applies Wald test and likelihood ratio test to test the appropriateness of the model. The Wald test is an individual statistical test to test the significance of the quadratic log of expenditure variables in the QUAIDS model using t-

test. If the quadratic term of log of expenditure is significant, then the QUAIDS model is superior than the AIDS model. The likelihood ratio test is a statistical test to test between an unrestricted model vs. a restricted model. The QUAIDS model is unrestricted model since it includes the quadratic log of expenditure variable in its model and AIDS is restricted model because it does not include the quadratic log of expenditure variable in its model. The likelihood ratio test is defined as:

$$(25) \quad LR = 2 (LL_{unrestricted} - LL_{restricted})$$

where LL unrestricted is log likelihood of the QUAIDS model and LL restricted is log likelihood of AIDS model. The likelihood ratio test has asymptotic chi Squared distribution with  $p - q$  degrees of freedom, where  $p$  is the number of parameters in the unrestricted model and  $q$  is the number of parameters in the restricted model. If it is statistically significant, then QUAIDS model is superior to the AIDS model, otherwise the AIDS model is appropriate model.

### **Data Source and Description**

The data set for this study was collected from the national social and economic survey of household in Indonesian (SUSENAS). The Indonesia government through Central Bureau of Statistics (CBS) conducts these surveys every year to collect data related to foods and non-foods expenditure and socioeconomic characteristics of Indonesian Households. The CBS collects this survey uses a proportional random sampling in selecting household primary sampling units (PSU). PSUs are subunits of census area segments. These selected primary sampling units are based on a stratified sampling design for Indonesian Census (Surbakti, 1995). The survey interviewed

households about food consumption during one week before survey and non-food consumption during one month before survey. The CBS conducts the SUSENAS survey every year. However, expenditure questions are collected every three years. SUSENAS 2011 was conducted every quarter. This study does not include the fourth quarter data as the fourth quarter data for year 2011 has not yet been published. The sample of household in SUSENAS 2011 consists of 213,505, households who live in urban and rural areas from all 33 provinces. The total number of households living in urban and rural areas is 88,049 and 125,456 households respectively.

This study will use the current survey data collected in 2011. SUSENAS 2011 consist of 215 food commodities. The CBS classifies food consumption into 14 group foods encompassing cereal, tubers, fish, meat, eggs and milk, vegetables, legumes, fruits, oil and fats, beverage, spices, miscellaneous foods, prepared food, and tobacco and betel. For the purpose of this study, we regroup 14 groups to 10 food groups. The 10 food groups consist of : (1) cereal encompassing cereals and tubers; (2) fish; (3)meat; (4) eggs and milk; (5) vegetables; (6) fruits; (7) oil and fats encompassing oils and fats and legumes; (8) prepared food and drink encompassing beverages and prepared food;(9) other foods encompassing spices and miscellaneous foods; and (10) tobacco. Non-food expenditures consist of 6 commodity groups encompassing housing and household facility, goods and services, clothing, footwear, and headgear, durable goods, taxes and insurance, and parties and ceremony.

The SUSENAS provides information prices for each food commodities. To calculate aggregate price for each food groups, this study follows procedure proposed by

Moschini (1995) by weighted average of price within groups using budget share as a weight as follow:

$$(26) \quad P_i = \sum_{k=1}^n w_k P_k$$

where  $P_i$  is the calculated price for food group  $i$ ,  $P_k$  is the price of individual food  $k$ , and  $w_k$  is budget share for food  $k$  within food group  $i$ .

It is common for cross sectional data to contain outlier data. Therefore, this study deletes outlier data associated with price exceeding five standard deviations. This study follows the previous studies in the demand analysis using cross sectional data such as Cox and Wohlgant (1986) and Yen, Lin and Smallwood (2003) by deleting data that exceeds five standard deviations above the mean in the national level. After deleting outlier data (5205 or 2.43%), available data set are 208,300 households consisting 86,283 urban households and 122,017 rural households respectively.

Estimating demand system requires complete price information. If missing or unreported aggregate price exists, this price was calculated by regressing observed prices on regional dummies, seasonal dummies, and income following Heien and Wessells (1988). Dagenais (1973) and Gourieroux and Monfort (1981) provide the properties of the parameter estimates using this method. Total household expenditure is used as a proxy for income (Eales et al., 1988; Teklu et al., 1988; Deaton, 1996; and Moeis, 2003). The estimated missing or unreported aggregate prices can be written as:

$$(27) \quad P_i = b_0 + \sum_{k=1}^n b_k d_{ki} + \mu_i$$

where  $P_i$  is the calculated price for food category  $i$ ,  $d_{ki}$  are variables encompassing five region dummy variables (Sumatra versus non-Sumatra for region 1, Java versus non-Java for region 2, Kalimantan versus non-Kalimantan for region 4, Sulawesi versus non-

Sulawesi for region 5, Papua versus non-Papua for region 6, two seasonal dummy variables (Quarter 2 and quarter 3) and total household expenditure.

In the first-stage budgeting, this study estimate demand for food and non-foods. Monthly food and non-food expenditures data are used in estimating food and non-foods in the first-stage budgeting. However, the SUSENAS does not provide information prices for non-food expenditures. Following study of Jensen and Manrique (1998), this study uses consumer price indexes for non-food items consisting: (1) housing, water, electricity, gas and fuel; (2) clothing; (3) health; (4) education, recreation and sports; and (5) transportation, communication and financial services to calculate price of non-food goods. The Central Bureau of Statistics calculates consumer price indexes in 66 cities as most important regional cities across the country ever year. This study uses the consumer price indexes for non-food commodity in 2011 (Statistical Yearbook of Indonesia, 2011). The aggregate price for the non-food commodity group was calculated using an average of the consumer price indexes for non-food items in each province. If a province has more than one city, the aggregate price for the non-food in each province was calculated as average of those cities.

Table III-1 show summary statistics the price along with some important variables of 10 food groups being studied from SUSENAS 2011 in both urban and rural areas for all income levels. The budget share indicates that per capita consumption of prepared food and drink dominates in national level, urban areas and it is followed by cereals and tobacco respectively (Table III-1). On the other hand, per capita consumption of cereal dominates in rural areas, followed by fish and tobacco. The budget share also shows that per capita meat consumption is the lowest among the food groups in national, urban and



rural areas. The price indicates that eggs and milk food group is the most expensive among 10 food groups, followed by fish, oils and fats in national and urban areas while the price of fish is the most expensive food in rural areas. The price of other foods is the cheapest among food groups in national, rural and urban areas.

In addition to the total urban and rural areas, we also divide each urban and rural areas into different income groups. Households in both urban and rural areas were regrouped into 5 stratum based on the total household expenditures where each category account for 20% of total households, either in urban or rural areas. Each urban or rural areas has five income groups consisting of low income (stratum 1), low to middle income (stratum 2), middle income (stratum 3), middle to high income (stratum 4) and high income (stratum 5). Stratum 1 shows the poorest households and stratum 5 presents the wealthiest households. Table III-2-III-6 presents summary statistics of food consumption for strata 1-5 in both rural and urban areas. Per capita consumption of prepared food and drink dominates in urban areas, followed by cereals. By contrast, per capita consumption of cereal dominates in rural areas, followed by prepared food and drink. Price of eggs and milk is the most expensive among food groups in urban areas while price of fish is the most expensive among food groups in rural areas except price of meat for stratum 5.

The demographic variables are as follows: food expenditures(Rupiah); total household expenditures for both food and non-food expenditures (Rupiah); household size representing the number of family; age of household heads; education level of household head; gender of household head; marital status of household; Region1, a binary variable representing households who live in Sumatra Island; Region 2, a binary variables representing households who live in Java Island; Region 3, a binary variables

representing households who live in Bali Island and its archipelago; Region 4, a binary variables representing households who live in Kalimantan island; Region 5, a binary variables representing households who live in Sulawesi Island; and Region 6, a binary variables representing households who live in Maluku and Papua and their archipelago.

Table III-7 reports summary statistics of demographic variables for both urban and rural areas in Indonesia. Data show that food expenditures and total expenditures of urban households are higher than that of rural households. Household size of rural households is higher than that in urban household. Education level of household head of urban areas is higher than that in household of rural areas. Those above demographic variables are expected to affect the demand for food in Indonesia.

### **Estimation Procedures and Statistical Tests**

This section describes the estimation procedures, statistical tests consisting of Wald test and Likelihood Ratio test to choose an appropriate model whether AIDS or QUAIDS model, and system misspecification tests.

#### **First-Stage Demand System**

The first-stage demand system encompassing food and non-food commodity groups was estimated with AIDS model. This study uses food and non-food expenditure data during the previous month before survey in the first-stage demand. All 213,505 households from all 33 provinces are used. The total number of households living in urban and rural areas is 88,049 and 125,456 households respectively. Since the data set does not contain some zero observations, the consistent two-step estimation procedure is

not employed in this first-stage demand. The AIDS model in the first-stage demand system is estimated using Full Information Maximum Likelihood (FIML) estimation with imposition of adding-up, homogeneity and symmetry condition. This study estimates demand for food and non-food commodity in all areas, urban areas, rural areas, 5 income groups in both urban and rural areas.

The results of misspecification test for normality and homoscedasticity in the first-stage demand are presented in Table III-9. The assumption of normality of error terms is rejected at  $\alpha = 5\%$  significance level. The homoscedasticity assumption of conditional variance of error terms are rejected at  $\alpha = 5\%$  significance level. This study uses full information maximum likelihood (FIML) estimation. FIML results in consistent estimators even though normality and homoscedasticity does not hold because the data set for this study are large enough (Greene, 2005; Wooldridge, 2001).

## **Second-Stage Demand System**

### **All Areas**

All 208,300 Indonesian households in both urban and rural areas are used. The data set contains some zero observations. The consistent two-step estimation procedure is employed to deal with these zero observation. The first step probit model was estimated separately by using maximum likelihood for all 10 food groups encompassing cereal, fish, meat, eggs and milk, vegetables, fruits, oil and fats, prepared food and drink, other foods and tobacco. This first step probit estimation gives the standard normal probability density function (PDF) and the standard normal cumulative distribution function (CDF). The second step AIDS and QUAIDS includes PDF and CDF from the first step probit

model for all 10 food groups and was estimated by Full Information Maximum Likelihood (FIML) estimation with imposition of homogeneity and symmetry. The AIDS and QUAIDS demand system were estimated for all the 10 food groups in the second step demand system because the adding-up condition does not hold. Table III-11 reports estimated parameters of QUAIDS demand system for the entire urban and rural areas or national level. All parameter estimates for the standard normal PDF ( $\Phi$ ) in QUAIDS model are statistically significant at the 1% level for all 10 food groups. These results indicate that the probability of buying a given type of food groups for those households who did not buy foods during survey period exists. These results provide strong evidence that zero observations must be included in estimating demand for food in Indonesia.

Wald and likelihood ratio test are presented in Table III-24. The null hypotheses for both tests are that the quadratic term in the log of expenditure variables is equal to zero. The Wald test shows that the null hypotheses are rejected at 1% level. The likelihood ratio tests also indicate that the null hypotheses are rejected at 1% level. Both Wald and likelihood ratio tests indicate that QUAIDS model is an appropriate model to estimate food demand system in Indonesia.

The results of misspecification tests for normality and homoscedasticity are presented in Table III-25. The assumption of normality of error terms is rejected at  $\alpha = 5\%$  significance level for all equations. The homoscedasticity assumption of conditional variance of error terms is also rejected at  $\alpha = 5\%$  significance level for all equations. This study uses full information maximum likelihood (FIML) estimation because the data set for this study are large enough so that FIML results in consistent

estimators although non-normality and heteroscedasticity exist (Greene, 2005; Wooldridge, 2001).

### **Urban Areas**

From data set 86,283 urban households contain zero expenditure. Zero expenditures for cereal, fish, meat, eggs and milks, vegetables, fruits, oil and fats, prepared food and drink, other foods and tobacco were 4,50%, 15,79%, 51,61%, 14.54%, 8.06%, 23.28%, 6.72%, 0,19%, 4.58% and 37.14%, respectively. Because of those zero observations, this study employs the consistent two step estimation procedure. Maximum likelihood estimation for all 10 food groups is applied in the first step Probit model. The second step AIDS and QUAIDS model by including PDF and CDF from the first step probit model for all 10 food groups was estimated by Full Information Maximum Likelihood (FIML) estimation with imposition of homogeneity and symmetry. Because the adding-up condition does not hold, the AIDS and QUAIDS demand system in the second step demand system were estimated for all the 10 food groups.

Tables III-12 through III-17 show estimated parameters of QUAIDS demand system for urban areas. Except oils and fats equation for stratum 5, all parameter estimates for the standard normal PDF ( $\Phi$ ) in QUAIDS model for 10 food groups are statistically significant at the 1% level. These results indicate strong evidence that zero observations must be included in estimating food demand in urban areas in Indonesia.

Wald and likelihood ratio test are presented in Table III-24. The null hypotheses of Wald test are rejected for all strata at 10% or lower levels, except vegetables equation in stratum 5. However, the null hypotheses of Likelihood Ratio test are rejected for all

strata at 10% or lower levels. Both statistical tests provide results that QUAIDS model is an appropriate model to estimate food demand system in urban areas in Indonesia.

The results of misspecification test for normality and homoscedasticity are presented in Table III-25. The assumption of normality of error terms is rejected at  $\alpha = 5\%$  significance level for all equations for all strata. In addition, the homoscedasticity assumption of conditional variance of error terms is rejected at  $\alpha = 5\%$  significance level for all equations for all strata. Like all urban and rural areas, this study uses full information maximum likelihood estimation to deal with non-normality and heteroscedasticity. FIML results in consistent estimators as the data set for this study are large even though non-normality and heteroscedasticity exist (Greene, 2005; Wooldridge, 2001).

### **Rural Areas**

Like urban areas, rural areas data set has some zero observations. From data set 122,017 rural households show that zero expenditures for cereal, fish, meat, eggs and milks, vegetables, fruits, oil and fats, prepared food and drink, other foods and tobacco were 1.08%, 11.10%, 70.00%, 28.28%, 1.96%, 27.98%, 3.00%, 2.39%, 1.74% and 26.18% respectively. The first step probit model for rural areas was estimated separately by using maximum likelihood for all 10 food groups. The second step AIDS and QUAIDS model by including PDF and CDF from the first step probit model for all 10 food groups in rural areas was estimated by Full Information Maximum Likelihood (FIML) estimation with imposition of homogeneity and symmetry. Because of violation

the adding-up condition in the consistent two step estimation, the AIDS and QUAIDS demand system were estimated for all entire the 10 food groups.

Estimated parameters of QUAIDS demand system for all strata are shown in Tables III-18 through III-23. All parameter estimates for the standard normal PDF ( $\Phi$ ) in QUAIDS model are statistically significant for all 10 food groups in all strata at 1% level. These results also provide strong evidence that zero observations must be accounted for estimating demand for 10 food groups in rural areas in Indonesia.

Table III-24 presents Wald and likelihood ratio test for demand for food in rural areas. Except eggs and milk equation in the entire rural areas, this study rejects the null hypotheses of the Wald test for all strata at 10% or lower levels. On the other hand, this study rejects all the null hypotheses of the Likelihood Ratio test for all 10 equations in the demand system at 1%. Therefore, both Wald and Likelihood Ratio test justify that QUAIDS model is an appropriate model to estimate food demand system in rural areas in Indonesia.

Table III-25 represents the results of misspecification test for normality and homoscedasticity for rural areas. Both the assumption of normality of error terms and homoscedasticity assumption of conditional variance of error terms is rejected at  $\alpha = 5\%$  significance level for all equations for all rural strata. Similar to urban areas, this study uses full information maximum likelihood (FIML) estimation to estimate demand system in rural areas. FIML results in consistent estimators with non-normality and heteroscedasticity problems (Greene, 2005; Wooldridge, 2001).

## **Empirical Results**

This section discusses estimation results in detail for all 10 food groups. Price elasticities both own and cross-price elasticity and expenditure elasticities for all 10 food groups in the second-stage demand are the main discussion of this section. This study also compares both price and expenditure elasticities between urban and rural areas.

### **First-Stage Demand System**

The estimated parameters and the t-statistics of AIDS model for food commodity in the first-stage demand are shown in Table III-8. 183 of 198 economic and demographic variables (92.4%) are statistically significant at 10% or lower levels. Table III-10 present unconditional Marshallian and expenditure elasticity for food commodity. All price and expenditure elasticities are evaluated on the basis of parameter estimated and sample means of independent variables using equation (23) and (24). The delta method is used to calculate standard errors of both price and expenditure elasticities. All own-price elasticities are negative and statistically significant at 1% level. The results are consistent with economy theory. Demand for food is inelastic for all cases. The own-price elasticities in all, urban, and rural areas are -0.911, -0.916, and -0.895 respectively. Higher income groups are the lower the own-price elasticity in both urban and rural areas. All expenditure elasticities for food commodity are positive and statistically significant at 1% level. All expenditure elasticities are less than 1. Therefore, food is normal good. Lower income groups are higher the expenditure elasticity in both urban and rural areas.



## **Second-Stage Demand System**

### **All Areas**

QUAIDS model in the second step was estimated using The FIML in the model procedure in SAS. Table III-8 reports the estimated parameters and the t-statistics related to the estimates of the QUAIDS demand system for 10 food groups for all urban and rural households. Among 120 demographic variables, 113 (94.17%) variables are statistically significant at 10% or lower levels. Among 100 price variables, 93 price coefficients (93%) are statistically significant at 10% or lower levels. Of 20 expenditure variables for both linear log and quadratic log of expenditure, all expenditure variables are statistically significant at 10% or lower levels.

Table III-26 reported the full matrix of the conditional Marshallian (uncompensated) price and expenditure elasticities for the 10 food groups. All price and expenditure elasticities are evaluated on the basis of parameter estimated and sample means of independent variables using equation (21) and (22). Standard errors of both price and expenditure elasticities are calculated using the delta method. The diagonal elements in table III-23 are own-price elasticities. All own-price elasticities are negative and statistically significant at 1% level. The estimated conditional Marshallian cross-price elasticities are indicated by the non-diagonal elements in table III-26. Among 90 cross-price elasticities, 87 cross-price elasticities are statistically significant at 10% or lower levels. The last row of table III-26 presents the estimated conditional expenditure elasticities. All conditional expenditure elasticities are positive and statistically significant at 1% level.

The unconditional Marshallian price and expenditure elasticities are shown in Table III-27. Unconditional Elasticity is calculated using equation (15) and (16). All own-price elasticities are negative and range from -0.536 for cereal to -1.171 for meat. These results are consistent with economic theory. All own-price elasticities are less than unity, except for meat, prepared food and drink, and tobacco. Consequently, demand for cereal is least responsive and demand for meat is most responsive food groups for price change. The signs of cross-price elasticities show the studied food products are a mixture of gross substitutes and complements. Meat category, for instance, is a gross substitute for fish, eggs and milk, fruits, oils and fats, prepared foods and drinks, and other foods but it is a gross complement for cereals, vegetables, and tobacco category. Eggs and milk category is a gross substitute for meat, vegetables, fruits, oils and fats, other foods and tobacco, but it is a gross complement for cereal, fish, and prepared food and drink. Unconditional expenditure elasticities are from 0.449 for cereal to 0.934 for fruit. Because all unconditional expenditure elasticities are inelastic, all 10 foods groups in all areas are normal goods.

### **Urban Areas**

The estimated parameters and the t-statistics related to the estimates of the QUAIDS demand system for 10 food groups for urban households are shown in Table III-12. Of 110 demographic variables, 107 variables or 97.27% are statistically significant at 10% or lower levels. Among 100 price variables, 97 price coefficients or 97% are statistically significant at 10% or lower levels. All 20 expenditure variables for both linear log and quadratic log of expenditure are statistically significant at 1% level. Table

III-13 through III-17 present in detail the estimated parameters and the t-statistic across 5 income groups from low income group (stratum 1) to highest income group (stratum 5). Among 1110 demographic variables, 1053 (95.72%) are statistically significant at 10% or lower levels. 469 of 500 (93.8%) price variables are statistically significant at 10% or lower levels. Among 100 expenditure variables, 97 (97%) are statistically significant at 10% or lower levels.

The full matrix of the conditional Marshallian price and expenditure elasticities for the 10 food groups in entire urban areas is presented table III-28. All own-price elasticities are negative and statistically significant at 1% level. Among 90 cross-price elasticities, 89 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-29 presents unconditional price and expenditure elasticity. All own-price elasticities are negative and range from -0.614 for cereal to -1.029 for meat. These results are consistent with economic theory. Except for meat demand, all own-price elasticities are less than unity with cereal having smallest value (-0.614) and fish having highest values (-0.953). The signs of cross-price elasticities show the results are a mixture of gross substitutes and complements. Demand for Cereals, for instance, is a gross substitute for meat and oils and fats, but it is a gross complement for fish, eggs and milk, vegetables, fruits, prepared food and drink, other foods and tobacco. Expenditure elasticities are less than unity and range from 0.416 for fruits and to 0.912 for prepared food and drink.

Conditional Marshallian price and expenditure elasticities for urban stratum 1 are presented in table III-30. All own-price elasticities are negative and statistically significant at 1% level. Among 90 cross-price elasticities, 81 cross-price elasticities are

statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-31 presents unconditional price and expenditure elasticity. All own-price elasticities are negative and range from -0.715 for other foods to -1.231 for fruits. Demand for meat, eggs and milk, fruits, and tobacco are elastic, while demand for cereal, fish, vegetables, oils and fats, prepared food and drink and other foods are inelastic. The signs of cross-price elasticities show the results are a mixture of gross substitutes and complements. Except for oils and fats and prepared food and drink, all expenditure elasticities are inelastic.

Table III-32 shows conditional Marshallian price and expenditure elasticities for urban stratum 2. All own-price elasticities are negative and statistically significant at 1% level. Of 90 cross-price elasticities, 97 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Unconditional price and expenditure elasticities are shown in Table III-33. Own-price elasticities for cereal, fish, vegetables, oils and fats, other foods, prepared food and drink, and tobacco are inelastic with fish having the highest values (-0.957) and cereals having the lowest values (-0.7). On the other hand, own-price elasticity for meat, eggs and milk, fruits are elastic with prepared eggs and milk having the highest value (-1.085). The cross-price elasticities indicate that the results are a mix either gross substitutes or gross complements. Expenditure elasticities range from 0.573 for fruits to 1.160 for prepared food and drink. Except prepared food and drink all expenditure elasticities are less than unity.

Table III-34 presents conditional Marshallian price and expenditure elasticities for urban stratum 3. All own-price elasticities are negative and statistically significant at 1% level. Of 90 cross-price elasticities, 88 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Unconditional price and expenditure elasticities are shown in Table III-35. All own-price elasticities are negative and are from -0.697 for cereal to -1.039 for meat. Demand for meat and eggs and milk are elastic while demand for cereals, fish, vegetables, fruits, oils and fats, prepared food and drink, other foods, and tobacco are inelastic. The cross-price elasticities indicate that the results are a mix. All unconditional expenditure elasticities are less than unity with prepared food and drink having highest value (0.992) and with fruits having lowest value (0.575).

Conditional Marshallian price and expenditure elasticities for urban stratum 4 are presented in table III-36. All own-price elasticities are negative and statistically significant at 1% level. 86 of 90 cross-price elasticities are statistically significant at 10% or lower levels, but the results are mixed. All expenditure elasticities are positive and statistically significant at 1% level. Table III-37 shows unconditional price and expenditure elasticity. With exception of meat (-1.013), all own-price elasticities are negative and range from -0.688 for cereals to -0.983 for tobacco. The cross-price elasticities show either gross substitute or complement. All expenditure elasticities are less than unity and range from 0.561 for cereals to 0.840 for prepared food and drink.

Table III-38 presents Marshallian price and expenditure elasticities for urban stratum 5. All own-price elasticities are negative and statistically significant at 1% level. . 85 of 90 cross-price elasticities are statistically significant at 10% or lower levels. All

expenditure elasticities are positive and statistically significant at 1% level.

Unconditional price and expenditure elasticity are presented in Table III-39. With exception meat (-1.057), all own-price elasticities are less than unity and range from -0.722 for cereal to -0.948 for eggs and milk. Cross-price elasticities are mixed between gross substitutes and complement. All unconditional expenditure elasticities are less than unity ranging from 0.381 for other foods to 0.625 for prepared food and drink.

### **Rural Areas**

The estimated parameters and the t-statistics related to the estimates of the QUAIDS demand system for 10 food groups for all rural households are reported in table III-18. Among 110 demographic variables, 102 variables or 92.73% are statistically significant at 10% or lower levels. Among 100 price variables, 94 price coefficients or 94% are statistically significant at 10% or lower levels. Of 20 expenditure variables for both linear log and quadratic log of expenditure, 19 expenditure variables are statistically significant at 10% or lower levels. The estimated parameters and the t-statistic across 5 income groups from low income group (stratum 1) to highest income group (stratum 5) in rural areas are presented in table III-19 through III-23. Among 1110 demographic variables, 1056 (96%) are statistically significant at 10% or lower levels. 447 out of 500 (89.4%) price variables are statistically significant at 10% or lower levels. 96 out of 100 (96%) expenditure variable are statistically significant at 10% or lower levels.

The conditional Marshallian (uncompensated) price and expenditure elasticities for the 10 food groups in all rural areas are reported in Table III-40. All own-price elasticities are negative and statistically significant at 1% level. All cross-price elasticities

are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-41 reports unconditional price and expenditure elasticities. All own-price elasticities are negative and range from -0.602 for cereals to -1.271 for meat. These results are consistent with economic theory as expected. Demand for meats, eggs and milk, fruits and tobacco are elastic while demand for cereals, fish, vegetables, oils and fats, prepared food and drink and other foods are inelastic. Like urban households, the cross-price elasticities show that the results are a mixture of gross substitutes and complements. Eggs and milk category is a gross substitute for fish, meats, fruits, oils and fats, prepared food and drink, other foods and tobacco but it is a gross complement for cereals and vegetables. Expenditure elasticities range from 0.521 for cereals to 1.083 fruits. With exception for fruits, all food groups are normal goods.

Table III-42 reports conditional Marshallian price and expenditure elasticities for rural stratum 1. All own-price elasticities are negative and statistically significant at 1% level. Among 90 cross-price elasticities, 79 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-43 shows unconditional price and expenditure elasticities. Demand for cereal, vegetable, oils and fats, and other foods are inelastic while demand for fish, meat, eggs and milks, fruit, prepared food and drink, and tobacco are elastic. The signs of cross-price elasticities show the results are a mixture of gross substitutes and complements. All expenditure elasticities are positive and range from 0.623 for meat to 1.090 for prepared food and drink. Except for vegetables and prepared food and drink, the other food groups are normal goods.

Conditional Marshallian price and expenditure elasticities for rural stratum 2 are presented in table III-44. All own-price elasticities are negative and statistically significant at 1% level. Among 90 cross-price elasticities, 84 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-45 shows unconditional price and income elasticities. Demand for cereal, fish, vegetables, oils and fats, prepared food and drink, other foods and tobacco are inelastic with other foods having the lowest values (-0.318). Meanwhile, demand for meats, eggs and milk, and fruits are more elastic with fruit having highest value (-1.090). The cross-price elasticities indicate that the results are mixed either gross substitutes or complements. Expenditure elasticities for cereal, fish, meat, eggs and milk, fruits, oils and fats, prepared food and drink, and tobacco are less than unity with fish having lowest value (0.817). Expenditure elasticities for vegetables and other foods are more than unity with other foods having highest value (1.272).

Table III-46 presents Marshallian price and expenditure elasticities for rural stratum 3. All own-price elasticities are negative and statistically significant at 1% level. 84 out of 90 cross-price elasticities are statistically significant at 10% or lower levels. All expenditure elasticities are positive and statistically significant at 1% level. Table III-47 reports unconditional price and expenditure elasticities. Own-price elasticities for cereal, fish, meat, vegetables, oils and fats, prepared food and drink, and other foods are less than unity and range from -0.311 (other foods) to -0.970 (meats). On the other hand, own-price elasticities for eggs and milk, fruits and tobacco are more than unity ranging from -1.028 to 1.151. The cross-price elasticities indicate that the results are a mix. Expenditure elasticities for cereals, fish, meat, eggs and milk, fruits, oils and fats,



prepared food and drink, and tobacco and are less than unity with eggs and milk having lowest value (0.656). On the other hand, expenditure elasticity for vegetables and other foods is more than unity with vegetables having highest value (1.104).

Conditional Marshallian price and expenditure elasticities for rural stratum 4 are presented in table III-48. All own-price elasticities are negative and statistically significant at 1%. 87 of 90 cross-price elasticities are statistically significant at 10% or lower levels, but the results are mixed. All expenditure elasticities are positive and statistically significant at 1% level. Unconditional price and expenditure elasticities are reported in Table III-49. All own-price elasticities are negative. Demand for meat, eggs and milk, and prepared food and drink are elastic while demand for cereals, fish, vegetables, fruits, oils and fats, other foods and tobacco are inelastic. The cross-price elasticities indicate that the results are mixed. With exception for prepared food and drink (1.308), all expenditure elasticities are less than unity and range from 0.419 for other foods to 0.791 for meats.

Table III-50 presents Marshallian price and expenditure elasticities for rural stratum 5. All own-price elasticities are negative and statistically significant at 1% level. 83 out of 90 cross-price elasticities are statistically significant at 10% or lower levels and the results are mixed. All expenditure elasticities are positive and statistically significant at 1% level. Unconditional price and expenditure elasticities are shown in Table III-51. Demand for cereals, fish, vegetables, fruits, oils and fats, prepared food and drink, other foods and tobacco are inelastic and range from -0.625 for cereals to -0.974 for tobacco. On other hand demand for meats (-1.060) and eggs and milk (-1.102) are elastic. All expenditure elasticities are less than unity.

## **Conclusion and Policy Implications**

Cereal category with sub categories of rice as a main food staple in Indonesia is least responsive to price changes among the 10 food groups in all, urban, and rural areas. Urban households show that cereals are more inelastic than those in rural households. Meat is the most responsive to price changes among the 10 food groups in all, urban and rural areas. Rural households are more responsive to change in meat price than those in urban areas. High-value foods such as meat, eggs and milk, fruits, and prepared food and drink are more responsive to price changes in rural areas while urban areas are more responsive to price changes for fish, vegetables, and oils and fats. On average, own-price elasticities for the 10 food groups in rural areas are higher than those in urban areas. These results imply that rural households are more responsive to price change than households in urban areas.

Demand for fruits is most responsive and demand for cereals is least responsive to change in expenditure in all areas. Expenditure elasticities in urban areas indicate that prepared food and drink are more responsive and fruits are least responsive in urban areas. On the other hand, fruits are most responsive and cereals are least responsive to change in expenditure in rural areas. Cereals as main staple food are more responsive to expenditure change in urban areas than rural areas. Demand for fish, meat, eggs and milk, fruits, prepared food and drink, other foods and tobacco are more responsive to expenditure changes in rural areas than urban areas while demand for cereals, vegetables, and oils and fats are more elastic to expenditure changes in urban areas than rural areas to expenditure change. On average, expenditure elasticities for the 10 food groups in rural

areas are higher than in urban areas. These results also imply that rural households are more responsive to expenditure changes than those in urban areas.

Based on own-price elasticity in urban areas across income levels, lower income groups are more responsive to price changes for cereal as a staple food. On average, own-price elasticities for all 10 food groups for lower income households are higher than for higher income households in urban areas. Like urban areas, own-price elasticities for cereals for lower income levels are higher than for higher income levels in rural areas. On average, the price elasticities for the rest of 10 food groups for lower income level also are higher than those for higher income level. The lower income families in rural areas are also more responsive as the prices change than those higher income families. Consequently, the lower income households in both urban and rural areas are more responsive to changes in prices.

Lower income groups are more responsive to expenditure changes for some food groups such as cereals, oils and fats, prepared food and drink, and tobacco. However, the expenditure elasticities for other food groups in urban areas across income groups do not show a clear pattern. For example is fish. The expenditure elasticity for income stratum 3 is higher than income strata 1, 2, 4 and 5, but the expenditure elasticity for income stratum 1 is higher than income stratum 5. In general, the expenditure elasticities for all 10 food groups become less elastic when moving from low income families to higher income families. The expenditure elasticity across income groups in rural areas does not indicate a clear pattern. Stratum 1 as low income families has higher expenditure elasticity for cereals than income strata 2, 4, and 5 but it is lower than stratum 3. However, for fish lower income groups are more responsive to expenditure changes. For

the rest of 10 food groups also indicate that there are not a clear pattern. In general, expenditure elasticity becomes less elastic when moving from low income families to higher income families. These results indicate that Engle's law does hold for all 10 food groups in both urban and rural areas.

The own-price elasticity across income groups between urban and rural areas show that price elasticity for all food groups for income stratum 2 through 5 in urban areas are higher than in urban areas. As a result, urban households are more responsive to changes in prices than urban households. Expenditure elasticities across income groups between urban and rural areas also show a clear pattern. Expenditure elasticities for each stratum in rural households are more elastic than in urban households. Therefore, rural families are more responsive to expenditure change than urban families. It is not surprising because on average rural households have lower expenditure than urban households (SUSUNAS 2011).

The results of this study have important implications. This study indicates that demand for cereals is inelastic and least responsive to price change among 10 food groups. Rice in cereal group is a main staple food in Indonesian households as 95% of total population in Indonesia eats rice. Rice consumption was 104.9 kg per capita in 2008 (SUSENAS 2008). However, Indonesia must import rice because the domestic rice consumption is higher than the domestic rice production. Therefore, rice exporting country can increase their trade to Indonesia. On the other hand, the government has to diversify staple food consumption to reduce rice consumption and import because besides rice, cassava, roots, maize and sago are also as a staple food in many regions in Indonesia.

Expenditure elasticities for high-value food such fish, meat, eggs and milk, oils and fats, fruits, prepared food and drink are more elastic than low-value food. As a result, demand for high-value product will grow as household income increase. Demand for meat, for example, will grow faster. Annual per capita meat consumption was 10 kg in 2005. However, meat consumption was still low compared to the nearby countries. In the same year, annual meat per capita consumption in Thailand, Vietnam, Malaysia and Philippines was 26.8, 34.9, 51.3 and 29.6 per kg respectively (FAO, 2009).

## **CHAPTER 4**

### **NUTRIENT DEMAND IN INDONESIA**

#### **Introduction**

Increased income and greater food consumption have contributed to a remarkable increase in both average Indonesian per capita food and nutrient availability. The total calories of low-value food such as starchy roots have been replaced by high-value foods such as meats, fish/sea foods, fruit, vegetables and vegetable oil during period 1961-2003. USDA research indicated that if Indonesian income level rose by 10 percent, the demand for higher valued foods such as dairy and fish would rise by 8 percent but the demand for lower valued foods such as cereal would increase by only 5 percent (Rada and Regmi, 2010).

Consumption of calories increased from 1,726 calories per capita per day in 1961 to 2,890 calories in 2003. The calorie consumption tends to increase steadily. Calorie intake has slightly increased to 2,912 kcal in 2005 and became a 3,805 kcal in 2010. Rice as a staple food still dominates in providing calories consumption. Rice provided 1,906 kcal in 2005 and rose to 2,229 kcal in 2010. The High-quality food such fruits, vegetables, meat, eggs, milk, fish and oil and fats accounted for 574 kcal in 2005 and increase almost two fold to 1,009 kcal in 2005. However, the increase in calorie consumption was mainly due to the increase in household consumption of oils and fats.

The consumption of oils and fats accounted for only 128 kcal in 2005, but it increased sharply to 632 kcal in 2010 (CBS, 2011).

Like calories, consumption of protein and fat are also experiencing an increasing trend from year to year. Protein consumption was 76.79 (grams) in 2005. Then it has increased to 85.76 (grams) in 2010. Rice consumption accounted for 47.55 grams in 2005 and rose to 56.85 in 2010. The high-quality food contributed by 27.68 grams (36.05%) in 2005 and increased slightly to 28.9 grams (33.70%) in 2010. Fat consumption in 2005 was 45.69 grams and has increased to 104.26 grams in 2010. An increase in fat consumption was due to an increase in the high-quality foods. The high-quality foods accounted for 35.72 grams (77.67%) in 2005 and increased sharply to 91.68 grams (87.93%) (CBS, 2011).

Recent change in demand pattern for food from lower valued foods to higher valued foods in Indonesia automatically affects demand for food. As a result, the change in food consumption behaviors also changes in nutrient availability and intake as well. This trend indicates that demand for higher protein food has been increasing recently. However, most of previous empirical works of demand for nutrient in Indonesia such as Alderman and Timmer (1979), Rae (1999), Skoufias (2003) and Moeis (2003) have been conducted using data before 2005. In addition, all previous nutrient studies estimated the demand for nutrient using direct approach by estimating nutrient equation as a function of income and other variables. Therefore, first, it is important to estimate demand for nutrient using recent household survey in Indonesia. Second, it is also important to use different method in estimating demand for nutrient. This study applies an indirect approach using information available from demand system.

The objectives of this chapter are: (1) to estimate demand for nutrient, focusing on macronutrient encompassing calorie, protein, fats and carbohydrate, based on urban vs rural areas; and (2) to estimate demand for nutrient based on income groups for both urban and rural areas using recent SUSENAS data in 2011.

### **Literature Review**

Several previous demand studies have been conducted to examine nutrient consumption in Indonesia. Study of demand for nutrient can be classified to be two methods, direct method and indirect method. The direct method uses a specific nutrient demand equation such as calorie and the indirect methods uses information available from demand system equation in estimating demand for nutrient. Alderman and Timmer (1979) using nutrient demand equation for calories examined total calories from staple food based on income groups using the 1976 SUSENAS data. Low income households in both urban and rural areas were more responsive to income changes than high income group in both areas. On average, rural households were more responsive to income change than urban households.

Rae (1999) using 1990 SUSUNAS data and nutrient demand equation investigated food consumption pattern and nutrition in urban Java households. He analyzed four nutrient contents encompassing calorie, protein, fats and carbohydrate. He found that households in the 'traditional' and 'traditional-high roots' cluster faced lower relative prices for fish and roots and higher relative prices for sugar, pulses and animal products, relative to households in the 'non-traditional cluster.



Like previous studies using direct method, Skoufias (2003) investigated the impact of economic crisis in 2007/2007 on demand for calories for fourteen selected food groups in both urban and rural areas. He found that the income elasticity of the demand for total calories is slightly higher after economic crisis than that of before economic crisis. This finding indicated that calorie-income elasticity is sensitive to price change. In addition, the calorie-income elasticity for cereals increased, but the calorie-income elasticity for other food items decreased.

Similar to Skoufias, Moeis (2003) investigated the impact of the 1997/1998 economic crisis in 1997 for demand for ten food group and nutrient by comparing 1996 and 1999 SUSENAS data. His study analyzed nutrient content encompassing of calorie, protein, fat and carbohydrate. He found that all household suffered from price increases and per capita nutrition intake decreased by 3 per cent for poor household and 10 per cent for non-poor household.

This nutrient demand study is different with the above previous studies. First, this study uses the recent household survey data from national social and economic survey in Indonesia (SUSENAS) in 2011. Second, all previous studies on nutrient demand in Indonesia used demand equation for specific nutrient such as calorie as functions of income, price and sociodemographic variables from household survey data. However, those approaches have no underlying theory to derive the demand for nutrient (Huang, 1996). This study uses demand system to derive demand for nutrient in Indonesia.

## Model Specification

This study estimated demand for nutrients based on the demand system approach. Therefore, nutrient elasticity with respect to expenditure and price can be calculated directly from the unconditional expenditure and Marshallian price elasticity of food in the demand system. This study follows Huang's approach (1996, 1999) to compute nutrient elasticity. Nutrient elasticities with respect to price and expenditure change are

$$(1) \quad \pi_{kj} = \sum_i e_{ij} a_{ki} q_i / \Phi_k$$

$$(2) \quad \eta_k = \sum_i e_i a_{ki} q_i / \Phi_k$$

where  $\pi_{kj}$  is the nutrient elasticity with respect to price,  $\eta_k$  is the nutrient elasticity with respect to expenditure,  $e_{ij}$  is the Marshallian price elasticity,  $e_i$  is the expenditure elasticity,  $a_{ki}$  is the amount of the  $k$ th nutrient obtained from a unit of the  $i$ th food,  $q_i$  is quantity consumed and  $\Phi_k$  is the total amount of that nutrient obtained from various food and it is calculated as  $\Phi_k = \sum_i a_{ki} q_i$ .

Based on the above two equations, price nutrient elasticity is basically a weighted average of all unconditional own and price elasticities with each weight equal to the share of each food's contribution to the  $k$ th nutrient. Similarly, expenditure nutrient elasticity is also a weighted average of all unconditional expenditure elasticities with each weight expressed as the share of each food's contribution to the  $k$ th nutrient (Huang, 1996, 1999).

The AIDS model is nested within the QUAIDS model. Chapter 3 has discussed the appropriate model in estimating demand for food in Indonesia. Based on Wald and Likelihood Ratio test, the QUAIDS model is superior to the AIDS model. Therefore, to

calculate nutrient elasticity this study uses QUAIDS model. The QUAIDS model can be defined as:

$$(3) \quad w_i = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{X}{a(P)} \right) + \frac{\lambda_i}{b(P)} \left( \ln \left[ \frac{X}{a(P)} \right] \right)^2 + u_i$$

where  $i$  and  $j$  are goods consisting of 10 major food groups,  $w_i$  is the share of total expenditure allocated to the  $i$ th goods for each household,  $p_j$  is the price of  $j$ th goods,  $X$  is the household expenditure on goods in the system,  $a(P)$  is the price index,  $b(P)$  is the Cobb-Douglas price aggregator,  $\gamma_{ij}$ ,  $\beta_i$ , and  $\lambda_i$  are parameters to be estimated, and  $u_{ih}$  is error term. The price index  $a(P)$  is defined as:

$$(4) \quad \ln[a(P)] = \alpha_0 + \sum_{i=1}^n \alpha_i \ln p_i + 0.5 \sum_{i=1}^n \sum_{j=1}^n \gamma_{ij} \ln p_i \ln p_j$$

The Cobb-Douglas price aggregator for household  $b(P)$  is defined as:

$$(5) \quad b(P) = \prod_{i=1}^n p_i^{\beta_i}$$

To incorporate demographic variables, the intercept in equation (1) can be written as:

$$(6) \quad \alpha_i = \rho_{i0} + \sum_{k=1}^m \rho_{ik} d_k$$

where  $d_k$  is the  $k$ th demographic variables,  $k= 1, \dots, m$  represent a total of demographic variables encompassing household size, educational level of household head (college versus non-college), age of household head, five region dummy variables (Sumatra versus non-Sumatra, Java versus non-Java, Kalimantan versus non-Kalimantan, Sulawesi versus non-Sulawesi, Papua versus non-Papua) and two quarter dummy variables (Quarter 2 and quarter 3).

The properties of demand theory can be imposed on the equation (1) by restricting its parameters known as adding-up, homogeneity and Slutsky symmetry. The adding-up restriction is imposed as:

$$(7) \quad \sum_{i=1}^n \rho_{i0} = 1; \sum_{i=1}^n \rho_{ik} = 0; \sum_{i=1}^n \gamma_{ij} = 0; \sum_{i=1}^n \beta_i = 0; \text{ and } \sum_{i=1}^n \lambda_i = 0.$$

Homogeneity is given by:

$$(8) \quad \sum_{j=1}^n \gamma_{ij} = 0 \text{ for any } i$$

Slutsky symmetry is imposed as

$$(9) \quad \gamma_{ij} = \gamma_{ji}, \quad i \neq j.$$

### **Data Source and Description**

The data set for this study was collected from the national social and economic survey of household in Indonesian (SUSENAS). SUSENAS collects data related to expenditure foods and non-foods and socioeconomic characteristics of Indonesian Households. The survey interviewed households about food consumption during one week before survey and non-food consumption during one month before survey. In addition, SUSENAS also provides information about nutritional content for each food that households consume. CBS uses a nutrient conversion table from the Ministry of Health and Nutrition Research Institute to calculate nutrient available to a household by multiplying the nutritional content of food items per unit of quantity to total quantity of that food items available (CBS, 2000). SUSENAS records only four major macronutrients encompassing calories (kcal), protein (grams), fats (grams) and carbohydrate (grams).

This study will use the current survey in 2011. The CBS classifies foods consumption into 14 food group encompassing cereal, tubers, fish, meat, eggs and milk, vegetables, pulses, fruits, oil and fats, beverage, condiment, miscellaneous foods, prepared food and cigarette and tobacco. For the purpose of this study, we classify food

consumption into 10 food groups encompassing cereals, fish, meat, eggs and milk, vegetables, fruits, oil and fats, prepared food and drink, other foods and tobacco. Accordingly, this study calculates demand for four macronutrient associated with 10 food groups.

The total sample of households in SUSENAS 2011 living in urban and rural areas is 213,500 households consisting of 88,049 urban and 125,456 rural households. As discussed in the chapter 3, however, after deleting the data outlier the data set used for this study are 208,300 encompassing 86,283 urban and 122,017 rural households respectively. Because demand for food is different across income level and accordingly nutrient availability also are different across income groups, this study classifies household income based on five income groups consisting low income (stratum 1), low to middle income (stratum 2), middle income (stratum 3), middle to high income (stratum 4) and high income (stratum 5). Each stratum accounts for 20% of total households for both urban and rural areas.

Table IV-1 reports share of nutrient consumed by household for national level, urban and rural areas. Cereal has contributed to most of source of calorie and protein and carbohydrate. Meanwhile fats are mostly contributed by Oil and fats category. Table IV-2 and IV-3 present share of nutrient by income group both urban and rural households. Most of nutrition intake for rural families across income group is higher than those for urban families for all nutrients (calorie, protein, fats and carbohydrate) under study.

## **Estimation and Results**

As mentioned in the previous section, nutrient elasticity is derived from the demand system. Chapter 3 has discussed how to estimate parameters and calculate both conditional and unconditional price and expenditure elasticity. We used unconditional price and expenditure elasticity from chapter 3 to calculate nutrient elasticity. The section focuses in discussing the nutrient elasticity for all 10 foods groups for all strata in both urban and rural areas and comparing them.

### **All Areas**

As explained before, nutrient elasticity consists of expenditure nutrient elasticity and price nutrient elasticity. The expenditure nutrient elasticity measures the percentage change in the corresponding nutrient such as calorie, protein, fats and carbohydrate under this study as a result of 1% change in expenditure. On the other hand, the price nutrient elasticity represents the percentage change in the corresponding nutrient for 1% change in price.

Table IV-4 presents the expenditure and price nutrient elasticities for all areas. All expenditure nutrients elasticities are positive and range from 0.5901 for carbohydrate to 0.7501 for fats. An increase in expenditure leads to an increase in the consumption of all nutrients under study with fats having the highest value and carbohydrate having the lowest value. Among 40 price nutrient elasticities, 34 are negative. These results imply that if we increase price, most of nutrient availability in 10 food groups will decrease. For instance, a 1% increase in the price of eggs and milk holding other prices and expenditure same reduces all calorie intake by 0.5857%, protein intake by 0.4855%, fats intake by

0.1187%, and carbohydrate intake by 0.4861%. An increase in the prices of fish, eggs and milks, vegetables, fruits, prepared food and drink, and other foods reduce all calorie, protein, fats and carbohydrate. The impact of an increase in price for the rest of the 10 food groups is a mixture of increasing and decreasing in nutrient intake under study. An increase in the price of eggs and milk has the most impact to the decline in household consumption of calorie, protein and carbohydrate. Not surprisingly, fats consumption is influenced much by oils and fats category. Higher price of oils and fats is lower fats consumption. Tobacco has no all macronutrients. However, its price nutrient elasticity is affected by cross commodities effect (Huang, 1996, 1999). If the price of tobacco increases by 1%, it decreases calorie, protein, and carbohydrate by 0.0324%, 0.0340%, 0.0483% but it increases fat by 0.0065%.

### **Urban Areas**

The expenditure and price nutrient elasticities for urban areas are reported in table IV-4. All expenditure nutrients elasticities are positive and range from 0.7961 for carbohydrate to 0.7447 for fats. An increase in expenditure leads an increase in the consumption of all macronutrients under study. The highest impact as a result of an increase in expenditure on nutrient availability is carbohydrate, followed by calories, protein, and fats. These results are not consistent with all areas. Nutritional availability as income increases in urban areas is above all areas. Most of price nutrient elasticities are negative. Of 40 price nutrient elasticities, 23 are negative. For instance, a 1% increase in the price of cereal holding other prices and expenditure unchanged reduces carbohydrate by 0.3260%, calorie by 0.2691%, protein by 0.1024%, and fats by 0.3098%. Therefore,

an increase in the price of cereal as staple food has biggest impact on carbohydrate, followed calorie, protein and fats. Among the 10 food groups, an increase in price for eggs and milk have a highest impact in reducing calorie, protein and carbohydrates, but fats intake is affected mostly by oils and fats consumption among the 10 food groups. These findings are similar to all areas.

Table IV-5 reports expenditure and price nutrient elasticities across income groups in urban areas. The expenditure nutrient elasticities across income strata are positive. Although it varies across income groups, expenditure nutrient elasticities indicate a clear pattern. First, lower income groups have higher expenditure nutrient elasticity than higher income groups. Second, the highest impact on increase in expenditure on nutrient consumption across income group is fats.

Price nutrient elasticities are mixed. Of 200 price nutrient elasticities, 111 (55.5%) are negative and 89 (45.5%) are positive. For example, an increase in the price of cereal reduces all calories, protein, fats and carbohydrate for all strata. In addition, Price of eggs and milks and prepared food and drink reduce all nutrients consumption for all strata. Price of other foods has a negative impact on calorie, protein, fats and carbohydrate nutrients intake for all income groups except fat for stratum 3, 4 and 5. Changes in price for eggs and milk have the highest impact in reducing calorie, protein and carbohydrates, but fats intake is influenced mostly by oils and fats consumption among the 10 food groups for all income groups. By contrast, price of tobacco has a positive impact on all nutrients intake for all strata. There is no clear pattern for whom get most benefit from increase in price of tobacco. However, stratum 1 as the poorest families gets the most benefit by increasing more all nutrients consumption.



## **Rural Areas**

The expenditure and price nutrient elasticities for rural areas are presented in table IV-4. All expenditure nutrient elasticities are positive. As expenditure increases, all macronutrients under study consisting calorie, protein, fats and carbohydrate increases similar to urban areas. It ranges from 0.6251 for carbohydrate to 0.7488 for fats. Like urban areas, the biggest impact on an increase in expenditure is fats, followed by protein, calories and carbohydrate. Price nutrient elasticities are mixture of negative and positive. Among 40 price nutrient elasticities, 33 are negative. For example, if the price of cereals as staple food increases by 1%, it reduces carbohydrate by 0.4167%, calories by 0.3162%, protein by 0.2585%, and fats by 0.0573%. Like urban areas, an increase in the price of cereal as a staple food has the biggest impact on reducing carbohydrate, followed calorie, protein and fats. The highest impact in reducing calories, protein and carbohydrate consumption as price increase is eggs and milks category. Fats consumption is influence mostly by the price of oils and fats. These findings are consistent to all areas and urban areas.

The price and expenditure nutrient elasticities across income groups in rural areas are reported in table IV-6. All expenditure nutrient elasticities are positive across income groups. Unlike urban areas, they do not show also a clear pattern. For instance, expenditure nutrient elasticities with respect to calorie, protein, and carbohydrate for stratum 1 are higher than others strata except fats. Expenditure nutrient elasticities with respect to calorie, protein, and carbohydrate for stratum 3 are higher than stratum 2, 3 and 4, but its expenditure nutrient elasticity with respect to fats is higher for stratum 2 than

that stratum 3. In general, expenditure nutrient elasticities with respect to all nutrients become inelastic in moving from lower income groups to higher income groups.

Among 200 price nutrient elasticities, 108 (54%) are negative and 92 (46%) are positive. For example, an increase in price of cereal as staple food will reduce all calories, protein, fats and carbohydrate for all strata. Prices of eggs and milk and prepared food and drink lower all calorie, protein, fats and carbohydrate consumption for all strata. On the other hand, price of tobacco has a positive impact on all nutrients intake for all strata. There is no clear pattern for whom get most benefit from for increase in price of tobacco. However, stratum 5 as the richest households get the least benefit as prices of tobacco go up.

### **Conclusion and Policy Implications**

All expenditure nutrient elasticities are positive in all, urban and rural areas but expenditure nutrient elasticities in urban areas are higher than rural areas for calorie, protein, and carbohydrate. Expenditure elasticity varies across income groups. Expenditure elasticity with respect to calorie, protein, and carbohydrate for each income groups in rural areas is higher than in urban areas. On the other hand, expenditure nutrient elasticity with respect to fats for stratum 1, 2, and 5 in urban areas is higher than in rural areas. In general, the expenditure nutrient elasticities in rural areas are higher than urban areas. This means that rural families benefit more from nutrient intake as expenditure change than urban families.

An increase in price of cereal as staple food in rural areas has a bigger negative impact on calorie, protein and carbohydrate intake than in urban areas. Price of eggs and

milk has the biggest negative impact on all nutrients intake in rural areas than urban areas. The price nutrient elasticity varies across income groups. Most price nutrient elasticities with respect to all nutrients under study in rural areas are higher than in urban areas. An increase in price is more harmful in nutrient consumption in rural households than in urban households. These findings imply that rural households consume less nutritional intake than urban households as price of the 10 food groups go up. In addition, prices mostly affect nutrient availability for lower income households in both urban and rural areas. Therefore, poor families in both urban and rural areas are particularly vulnerable for nutritional deficiencies as prices go up.

## **CHAPTER 5**

### **SUMMARY AND CONCLUSIONS**

The goals of this study are to estimate and analyze the impact of economic (price and expenditure) and demographic variables on food and nutrient consumption patterns in Indonesia using the data set collected from the national social and economic survey of household in Indonesian (SUSENAS) in 2011. In order to accomplish those goals, this study uses the almost ideal demand system (AIDS) developed by Deaton and Muellbauer (1980) and the quadratic almost ideal demand system (QUAIDS) developed by Banks et al. (1996). Because of existing zero budgets in demand system caused by zero expenditure during the survey in SUSENAS data set, the consistent two-step estimation is applied to account for those zero budgets. This study consists of the 10 food categories encompassing cereals, fish, meat, eggs and milk, vegetables, fruits, oil and fats, prepared food and drink, other foods and tobacco. Because of differences in consumption patterns in urban and rural and areas of Indonesia, this study estimates the demand for the 10 food groups separately between urban and rural areas. Moreover, as the income distribution and consumption patterns in urban and rural areas in Indonesia are different, this study also estimates the demand for the 10 food groups by income groups in both urban and rural areas.

The system misspecification test for the multi-equation regression model is performed to assure an appropriate estimation procedure in estimating food demand system. The system misspecification tests are conducted for normality and static homoscedasticity. Results of misspecification tests show that both normality and homoscedasticity do not hold in both the first and second-stage demand system. Because the data sets are large, the demand systems in this study were estimated using the Full information Maximum Likelihood estimation assuming normality and homoscedasticity. Moreover, Wald and likelihood ratio test were performed to choose model which is the appropriate in analyzing the demand for food and nutrient in Indonesia in the second-step demand system. Both Wald and Likelihood Ration test indicates that the QUAIDS models are superior to the AIDS models in the second-stage demand system.

Some major results of this study can be summarized as follows. First, price as an important factor of market demand has played an important role in determining demand for foods in Indonesia. Based on own-price elasticity, demand for high-value foods such as fish, meat, eggs and milks, vegetables, fruits, and oil and fats are very sensitive to price changes in both urban and rural areas. On the other hand, cereals with sub categories of rice as food staple are less sensitive to price changes, but rural households are more sensitive to change in price of cereals than urban households. In general, rural households are more sensitive to price change than urban households. The price elasticities of demand become less elastic in moving from the low to high income group in both urban and rural. Moreover, both urban and rural households are more responsive to own-price change than to cross-price change.

Second, the expenditure elasticities are positive and large enough for the all 10 food groups in this study except the cereal category. Prepared food and drink category as a processed food has the highest expenditure elasticity in all areas. Unsurprisingly, Indonesians are purchasing packaged food with some higher value added from the standardized store, rather than purchasing unprocessed products from local fresh markets. The total value of packaged food purchases grew from \$4.2 billion in 1998 to over \$16 billion in 2008 (Rada and Regmi, 2010). Expenditure elasticity of cereals for urban households is higher than rural households. In general, the expenditure elasticities of demand for rural households are more elastic than urban households. The expenditure elasticities become less elastic in moving from the low to high income group in both urban and rural areas. These findings imply that income is as driving force in changing food consumption pattern in Indonesia recently. Expenditure elasticity for the high-value foods such as fish, meat, eggs and milks, vegetables, fruits, and oil and fats are more elastic than the low-value foods such as cereals in both urban and rural areas. Therefore, demand for those high-value foods grow faster as household income increase.

Third, this study also finds that most of demographic variables such region, quarter, household size, age of household head, education of household head and gender are statistically significant. Therefore, demographic variables also have a significant impact on the food demand in Indonesia.

Fourth, all expenditure nutrient elasticities are positive. As household income increases, households increase consumption of all calorie, protein, fats and carbohydrate under this study. Urban households are more elastic than those rural households. The impact of income on nutrient intake is mostly for lower to middle income groups in both

urban and rural areas. The highest impact as a result of an increase in income on nutrient availability is fats, followed by protein, calories and carbohydrate in both urban and rural households. All nutrients expenditure elasticities increase in moving from high income families to low income families in both urban and rural households. Rapid economic and income growth over the last decade reduced nutritional deficiencies in Indonesia. On the other hand, health may be main issues for households in Indonesia in the future since obesity and heart attack are related to fats.

Fifth, most price nutrient elasticities are negative, although some are positive. Unlike expenditure elasticity, price nutrient elasticities indicate that rural households are more elastic than urban households across income groups. Consequently, an increase in price would reduce nutrient consumption in rural households more than in urban households. For example, rice is a staple food classified as being in the cereal category. If the price of rice increases, rural households consume less calorie, protein, fats, and carbohydrate. Price mostly affects nutrient availability for lower income households. As a result, whenever price rises the poor families in both urban and rural areas are particularly vulnerable to nutritional deficiencies.

The findings of this study have important consequences for Indonesian government in formulating food policy and reducing nutritional deficiencies. First, regarding with the price elasticity where lower income groups are more elastic than higher income groups, the poor families shift consumption to other food consumption with lower quality as price increases. Second, lower income groups are also more elastic associated with expenditure elasticity than higher income groups. This implies that economic policy such as income subsidy help poor families. Third, nutrient expenditure

elasticity becomes more elastic in moving from higher income groups to lower income groups. An increase in income helps poor households in both urban and rural areas to consume more nutrients so that it could reduce nutritional deficiencies. Fourth, prices mostly affect nutrient availability for lower income households in both urban and rural areas. These results imply that economic policy of maintaining low inflation can help for poor families in both urban and rural areas in reducing nutritional deficiencies.



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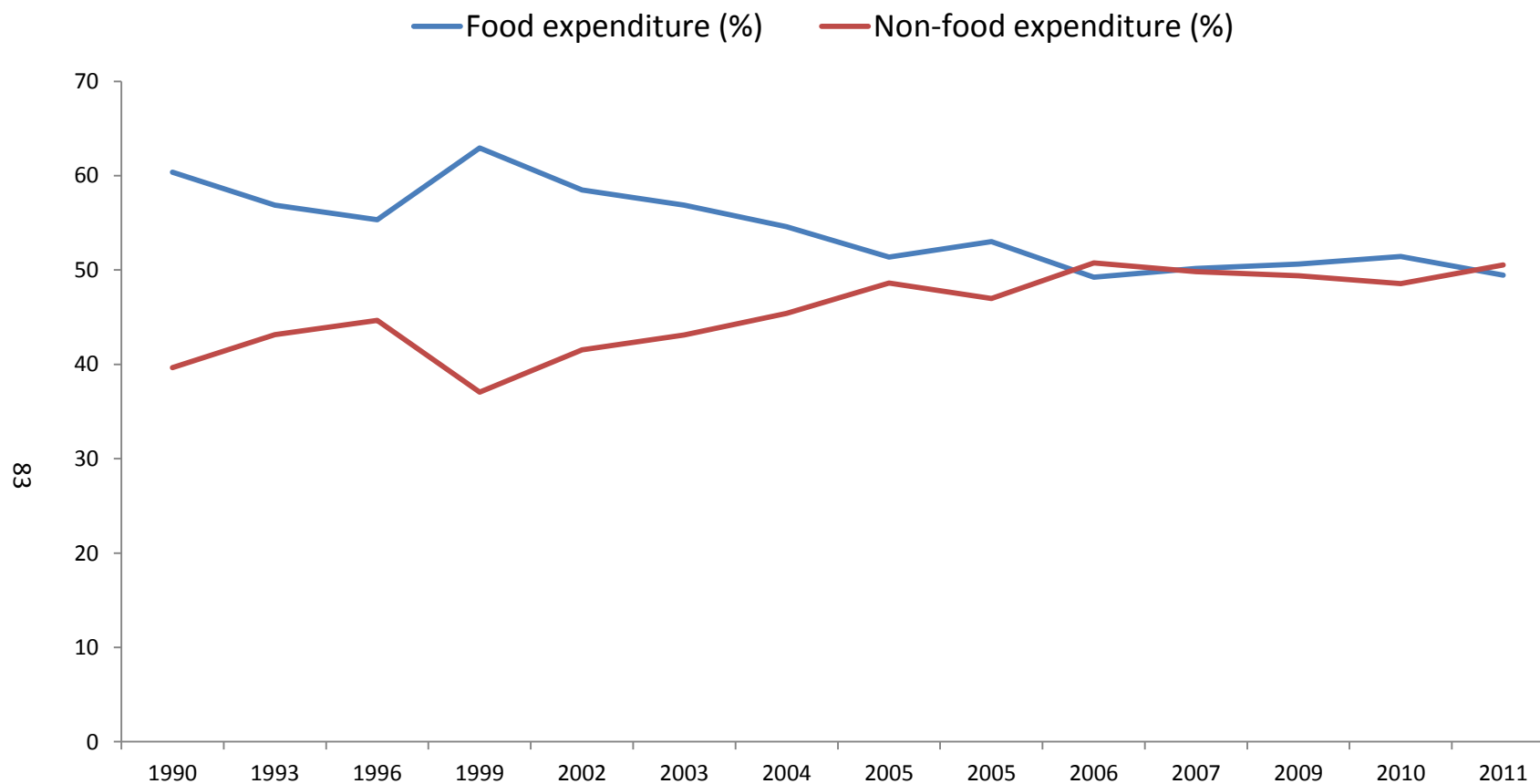
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**Table II-1. Demographic Variables of Population, Indonesia, 1980-2010**

Year	Population			Age of Population (millions)			Life Expectation (year)		Mortality Rate (Year)
	Total Population (millions)	Urban Population (%)	Rural Population (%)	0-14	15-64	over 65	Female	Male	
1980	150.82	22.1	77.9	61.98	83.46	5.38	63	56	121
1985	168.12	26.1	73.9	65.69	96.36	6.07	62	58	83
1990	184.35	30.6	69.4	67.21	110.20	7.75	64	60	70
1995	199.40	35.6	64.4	67.13	124.03	9.23	66	62	67
2000	213.39	42.0	58.0	65.58	137.97	10.98	67	64	54
2005	227.30	48.1	51.9	65.36	150.28	13.01	69	66	44
2010	239.87	53.7	46.3	64.85	161.70	15.04	71	67	35

Source: United Nations, 2012

**Figure II-1. Percentage of Food and Non-Food Expenditure to Total Expenditures, Indonesia, 1990-2011**



Note: Food expenditures include cereals, tubers, fish, meat, eggs and milk, vegetables, legumes, fruits, oil and fats, beverage stuffs, spices, miscellaneous food items, prepared food, alcoholic beverage, and tobacco and betel. Non-food expenditures include housing and household facility, goods and services, clothing, footwear, and headgear, durable goods, taxes and insurance, and parties and ceremony.

Sources: Statistical Yearbook of Indonesia, Central Bureau of Statistics, various Issues.



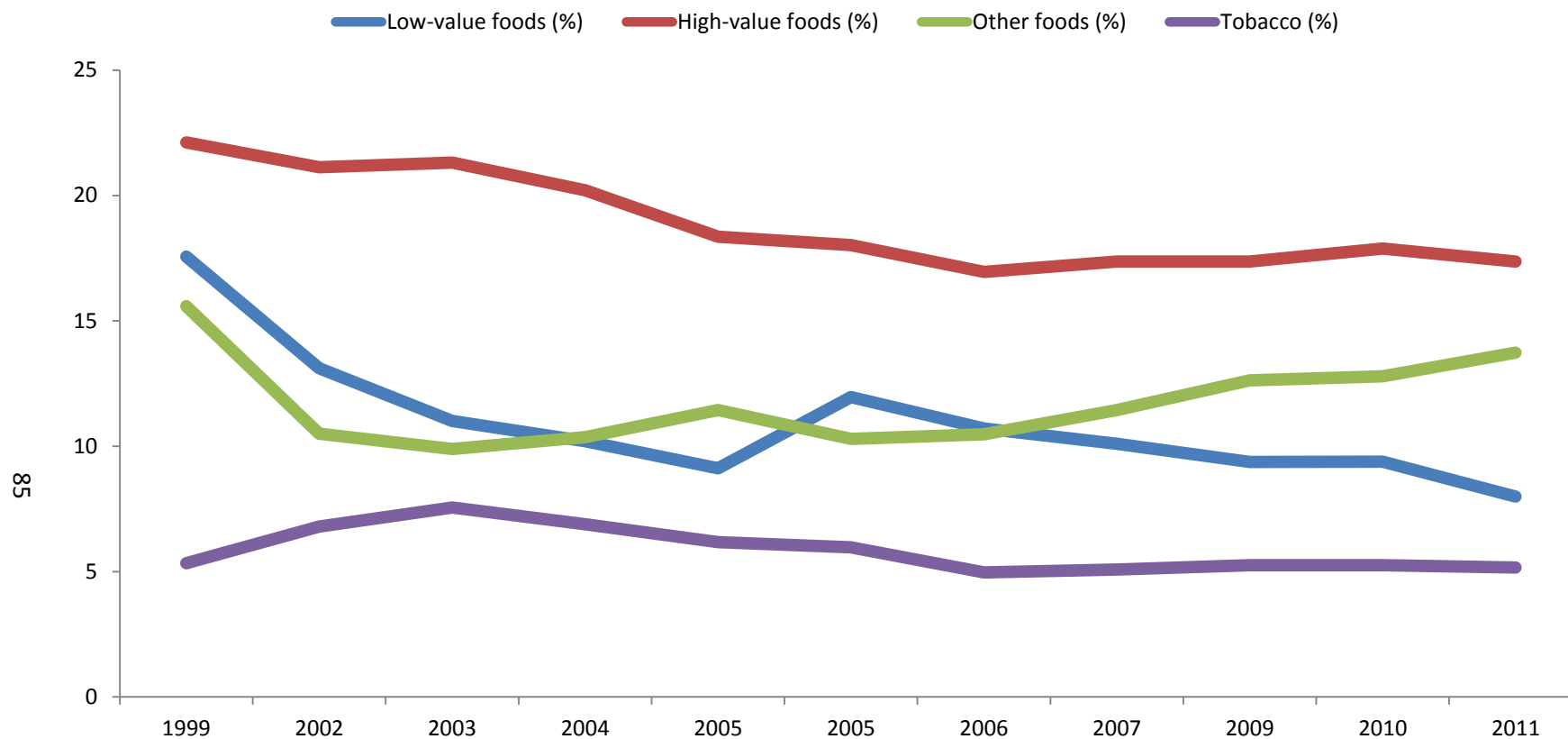
**Table II-2. Percentage of Monthly Average per Capita Expenditure by Commodity Group, Indonesia, 1999-2011.**

	1999	2002	2003	2004	2005	2005	2006	2007	2009	2010	2011
Food											
Cereal	16.78	12.47	10.36	9.44	8.54	11.37	10.15	9.57	8.86	8.89	7.48
Tubers	0.78	0.64	0.65	0.76	0.58	0.59	0.56	0.53	0.51	0.49	0.51
Fish	5.58	5.17	5.37	5.06	4.66	4.72	3.91	3.96	4.29	4.34	4.27
Meat	2.29	2.86	2.90	2.85	2.44	1.85	1.95	1.84	1.89	2.10	1.85
Eggs and milk	2.91	3.28	3.04	3.05	3.12	2.96	2.97	3.12	3.27	3.20	2.88
Vegetables	6.23	4.73	4.80	4.33	4.05	4.42	3.87	4.02	3.91	3.84	4.31
Legumes	2.33	2.02	1.90	1.75	1.70	1.63	1.47	1.55	1.57	1.49	1.26
Fruits	2.07	2.84	2.97	2.61	2.16	2.10	2.56	2.27	2.05	2.49	2.15
Oil and fats	3.04	2.25	2.23	2.31	1.93	1.97	1.69	2.16	1.96	1.92	1.91
Beverage stuffs	3.12	2.71	2.52	2.48	2.23	2.50	2.21	2.13	2.02	2.26	1.80
Spices	1.65	1.55	1.46	1.43	1.33	1.37	1.10	1.12	1.08	1.09	1.06
Miscellaneous food items	1.29	1.37	1.24	1.23	1.34	1.27	1.34	1.39	1.33	1.29	1.07
Prepared food and beverage	9.53	10.5	9.89	10.36	11.44	10.29	10.48	11.44	12.63	12.79	13.73
Tobacco and betel	5.33	6.80	7.56	6.89	6.18	5.97	4.97	5.08	5.26	5.25	5.16
Total of food	62.94	58.47	56.89	54.59	51.37	53.01	49.24	50.17	50.62	51.43	49.45
Total of Non-food	37.06	41.53	43.11	45.42	48.63	46.99	50.76	49.83	49.38	48.57	50.55

Note: 1999, 2002-2006 only include 10,000 households, 2007-2010 include 68,800 households and 2011 include 75,000 households

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics, 2011

**Figure II-2. Percentage of Low and High-Value Food Expenditure to Food Expenditure, Indonesia, 1999-2011**



Note: Low-value foods consist of cereals and tuber, high-value foods consist of fish, meat, eggs and milk, vegetables, fruits, and oil and fats, other foods consist of Beverage stuffs, spices, miscellaneous food items, prepared food and beverage, and tobacco consists of tobacco and betel.

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics, 2011

**Table II-3. Percentage of Monthly Average per Capita Expenditure, Urban and Rural Areas by Commodity Group, Indonesia, 2008-2010.**

Food Group	2008			2009			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Cereal	14.79	24.43	19.07	13.43	22.63	17.51	13.42	22.09	17.29
Tubers	0.75	1.43	1.05	0.72	1.36	1.00	0.67	1.30	0.95
Fish	7.43	8.49	7.90	7.84	9.28	8.48	7.86	9.14	8.43
Meat	4.26	2.92	3.67	4.38	2.90	3.73	4.70	3.30	4.07
Eggs and milk	7.49	4.62	6.22	7.67	4.93	6.46	7.32	4.86	6.22
Vegetables	7.12	9.14	8.02	6.68	9.03	7.72	6.55	8.60	7.46
Legumes	3.07	3.11	3.08	3.08	3.14	3.10	2.84	2.98	2.90
Fruits	4.85	4.12	4.53	4.42	3.59	4.05	5.08	4.55	4.85
Oil and fats	3.83	4.89	4.30	3.45	4.39	3.87	3.34	4.21	3.73
Beverage stuffs	3.64	4.99	4.24	3.44	4.69	3.99	3.77	5.17	4.40
Spices	2.08	2.41	2.23	1.97	2.34	2.13	1.95	2.33	2.12
Miscellaneous food items	2.80	2.72	2.76	2.64	2.62	2.63	2.48	2.53	2.50
Prepared food and beverage	28.15	16.10	22.80	30.59	17.88	24.95	30.60	17.75	24.86
Tobacco and betel	9.73	10.63	10.13	9.69	11.25	10.38	9.43	11.18	10.21

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics, 2009 and 2011

**Table II-4. Monthly Average Expenditure on Food per Capita, Urban and Rural Areas by Province, Indonesia, 2008-2010 (Rupiah)**

Province	Urban				Rural			
	2008	2009	2010	average	2008	2009	2010	average
Aceh	258,233	351,245	341,142	316,873.3	281,781	247,427	275,749	268,319.0
Sumatera Utara	227,521	257,661	288,594	257,925.3	198,301	219,171	248,859	222,110.3
Sumatera Barat	263,491	299,590	344,099	302,393.3	212,391	238,274	280,748	243,804.3
Riau	285,064	328,636	356,537	323,412.3	237,941	263,543	276,157	259,213.7
Kepulauan Riau	301,036	330,344	388,302	339,894.0	244,200	303,902	341,117	296,406.3
Jambi	209,364	243,003	287,309	246,558.7	200,524	214,071	259,462	224,685.7
Sumatera Selatan	261,856	248,475	284,268	264,866.3	186,102	204,521	242,246	210,956.3
Bangka Belitung	284,162	303,406	380,298	322,622.0	277,071	290,870	328,440	298,793.7
Bengkulu	200,057	220,732	299,906	240,231.7	185,289	195,910	239,474	206,891.0
Lampung	209,458	228,316	271,181	236,318.3	159,979	166,439	200,913	175,777.0
DKI Jakarta	313,878	357,934	398,782	356,864.7	-	-	-	-
Jawa Barat	223,205	239,201	278,285	246,897.0	165,387	192,426	222,277	193,363.3
Banten	234,802	277,154	338,135	283,363.7	180,920	195,712	234,517	203,716.3
Jawa Tengah	178,180	193,974	225,430	199,194.7	138,660	156,775	183,675	159,703.3
DI Yogyakarta	199,260	232,932	270,885	234,359.0	141,612	159,436	195,603	165,550.3
Jawa Timur	191,264	220,890	250,338	220,830.7	139,244	158,112	181,119	159,491.7
Bali	215,944	241,671	311,931	256,515.3	167,920	183,935	234,204	195,353.0
NTB	186,472	191,821	249,107	209,133.3	153,907	169,850	205,617	176,458.0
NTT	204,344	236,813	273,831	238,329.3	127,838	145,969	179,358	151,055.0
Kalimantan Barat	218,161	255,780	322,786	265,575.7	194,968	222,253	243,618	220,279.7
Kalimantan Tengah	283,938	308,212	326,759	306,303.0	235,185	251,330	296,577	261,030.7
Kalimantan Selatan	269,406	282,810	347,424	299,880.0	211,659	244,792	288,766	248,405.7
Kalimantan Timur	281,603	370,349	427,256	359,736.0	208,312	223,957	287,859	240,042.7
Sulawesi Utara	186,399	200,747	286,724	224,623.3	180,823	205,324	251,796	212,647.7
Gorontalo	186,260	202,642	260,413	216,438.3	133,510	147,191	194,224	158,308.3
Sulawesi Tengah	218,058	243,461	281,251	247,590.0	162,731	184,873	222,649	190,084.3
Sulawesi Selatan	271,727	256,990	323,848	284,188.3	144,500	148,197	208,045	166,914.0
Sulawesi Barat	185,489	180,269	254,171	206,643.0	155,240	175,342	210,483	180,355.0
Sulawesi Tenggara	203,898	236,087	335,709	258,564.7	131,739	148,526	191,015	157,093.3
Maluku	232,003	247,366	262,616	247,328.3	155,561	175,256	212,195	181,004.0
Maluku Utara	275,301	338,486	371,122	328,303.0	191,156	211,978	251,754	218,296.0
Papua	333,558	392,730	415,596	380,628.0	185,796	219,375	271,703	225,624.7
Papua Barat	281,021	365,174	406,785	350,993.3	182,991	239,374	246,550	222,971.7
Indonesia	222,980	250,873	291,678	255,177.0	186,741	186,741	219,803	197,761.7

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics 2009 and 2011

**Table II-5. Average Daily per Capita Consumption of Calorie (Kilo Calorie) by Food Group, Indonesia, 1999-2011**

Food Group	1999	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Cereal	1,066.50	1,039.91	1,035.07	1,024.08	1,009.13	992.93	953.16	968.48	939.99	927.05	919.10
Tubers	60.73	55.43	55.62	66.91	56.01	51.08	52.49	52.75	39.97	37.05	43.49
Fish	36.04	42.53	46.91	45.05	47.59	44.56	46.71	47.64	43.52	45.34	47.83
Meat	20.07	35.01	41.71	39.73	41.45	31.27	41.89	38.60	35.72	41.14	44.71
Eggs and milk	24.39	39.63	37.83	40.47	47.17	43.35	56.96	53.60	51.59	56.20	55.97
Vegetables	32.28	37.44	40.95	38.80	38.72	40.20	46.39	45.46	38.95	38.72	37.40
Legumes	52.40	71.66	63.93	62.24	69.97	64.42	73.02	60.58	55.94	56.19	54.17
Fruits	32.71	40.75	42.75	41.61	39.85	36.95	49.08	48.01	39.04	40.91	39.44
Oil and fats	205.90	246.66	241.70	236.67	241.87	234.50	246.34	239.30	228.35	233.39	232.03
Beverage stuffs	103.35	120.00	115.54	114.75	110.73	103.69	113.94	109.87	101.73	100.29	97.69
Spices	15.42	18.28	15.89	16.41	19.25	18.81	17.96	17.11	15.61	16.00	16.14
Misc. food items	28.76	41.66	39.60	40.16	52.84	48.14	70.93	66.92	58.75	59.18	59.70
Prepared food and beverage	170.82	198.18	212.40	219.18	233.08	216.83	246.04	289.85	278.46	273.84	304.35
Tobacco and betel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,849.36	1,987.13	1,989.89	1,986.06	2,007.65	1,926.74	2,014.91	2,038.17	1,927.63	1,925.61	1,952.01

Note: 1999, 2002-2006 only include 10,000 households, 2007-2010 include 68,800 households and 2011 include 75,000 households

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics, 2011

**Table II-6. Average Daily per Capita Consumption of Protein (grams) by Food Group, Indonesia, 1999-2011**

Food Group	1999	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Cereal	25.04	24.42	24.29	24.05	23.69	23.33	22.43	22.75	22.06	21.76	21.57
Tubers	0.43	0.43	0.44	0.53	0.45	0.41	0.40	0.42	0.33	0.32	0.36
Fish	6.07	7.17	7.91	7.65	8.02	7.49	7.77	7.94	7.28	7.63	8.02
Meat	1.33	2.26	2.62	2.54	2.61	1.95	2.62	2.40	2.22	2.55	2.75
Eggs and milk	1.43	2.33	2.22	2.38	2.71	2.51	3.23	3.05	2.96	3.27	3.25
Vegetables	2.23	2.49	2.75	2.57	2.52	2.66	3.02	3.01	2.58	2.52	2.43
Legumes	4.81	6.36	5.85	5.52	6.31	5.88	6.51	5.49	5.19	5.17	5.17
Fruits	0.33	0.45	0.46	0.43	0.43	0.39	0.57	0.52	0.41	0.47	0.42
Oil and fats	0.42	0.53	0.54	0.48	0.48	0.45	0.46	0.39	0.34	0.34	0.31
Beverage stuffs	0.79	1.13	1.01	1.03	1.08	10.00	1.13	1.06	0.98	1.05	1.07
Spices	0.66	0.79	0.69	0.71	0.82	0.81	0.76	0.73	0.68	0.69	0.69
Misc. food items	0.53	0.75	0.74	0.76	1.03	0.95	1.43	1.37	1.21	1.21	1.21
Prepared food and beverage	4.62	5.34	5.84	6.01	6.44	5.83	7.33	8.36	8.10	8.03	9.01
Tobacco and betel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	48.67	54.45	55.37	54.65	55.27	53.65	57.66	57.49	54.35	55.01	56.25

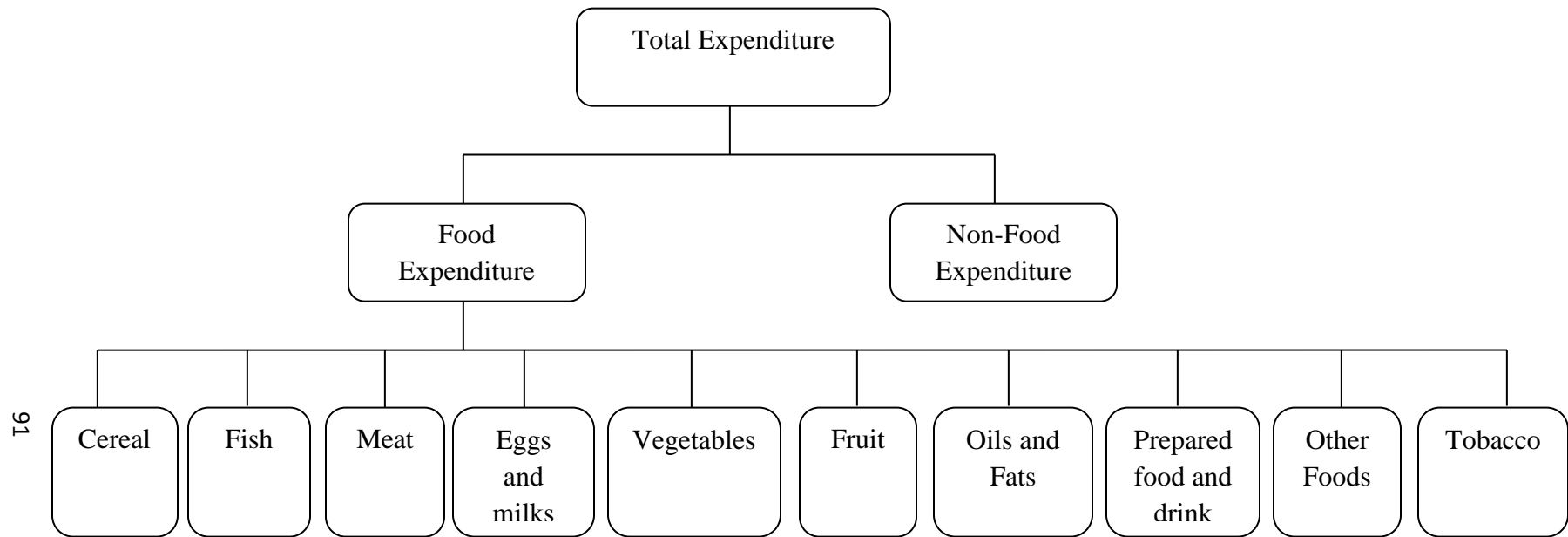
Note: 1999, 2002-2006 only include 10,000 households, 2007-2010 include 68,800 households and 2011 include 75,000 households

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics, 2011

**Table II-7. Average Daily Per Capita Consumption of Calorie and Protein by Province, Indonesia, 2008-2010**

province	Calorie (kcal)			Protein (grams)		
	2008	2009	2010	2008	2009	2010
Aceh	2,080.83	2,010.37	2,075.79	57.49	54.57	57.45
Sumatera Utara	2,074.76	1,921.70	1,970.81	60.13	55.04	57.13
Sumatera Barat	2,160.13	2,082.73	2,056.46	56.98	55.28	56.87
Riau	2,144.41	1,932.54	1,903.59	57.95	54.73	55.03
Kepulauan Riau	2,131.56	2,079.02	2,004.71	62.23	60.69	57.61
Jambi	2,057.70	1,904.06	1,927.61	56.22	51.54	52.62
Sumatera Selatan	2,106.36	1,991.76	1,989.11	56.86	53.62	54.67
Bangka Belitung	2,035.46	1,800.29	1,971.63	59.31	51.57	58.37
Bengkulu	2,074.01	1,982.19	2,007.41	55.18	52.84	54.40
Lampung	2,169.98	1,945.76	1,953.67	57.64	51.49	52.78
DKI Jakarta	1,884.95	1,896.40	1,881.91	58.49	59.54	59.17
Jawa Barat	2,085.83	1,962.59	1,930.25	59.50	56.05	56.19
Banten	2,055.61	1,979.58	1,964.26	60.03	57.32	58.34
Jawa Tengah	1,982.84	1,860.83	1,835.37	55.80	51.48	51.27
DI Yogyakarta	1,765.82	1,802.61	1,852.05	49.56	51.35	52.89
Jawa Timur	1,956.19	1,856.72	1,844.14	55.30	52.70	52.53
Bali	2,385.21	2,192.83	2,120.28	68.81	64.10	62.08
NTB	2,003.69	1,956.21	2,050.38	56.49	54.87	57.93
NTT	2,037.34	1,971.70	1,960.28	56.14	54.12	54.00
Kalimantan Barat	2,010.41	1,926.22	1,917.06	55.84	53.01	53.58
Kalimantan Tengah	2,203.65	2,071.30	2,058.25	63.34	60.89	60.72
Kalimantan Selatan	2,084.36	2,039.19	2,080.53	58.86	58.46	60.12
Kalimantan Timur	1,816.03	1,736.69	1,829.15	54.04	52.58	57.92
Sulawesi Utara	2,062.56	1,910.19	2,015.22	56.90	52.10	56.01
Gorontalo	2,003.43	1,826.90	1,895.67	55.19	48.95	53.96
Sulawesi Tengah	2,136.33	1,950.63	1,896.25	55.94	51.72	51.12
Sulawesi Selatan	2,129.15	2,006.11	2,056.17	61.97	57.49	60.03
Sulawesi Barat	2,000.04	1,868.58	2,136.21	52.48	52.80	59.59
Sulawesi Tenggara	2,138.50	1,931.97	1,926.63	57.10	54.12	56.31
Maluku	1,939.04	1,956.68	1,841.53	53.00	49.90	46.76
Maluku Utara	1,974.11	1,737.47	1,854.02	50.76	42.87	46.91
Papua	1,906.18	1,950.40	1,992.89	46.90	49.75	48.06
Papua Barat	1,873.31	1,822.13	1,892.73	48.49	49.35	51.08
Indonesia	2,038.17	1,927.63	1,925.61	57.49	54.35	55.01

Source: Statistical Yearbook of Indonesia, Central Bureau of Statistics 2009 and 2011



**Figure III-1. Household Utility Tree for Food Consumption in Indonesia**



**Table III-1. Summary Statistics of Food Consumption, Indonesia, 2011**

Items	Quantity (kg)			Food Expenditure (Rupiah)			Price (Rupiah/kg)			Budget Share		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
Cereals	8.32	6.90	9.33	50234.85	43889.93	54721.60	6963.72	7046.75	6905.01	0.217	0.166	0.253
Fish	3.27	2.95	3.49	28650.09	29936.29	27740.57	12506.21	13341.97	11915.21	0.104	0.093	0.111
Meat	0.40	0.52	0.32	10890.00	13762.39	8858.82	11580.26	14752.74	9336.88	0.032	0.037	0.029
Eggs and dairy	1.72	2.07	1.47	14669.19	20427.98	10596.93	13854.47	17619.27	11192.24	0.047	0.058	0.039
Vegetables	10.29	10.58	10.08	23554.58	23685.66	23461.88	3804.20	3645.52	3916.40	0.097	0.085	0.106
Fruits	1.89	1.97	1.84	12103.63	14827.10	10177.76	5797.95	6898.88	5019.44	0.041	0.044	0.039
Oils and fats	2.50	2.52	2.49	16574.07	17856.87	15666.95	9496.65	9184.32	9717.51	0.070	0.067	0.073
Prepared food and drink	34.28	40.66	29.78	69564.31	97205.09	50018.44	3681.64	4407.94	3168.04	0.247	0.312	0.201
Other foods	22.06	21.61	22.38	9923.15	10850.08	9267.68	2040.49	2142.13	1968.61	0.039	0.038	0.040
Tobacco	4.56	4.19	4.83	30369.60	32520.61	28848.53	5431.31	5389.65	5460.78	0.106	0.101	0.109

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-2. Summary Statistics of Food Consumption, Stratum 1, Urban and Rural Areas, Indonesia, 2011**

Items	Quantity (kg)		Food Expenditure (Rupiah)		Price (Rupiah/kg)		Budget Share	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	5.12	6.24	27463.84	30286.18	6257.51	6163.35	0.225	0.308
Fish	1.70	1.95	9645.63	9740.50	7783.76	7616.34	0.076	0.098
Meat	0.11	0.07	2295.79	1408.35	5918.71	3111.10	0.017	0.013
Eggs and dairy	0.78	0.63	4850.93	2804.30	10095.63	6456.42	0.038	0.028
Vegetables	7.00	6.31	12268.26	12217.04	2875.16	3335.44	0.101	0.126
Fruits	0.76	0.83	3615.14	2995.84	3674.74	2755.27	0.029	0.030
Oils and fats	1.72	1.52	10538.66	8661.21	8168.50	8833.89	0.088	0.091
Prepared food and drink	24.61	14.86	36496.41	18615.79	2951.62	2361.47	0.301	0.191
Other foods	15.98	15.77	5169.53	4190.97	1739.85	1587.45	0.042	0.043
Tobacco	2.35	2.27	11415.40	7835.33	3366.98	3441.45	0.081	0.072

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-3. Summary Statistics of Food Consumption, Stratum 2, Urban and Rural Areas, Indonesia, 2011**

Items	Quantity (kg)		Food Expenditure (Rupiah)		Price (Rupiah/kg)		Budget Share	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	6.65	8.92	38278.12	46927.43	6722.37	6609.90	0.189	0.289
Fish	2.53	2.84	18289.74	16960.31	11037.33	9989.90	0.089	0.104
Meat	0.25	0.15	5503.88	3406.13	10300.78	5661.29	0.027	0.020
Eggs and dairy	1.30	0.95	10004.78	5261.13	13665.06	8854.17	0.049	0.033
Vegetables	9.28	8.67	18122.39	18051.02	3344.72	3677.53	0.090	0.112
Fruits	1.28	1.37	7145.62	5503.17	5301.56	3827.43	0.036	0.034
Oils and fats	2.25	2.14	14662.08	12462.85	8830.13	9571.65	0.073	0.079
Prepared food and drink	34.52	22.85	60318.33	29894.73	3635.41	2699.39	0.300	0.185
Other foods	19.91	20.21	7932.11	6526.08	1977.20	1800.38	0.039	0.041
Tobacco	3.72	3.87	23292.90	17176.37	4985.29	4874.88	0.109	0.103

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-4. Summary Statistics of Food Consumption, Stratum 3, Urban and Rural Areas, Indonesia, 2011**

Items	Quantity (kg)		Food Expenditure (Rupiah)		Price (Rupiah/kg)		Budget Share	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	7.15	9.80	44385.16	56209.42	7028.25	6956.16	0.163	0.260
Fish	2.99	3.47	26915.77	24368.87	13490.36	11883.89	0.097	0.112
Meat	0.41	0.24	9870.62	6076.34	14164.99	8429.38	0.036	0.027
Eggs and dairy	1.77	1.27	15737.90	8085.60	16476.26	10867.60	0.057	0.038
Vegetables	10.51	9.99	22754.76	22341.75	3665.02	3912.13	0.084	0.105
Fruits	1.73	1.72	11331.00	7972.08	6679.23	4739.23	0.042	0.037
Oils and fats	2.50	2.49	17457.54	15039.50	9222.60	9799.95	0.065	0.071
Prepared food and drink	39.57	28.76	82572.34	42200.37	4282.89	3036.71	0.304	0.196
Other foods	21.62	22.33	10064.18	8318.97	2132.40	1943.87	0.037	0.039
Tobacco	4.48	4.89	33100.12	25649.02	5899.21	5507.91	0.114	0.116

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-5. Summary Statistics of Food Consumption, Stratum 4, Urban and Rural Areas, Indonesia, 2011**

Items	Quantity (kg)		Food Expenditure (Rupiah)		Price (Rupiah/kg)		Budget Share	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	7.56	10.48	50822.93	64955.48	7408.81	7252.73	0.141	0.228
Fish	3.47	4.13	38078.00	34327.75	15720.31	13840.93	0.103	0.120
Meat	0.65	0.38	16917.93	10286.98	18349.03	11481.86	0.046	0.035
Eggs and dairy	2.52	1.68	24989.49	12271.42	20321.97	12748.45	0.067	0.043
Vegetables	11.95	11.43	28582.51	27468.07	4035.32	4172.14	0.079	0.098
Fruits	2.37	2.12	17941.77	11697.17	8231.36	5872.58	0.050	0.041
Oils and fats	2.80	2.83	20669.65	18054.15	9698.46	10001.83	0.058	0.065
Prepared food and drink	46.19	35.07	113468.38	58272.74	4964.52	3442.21	0.311	0.205
Other foods	23.99	24.36	13002.21	10842.55	2314.71	2121.35	0.036	0.039
Tobacco	4.95	5.90	42441.76	37192.38	6312.09	6349.37	0.109	0.127

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-6. Summary Statistics of Food Consumption, Stratum 5, Urban and Rural Areas, Indonesia, 2011**

Items	Quantity (kg)		Food Expenditure (Rupiah)		Price (Rupiah/kg)		Budget Share	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	8.01	11.23	58499.66	75229.64	7816.82	7542.92	0.112	0.181
Fish	4.05	5.07	56752.12	53305.14	18678.11	16245.00	0.101	0.122
Meat	3.97	2.81	46556.45	24561.92	27537.33	17034.53	0.080	0.055
Eggs and dairy	14.17	14.02	36700.36	37231.43	4307.39	4484.78	0.069	0.089
Vegetables	3.73	3.15	34101.68	22720.32	10607.49	7902.68	0.061	0.051
Fruits	3.36	3.45	25956.40	24116.97	10001.95	10380.26	0.050	0.059
Oils and fats	58.41	47.34	193168.78	101107.78	6205.27	4300.39	0.342	0.229
Prepared food and drink	26.56	29.24	18082.36	16459.72	2546.51	2389.98	0.033	0.039
Other foods	5.42	7.23	52352.92	56389.30	6384.70	7130.29	0.091	0.126
Tobacco	1.16	0.78	34223.43	23116.00	25030.14	18000.66	0.060	0.050

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-7. Summary Statistics of Demographic Variables, Indonesia, 2011**

Items	All			Stratum 1		Stratum 2	
	All	Urban	Rural	Urban	Rural	Urban	Rural
	Average						
Food Expenditure (Rupiah)	266533.47	304962.00	239359.15	123759.58	98755.52	203549.94	162169.21
Total Expenditure (Rupiah)	2219349.70	2834481.59	1784365.84	881828.06	630183.09	1505507.90	1049000.82
Household Size	3.93	3.91	3.95	2.75	2.59	3.69	3.74
Age of Household Head (years)	46.58	46.22	46.83	49.68	52.27	44.80	45.83
Education of household head (year)	8.17	9.66	7.12	6.99	5.21	8.63	6.54
	Percentage						
Gender of Household Head							
Male	85.95	85.07	86.58	71.99	69.45	84.64	87.16
Female	14.05	14.93	13.42	28.01	30.55	15.36	12.84
Married of Household Head							
Married	96.77	94.87	98.12	92.58	96.43	93.38	97.93
Unmarried	3.23	5.13	1.88	7.42	3.57	6.62	2.07
86 Region 1 (Sumatra)	28.85	25.40	31.29	15.41	19.45	23.95	25.41
Region 2 (Java)	33.18	44.79	24.98	62.21	40.52	50.01	31.07
Region 3 (Bali and its archipelago)	7.79	6.21	8.91	7.13	11.75	6.25	10.45
Region 4 (Kalimantan)	10.05	9.37	10.53	4.50	5.27	7.27	7.56
Region 5 (Sulawesi)	13.30	9.67	15.86	9.73	17.10	9.89	17.21
Region 6 (Papua and its Archipelago)	6.83	4.57	8.42	1.03	5.91	2.64	8.28

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.

**Table III-7. Continued**

Items	Strata 3		Strata 4		Strata 5	
	Urban	Rural	Urban	Rural	Urban	Rural
	Average					
Food Expenditure (Rupiah)	274189.40	216261.91	366914.63	285368.70	556394.16	434238.22
Total Expenditure (Rupiah)	2117058.52	1432543.79	3058124.03	1978706.74	6609825.38	3831358.18
Household Size	4.01	4.14	4.32	4.42	4.77	4.83
Age of Household Head (years)	44.63	45.22	45.29	45.17	46.72	45.67
Education of household head (year)	9.57	7.08	10.69	7.74	12.43	9.03
	Percentage					
Gender of Household Head						
Male	88.08	90.05	89.30	92.04	91.35	94.19
Female	11.92	9.95	10.70	7.96	8.65	5.81
Married of Household Head						
Married	94.61	98.38	96.12	98.75	97.66	99.10
Unmarried	5.39	1.62	3.88	1.25	2.34	0.90
66 Region 1 (Sumatra)	29.23	32.17	30.70	37.95	27.70	41.49
Region 2 (Java)	41.66	23.85	35.33	17.25	34.73	12.21
Region 3 (Bali and its archipelago)	5.86	8.74	5.56	7.31	6.24	6.32
Region 4 (Kalimantan)	9.49	10.36	11.97	13.22	13.62	16.22
Region 5 (Sulawesi)	9.16	16.14	9.43	14.74	10.12	14.13
Region 6 (Papua and its Archipelago)	4.59	8.75	7.01	9.54	7.59	9.63

Note: Summary statistics are calculated with a simple average.

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011.



**Table III-8. Parameters of the AIDS Model, Food Demand, First-Stage Demand, Indonesia, 2011**

	All areas		Urban Areas							
			All		Stratum 1		Stratum 2		Stratum 3	
	Food	T-stat	Food	T-stat	Food	T-stat	Food	T-stat	Food	T-stat
Constant	1.532	571.61	1.542	362.86	1.205	66.15	1.219	23.59	1.466	26.67
Area	-0.019	-57.80	-	-	-	-	-	-	-	-
Region 1 (Sumatra)	0.012	17.31	0.021	16.64	0.002	0.31	0.011	3.00	0.020	6.28
Region 2 (Java)	-0.001	-2.22	0.008	7.16	0.006	2.36	0.012	4.56	0.008	3.13
Region 4 (Kalimantan)	0.020	28.43	0.022	19.72	0.017	5.28	0.020	7.23	0.023	8.86
Region 5 (Sulawesi)	0.025	42.81	0.032	32.41	0.022	9.44	0.031	13.02	0.034	14.67
Region 6 (Papua)	-0.003	-5.76	0.007	7.74	0.001	0.57	0.008	3.53	0.012	5.51
Quarter 2	-0.001	-1.63	-0.001	-1.45	-0.002	-1.33	-0.001	-0.71	0.000	-0.08
Quarter 3	-0.016	-45.07	-0.016	-29.68	-0.015	-10.85	-0.020	-14.31	-0.022	-16.30
Household size	0.015	167.80	0.014	107.55	0.014	29.78	0.015	32.87	0.013	31.36
Age of household head	0.000	-41.68	-0.001	-36.83	0.000	-8.43	-0.001	-14.83	-0.001	-18.50
Education of household head	-0.003	-66.61	-0.003	-48.81	-0.005	-27.31	-0.005	-24.04	-0.004	-23.28
Gender	0.028	65.15	0.031	49.60	0.040	30.39	0.036	22.71	0.033	20.20
Price of foods	-0.101	-166.62	-0.109	-117.01	-0.064	-20.51	-0.059	-7.43	-0.092	-9.59
Price of non-foods	0.101	166.62	0.109	117.01	0.064	20.51	0.059	7.43	0.092	9.59
Linear log of expenditure	-0.141	-329.76	-0.141	-206.96	-0.079	-32.17	-0.086	-13.11	-0.125	-16.49

Source: estimated

**Table III-8. Continued**

	Urban Areas				Rural Areas			
	Stratum 4		Stratum 5		All		Stratum 1	
	Food	T-stat	Food	T-stat	Food	T-stat	Food	T-stat
Constant	1.603	36.92	1.846	130.32	1.498	419.16	0.974	57.24
Area	-	-	-	-	-	-	-	-
Region 1 (Sumatra)	0.020	7.38	0.022	9.10	0.008	9.06	-0.010	-4.31
Region 2 (Java)	0.010	3.70	0.010	4.26	-0.006	-7.57	-0.013	-6.81
Region 4 (Kalimantan)	0.024	9.30	0.020	9.01	0.018	21.17	0.006	2.25
Region 5 (Sulawesi)	0.036	15.38	0.026	12.84	0.022	29.41	0.010	5.40
Region 6 (Papua)	0.008	3.74	0.004	1.82	-0.011	-14.26	-0.026	-14.62
Quarter 2	-0.002	-1.75	-0.003	-2.70	0.000	-0.80	-0.006	-4.52
Quarter 3	-0.020	-15.88	-0.011	-10.41	-0.016	-34.11	-0.018	-14.40
Household size	0.013	35.68	0.014	56.76	0.015	128.15	0.010	20.85
Age of household head	-0.001	-16.48	-0.001	-13.00	0.000	-22.33	0.000	-0.95
Education of household head	-0.003	-21.96	-0.001	-9.31	-0.003	-44.05	-0.003	-15.75
Gender	0.026	15.92	0.014	8.91	0.025	43.29	0.030	24.72
Price of foods	-0.114	-14.45	-0.160	-55.53	-0.093	-115.02	-0.021	-7.85
Price of non-foods	0.114	14.45	0.160	55.53	0.093	115.02	0.021	7.85
Linear log of expenditure	-0.149	-23.91	-0.200	-89.27	-0.139	-254.51	-0.047	-21.59

Source: estimated

**Table III-8. Continued**

	Rural Areas							
	Stratum 2		Stratum 3		Stratum 4		Stratum 5	
	Food	T-stat	Food	T-stat	Food	T-stat	Food	T-stat
Constant	1.177	25.37	1.234	22.72	1.420	31.49	2.025	177.02
Area	-	-	-	-	-	-	-	-
Region 1 (Sumatra)	0.001	0.60	0.006	2.88	0.019	9.47	0.018	9.58
Region 2 (Java)	-0.009	-5.32	-0.008	-4.38	0.000	0.10	0.002	1.06
Region 4 (Kalimantan)	0.010	4.57	0.014	6.43	0.023	11.32	0.025	14.64
Region 5 (Sulawesi)	0.015	9.06	0.022	12.27	0.031	17.23	0.024	15.10
Region 6 (Papua)	-0.021	-12.48	-0.015	-8.01	0.000	-0.23	-0.010	-5.42
Quarter 2	0.002	1.54	0.000	0.07	-0.002	-1.59	-0.003	-3.73
Quarter 3	-0.014	-12.69	-0.019	-16.18	-0.021	-18.91	-0.016	-17.74
Household size	0.014	35.29	0.015	35.29	0.014	40.75	0.014	66.37
Age of household head	0.000	-10.68	0.000	-7.59	0.000	-8.84	0.000	-8.47
Education of household head	-0.003	-20.00	-0.003	-20.45	-0.003	-22.28	-0.002	-15.96
Gender	0.024	18.13	0.022	15.22	0.018	11.96	0.012	7.97
Price of foods	-0.042	-5.65	-0.048	-5.48	-0.075	-9.31	-0.189	-73.06
Price of non-foods	0.042	5.65	0.048	5.48	0.075	9.31	0.189	73.06
Linear log of expenditure	-0.081	-13.68	-0.094	-13.56	-0.128	-20.96	-0.245	-116.28

Source: estimated

**Table III-9. Misspecification Test for the AIDS, Food Demand, the First-Stage Demand, Indonesia, 2011**

Hypotheses Test	Areas			Strata 1		Strata 2	
	All	Urban	Rural	Urban	Rural	Urban	Rural
Normality							
Kolmogorov-Smirnov	0.02***	0.01***	0.03***	0.03***	0.05***	0.02***	0.05***
Mardia Skewness	1020***	2.51***	1955***	217.4***	1458***	89.33***	1308***
Mardia Kurtosis	21.62***	10.01***	20.36***	13.6***	17.78***	6.67***	20.77***
Henze-Zirkler T	14.33***	7.36***	14.72***	8.92***	11.88***	7.01***	11.48***
Homoscedasticity							
White's Test	15443***	5189***	11631***	1613***	1847***	1371***	2019***

Note:

- (1)The normality test for an individual equation and all equations in the system was performed with Kolmogorov-Smirnov and Mardia Skewness, Mardia Kurtosis and Henze Zirkler respectively.
- (2)The homoscedasticity test was conducted with the white's test.
- (3) Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-9. Continued**

Hypotheses Test	Strata 3		Strata 4		Strata 5	
	Urban	Rural	Urban	Rural	Urban	Rural
Normality						
Kolmogorov-Smirnov	0.01***	0.04***	0.01***	0.03***	0.03***	0.01***
Mardia Skewness	54.57***	737***	0.82***	390.6***	457.1***	42.77***
Mardia Kurtosis	2.75***	11.83***	-0.7***	6.21***	8.82***	1.52***
Henze-Zirkler T	5.47***	10.34***	0.93***	8.47***	7.45***	2.15***
Homoscedasticity						
White's Test	987***	1679***	949.7***	1473***	713.8***	1143***

Note:

- (1) The normality test for an individual equation and all equations in the system was performed with Kolmogorov-Smirnov and Mardia Skewness, Mardia Kurtosis and Henze Zirkler respectively.
- (2) The homoscedasticity test was conducted with the white's test.
- (3) Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-10. Marshallian Price and Expenditure Elasticities, the AIDS Model, First-Stage Demand, Indonesia, 2011**

	All Areas		Urban Areas					
	Food	Non-food	All		Stratum 1		Stratum 2	
			Food	Non-food	Food	Non-food	Food	Non-food
Food	-0.911***	0.148***	-0.916***	-0.097***	-0.982***	0.111***	-0.944***	0.092***
	-908.8	153.9	-537.2	-49.5	-280.6	23.1	-242.4	8.7
Non-food	-0.131***	-1.216***	0.179***	-1.207***	-0.028***	-1.174***	-0.078***	-1.129***
	-89.1	-865.2	110.5	-644.9	-5.2	-156.0	-14.4	-75.8
Expenditure	0.763***	1.347***	0.736***	1.304***	0.870***	1.202***	0.852***	1.208***
	1061.2	1280.2	577.8	887.9	216.2	191.5	75.5	76.2

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively

**Table III-10. Continued**

	Urban Areas						Rural Areas	
	Stratum 3		Stratum 4		Stratum 5		All	
	Food	Non-food	Food	Non-food	Food	Non-food	Food	Non-food
Food	-0.922***	0.145***	-0.896***	0.184***	-0.860***	0.353***	-0.895***	0.115***
	-231.7	11.6	-213.0	16.0	-167.5	48.2	-692.9	92.1
Non-food	-0.099***	-1.184***	-0.112***	-1.198***	-0.096***	-1.242***	-0.183***	-1.200***
	-19.6	-74.8	-24.8	-97.0	-27.2	-247.3	-81.2	-553.6
Expenditure	0.777***	1.283***	0.712***	1.310***	0.507***	1.337***	0.781***	1.382***
	57.5	74.8	59.0	101.0	91.9	353.9	905.3	920.4

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively

**Table III-10. Continued**

	Rural Areas									
	Stratum 1		Stratum 2		Stratum 3		Stratum 4		Stratum 5	
	Food	Non-food	Food	Non-food	Food	Non-food	Food	Non-food	Food	Non-food
Food	-0.965***	0.034***	-0.930***	0.051***	-0.919***	0.063***	-0.893***	0.097***	-0.787***	0.241***
	-357.4	9.5	-311.7	6.1	-310.9	6.4	-293.9	10.6	-221.9	54.1
Non-food	-0.075***	-1.073***	-0.142***	-1.104***	-0.154***	-1.120***	-0.180***	-1.164***	-0.250***	-1.283***
	-13.0	-140.9	-23.3	-64.6	-27.2	-60.1	-35.1	-75.1	-59.9	-245.5
Expenditure	0.931***	1.148***	0.879***	1.247***	0.857***	1.273***	0.796***	1.344***	0.547***	1.532***
	290.5	167.9	99.7	69.2	81.0	63.2	81.9	81.9	140.3	334.7

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively



**Table III-11. Parameters of the QUAIDS Model, Second-Stage Demand, All Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.8238	599.33	-0.0580	-49.56	-0.0613	-46.96	-0.0770	-67.04	0.1384	104.33
Area	-0.0275	-93.73	-0.0031	-13.01	0.0000	0.01	0.0012	5.93	-0.0022	-9.24
Region 1 (Sumatra)	-0.0456	-104.04	0.0450	95.55	-0.0122	-37.01	0.0200	55.35	0.0094	28.03
Region 2 (Java)	-0.0487	-117.07	-0.0155	-36.54	-0.0069	-21.61	0.0172	49.36	-0.0003	-0.98
Region 4 (Kalimantan)	-0.0561	-92.48	0.0658	111.22	-0.0065	-15.99	0.0181	39.74	-0.0103	-23.58
Region 5 (Sulawesi)	-0.0593	-114.32	0.0845	162.45	-0.0102	-24.30	0.0095	25.02	-0.0092	-24.17
Region 6 (Papua)	-0.0366	-80.94	0.0359	77.30	-0.0046	-11.17	-0.0009	-2.34	0.0198	53.71
Quarter 2	0.0104	42.11	0.0004	1.73	-0.0005	-2.69	0.0010	5.08	-0.0061	-28.95
Quarter 3	0.0108	41.92	0.0003	1.25	0.0021	11.61	-0.0002	-0.86	-0.0105	-48.59
Household size	0.0153	178.88	0.0011	14.08	0.0010	22.21	0.0035	63.38	-0.0060	-104.27
Age of household head	-0.0002	-28.62	0.0001	8.37	0.0001	21.57	-0.0003	-43.10	0.0000	3.24
Education of household head	-0.0017	-50.80	0.0003	10.53	0.0000	-0.26	0.0002	10.64	-0.0004	-13.32
Gender	0.0263	66.79	0.0040	13.53	0.0029	10.99	0.0067	26.27	0.0006	2.42
Price of cereals	0.0010	3.12	0.0062	41.38	0.0052	34.99	-0.0021	-14.88	-0.0156	-78.87
Price of fish	0.0062	41.38	0.0128	76.13	0.0029	34.15	-0.0020	-21.42	-0.0021	-18.22
Price of meat	0.0052	34.99	0.0029	34.15	-0.0161	-107.34	0.0001	1.00	0.0000	0.11
Price of eggs and milk	-0.0021	-14.88	-0.0020	-21.42	0.0001	1.00	0.0005	4.57	0.0020	19.40
Price of vegetables	-0.0156	-78.87	-0.0021	-18.22	0.0000	0.11	0.0020	19.40	0.0224	110.99
Price of fruits	-0.0069	-40.83	0.0007	7.04	0.0010	9.17	-0.0009	-11.21	0.0005	3.73
Price of oils and fats	0.0063	34.38	-0.0039	-37.20	0.0031	29.40	-0.0005	-5.15	-0.0018	-13.04
Price of prepared food and drink	0.0030	18.07	-0.0072	-59.28	0.0055	58.04	-0.0025	-23.64	-0.0048	-41.21
Price of other foods	-0.0110	-87.27	0.0000	0.48	-0.0001	-1.73	0.0007	11.38	-0.0003	-3.32
Price of tobacco	0.0139	87.10	-0.0075	-71.44	-0.0016	-15.77	0.0047	52.30	-0.0002	-1.45
Linear log of expenditure	-0.1299	-291.92	0.0312	91.49	0.0258	85.73	0.0210	70.30	0.0151	36.99
Quadratic log of expenditure	0.0046	101.70	-0.0029	-81.12	-0.0015	-46.72	-0.0013	-40.29	-0.0031	-65.94
$\Theta$ (cdf)	0.0058	12.42	0.0082	17.96	0.0155	45.35	0.0020	5.32	-0.0115	-27.41
$\Phi$ (pdf)	0.2714	314.93	0.0407	95.48	0.0270	78.29	0.0453	133.07	-0.0048	-6.33

Source: estimated

**Table III-11. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	-0.0579	-51.52	-0.1278	-111.10	-0.0164	-16.00	0.0386	35.86	-0.0117	-9.95
Area	-0.0070	-37.81	-0.0053	-27.72	0.0534	190.18	-0.0020	-15.76	-0.0099	-54.50
Region 1 (Sumatra)	0.0038	12.00	0.0231	71.16	-0.0514	-118.84	0.0050	20.36	0.0062	20.63
Region 2 (Java)	-0.0054	-17.52	0.0417	134.94	0.0116	37.33	0.0105	43.01	-0.0032	-12.27
Region 4 (Kalimantan)	-0.0081	-20.51	0.0144	34.35	-0.0189	-29.32	0.0166	60.03	-0.0087	-23.03
Region 5 (Sulawesi)	0.0035	9.61	0.0096	26.14	-0.0338	-64.03	0.0086	32.48	0.0058	17.17
Region 6 (Papua)	0.0161	47.23	-0.0004	-1.16	-0.0288	-81.41	0.0030	10.71	-0.0053	-19.19
Quarter 2	-0.0004	-2.20	0.0029	16.08	0.0032	19.50	-0.0181	-122.36	0.0073	47.45
Quarter 3	-0.0026	-14.13	-0.0006	-3.31	-0.0086	-48.37	0.0004	3.36	0.0114	128.10
Household size	0.0015	30.37	0.0000	-0.22	-0.0152	-187.39	0.0000	-0.22	0.0001	3.96
Age of household head	0.0001	12.32	0.0002	41.19	0.0005	81.40	-0.0001	-22.74	-0.0003	-62.03
Education of household head	0.0004	18.10	0.0003	12.42	0.0039	158.20	0.0000	2.92	-0.0026	-117.30
Gender	0.0030	12.38	0.0034	14.71	-0.0918	-331.17	-0.0001	-0.87	0.0489	104.72
Price of cereals	-0.0069	-40.83	0.0063	34.38	0.0030	18.07	-0.0110	-87.27	0.0139	87.10
Price of fish	0.0007	7.04	-0.0039	-37.20	-0.0072	-59.28	0.0000	0.48	-0.0075	-71.44
Price of meat	0.0010	9.17	0.0031	29.40	0.0055	58.04	-0.0001	-1.73	-0.0016	-15.77
Price of eggs and milk	-0.0009	-11.21	-0.0005	-5.15	-0.0025	-23.64	0.0007	11.38	0.0047	52.30
Price of vegetables	0.0005	3.73	-0.0018	-13.04	-0.0048	-41.21	-0.0003	-3.32	-0.0002	-1.45
Price of fruits	0.0034	22.41	-0.0018	-14.16	0.0016	14.47	0.0010	12.90	0.0015	11.93
Price of oils and fats	-0.0018	-14.16	0.0048	21.78	-0.0130	-107.74	0.0029	32.71	0.0038	28.54
Price of prepared food and drink	0.0016	14.47	-0.0130	-107.74	0.0273	163.66	-0.0068	-87.24	-0.0032	-28.73
Price of other foods	0.0010	12.90	0.0029	32.71	-0.0068	-87.24	0.0126	141.10	0.0010	11.92
Price of tobacco	0.0015	11.93	0.0038	28.54	-0.0032	-28.73	0.0010	11.92	-0.0124	-70.92
Linear log of expenditure	0.0142	47.09	0.0575	176.38	0.0710	243.55	0.0086	25.65	0.0145	48.22
Quadratic log of expenditure	-0.0001	-3.48	-0.0073	-202.19	-0.0018	-53.17	-0.0014	-40.56	0.0008	29.64
$\Theta$ (cdf)	0.0056	15.99	-0.0099	-28.31	0.0168	43.47	-0.0022	-8.95	-0.0029	-9.15
$\Phi$ (pdf)	0.0371	112.80	0.1112	188.72	0.2060	560.23	0.0683	131.54	0.0815	191.43

Source: estimated

**Table III-12. Parameters of the QUAIDS Model, Second-Stage Demand, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	-0.1629	-70.03	0.0733	39.65	0.1656	131.42	0.1319	69.19	0.0977	39.58
Region 1 (Sumatra)	-0.0122	-15.22	0.0476	76.90	-0.0170	-48.64	-0.0135	-29.37	0.0154	27.08
Region 2 (Java)	0.0107	16.48	0.0674	114.72	-0.0302	-88.88	-0.0139	-30.67	-0.0011	-2.09
Region 4 (Kalimantan)	-0.0029	-4.24	0.0433	72.63	-0.0130	-38.68	0.0019	3.89	-0.0040	-7.12
Region 5 (Sulawesi)	-0.0078	-14.69	0.0347	73.20	-0.0179	-62.49	0.0019	4.97	0.0073	15.47
Region 6 (Papua)	-0.0215	-43.62	-0.0146	-35.62	-0.0089	-32.92	0.0091	24.84	-0.0097	-21.79
Quarter 2	0.0160	51.67	-0.0013	-6.47	-0.0002	-1.85	-0.0006	-2.70	-0.0047	-18.46
Quarter 3	0.0153	47.84	-0.0005	-2.38	0.0016	12.51	-0.0015	-7.20	-0.0064	-24.12
Household size	0.0327	289.34	0.0044	45.37	-0.0001	-3.30	-0.0001	-1.23	0.0071	67.89
Age of household head	0.0008	82.00	-0.0001	-19.09	0.0002	43.03	-0.0005	-70.36	0.0003	30.02
Education of household head	0.0002	5.24	-0.0005	-17.43	0.0006	37.70	-0.0004	-13.41	-0.0003	-10.58
Gender	-0.0018	-4.95	-0.0004	-1.24	-0.0020	-10.23	0.0030	10.32	-0.0058	-18.54
Price of cereals	0.0629	196.65	0.0016	10.37	0.0030	32.24	-0.0068	-48.56	-0.0070	-31.08
Price of fish	0.0016	10.37	0.0001	0.90	0.0016	26.30	-0.0006	-7.55	-0.0046	-38.49
Price of meat	-0.0068	-48.56	-0.0006	-7.55	0.0023	49.06	0.0030	30.96	-0.0005	-4.47
Price of eggs and milk	-0.0070	-31.08	-0.0046	-38.49	-0.0004	-5.50	-0.0005	-4.47	0.0162	67.93
Price of vegetables	-0.0035	-21.92	0.0033	37.33	0.0016	24.38	0.0013	18.87	0.0000	0.04
Price of fruits	0.0086	31.32	-0.0021	-16.00	-0.0025	-26.81	-0.0018	-14.92	-0.0030	-14.79
Price of oils and fats	-0.0485	-270.79	0.0053	50.90	0.0031	52.34	0.0027	23.85	-0.0051	-39.93
Price of prepared food and drink	-0.0096	-59.82	0.0007	9.12	0.0020	38.26	-0.0010	-14.67	0.0032	28.97
Price of other foods	-0.0005	-4.43	-0.0054	-70.20	-0.0017	-21.31	0.0014	28.88	0.0012	13.74
Price of tobacco	0.0030	32.24	0.0016	26.30	-0.0089	-92.71	0.0023	49.06	-0.0004	-5.50
Linear log of expenditure	0.0232	31.46	0.0144	27.36	-0.0363	-96.43	0.0022	4.03	-0.0060	-7.87
Quadratic log of expenditure	-0.0009	-11.44	-0.0028	-55.88	0.0026	70.85	-0.0027	-55.93	0.0002	2.52
$\Theta$ (cdf)	-0.0176	-36.10	0.0172	52.45	0.0047	21.88	0.0125	37.01	0.0005	1.09
$\Phi$ (pdf)	0.0697	178.24	0.0614	186.50	0.0388	139.05	0.0756	221.31	0.0341	52.10

Source: estimated

**Table III-12. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.2976	198.83	0.0520	18.42	0.0353	19.38	0.1308	56.35	0.1682	119.41
Region 1 (Sumatra)	0.0150	33.19	-0.0012	-2.08	-0.0451	-92.03	0.0088	18.56	0.0041	14.67
Region 2 (Java)	0.0034	7.80	0.0009	1.78	-0.0474	-95.61	0.0079	19.41	0.0001	0.51
Region 4 (Kalimantan)	-0.0126	-28.78	0.0059	10.86	-0.0217	-48.41	0.0112	26.27	-0.0107	-43.19
Region 5 (Sulawesi)	-0.0039	-10.45	0.0076	17.07	-0.0305	-87.82	0.0017	4.69	0.0058	25.74
Region 6 (Papua)	-0.0052	-14.70	0.0187	45.34	0.0266	84.84	0.0058	16.88	-0.0033	-16.54
Quarter 2	-0.0012	-6.66	0.0042	17.04	0.0027	17.57	-0.0167	-81.64	0.0018	19.18
Quarter 3	-0.0016	-8.94	0.0019	7.52	-0.0126	-79.03	0.0019	10.83	0.0020	25.24
Household size	-0.0053	-88.07	0.0062	63.75	-0.0474	-363.68	0.0015	20.66	0.0009	46.81
Age of household head	-0.0001	-8.37	0.0004	42.85	-0.0005	-62.37	-0.0001	-19.66	-0.0003	-74.52
Education of household head	0.0007	28.66	0.0001	2.47	0.0034	108.36	-0.0003	-14.80	-0.0033	-171.25
Gender	-0.0030	-11.59	-0.0032	-10.63	-0.0250	-65.90	-0.0033	-14.43	0.0392	135.57
Price of cereals	-0.0035	-21.92	0.0086	31.32	-0.0485	-270.79	-0.0096	-59.82	-0.0005	-4.43
Price of fish	0.0033	37.33	-0.0021	-16.00	0.0053	50.90	0.0007	9.12	-0.0054	-70.20
Price of meat	0.0013	18.87	-0.0018	-14.92	0.0027	23.85	-0.0010	-14.67	0.0014	28.88
Price of eggs and milk	0.0000	0.04	-0.0030	-14.79	-0.0051	-39.93	0.0032	28.97	0.0012	13.74
Price of vegetables	0.0007	5.66	-0.0040	-26.94	0.0059	54.60	-0.0023	-28.46	-0.0030	-39.73
Price of fruits	-0.0040	-26.94	0.0081	24.47	-0.0081	-53.17	0.0045	34.24	0.0003	2.62
Price of oils and fats	0.0059	54.60	-0.0081	-53.17	0.0495	248.27	-0.0042	-32.72	-0.0006	-8.38
Price of prepared food and drink	-0.0023	-28.46	0.0045	34.24	-0.0042	-32.72	0.0103	84.97	-0.0036	-62.64
Price of other foods	-0.0030	-39.73	0.0003	2.62	-0.0006	-8.38	-0.0036	-62.64	0.0120	105.78
Price of tobacco	0.0016	24.38	-0.0025	-26.81	0.0031	52.34	0.0020	38.26	-0.0017	-21.31
Linear log of expenditure	-0.0637	-127.20	-0.0123	-14.06	0.1280	301.55	-0.0214	-30.39	-0.0206	-59.80
Quadratic log of expenditure	0.0034	69.31	0.0010	11.70	-0.0046	-118.40	0.0012	18.03	0.0008	25.32
Θ (cdf)	0.0130	43.98	-0.0011	-2.07	-0.0411	-150.42	0.0092	26.36	0.0070	38.94
Φ (pdf)	0.0534	228.29	0.0191	21.47	0.3922	638.10	0.0388	89.58	0.0834	179.83

Source: estimated

**Table III-13. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 1, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1934	36.83	0.2245	59.42	0.0840	26.97	0.0754	22.39	0.3113	57.06
Region 1 (Sumatra)	0.0058	1.18	0.0322	10.42	-0.0026	-0.43	-0.0106	-4.55	0.0040	1.40
Region 2 (Java)	-0.0275	-13.67	0.0710	51.31	-0.0039	-2.13	-0.0140	-13.91	-0.0273	-17.77
Region 4 (Kalimantan)	-0.0203	-7.50	0.0451	28.23	-0.0075	-4.17	0.0057	4.24	-0.0232	-11.40
Region 5 (Sulawesi)	-0.0316	-19.69	0.0244	21.40	0.0041	3.64	0.0063	6.85	-0.0026	-1.82
Region 6 (Papua)	-0.0376	-27.07	-0.0071	-7.73	-0.0135	-13.42	0.0088	10.39	-0.0057	-4.44
Quarter 2	0.0081	9.00	-0.0009	-1.73	0.0002	0.29	0.0003	0.48	-0.0049	-6.32
Quarter 3	0.0100	10.35	0.0009	1.62	0.0050	8.13	-0.0011	-2.04	-0.0142	-17.36
Household size	0.0364	69.17	-0.0013	-3.96	0.0006	2.26	0.0003	0.95	-0.0040	-9.51
Age of household head	0.0005	17.81	-0.0002	-10.83	0.0001	7.71	-0.0003	-19.20	0.0000	-0.81
Education of household head	0.0010	8.62	-0.0001	-1.25	0.0005	6.51	0.0007	9.57	0.0004	4.13
Gender	-0.0330	-31.27	-0.0058	-8.63	-0.0082	-11.97	-0.0009	-1.45	-0.0088	-10.15
Price of cereals	0.0478	57.49	-0.0055	-12.26	-0.0009	-2.67	-0.0009	-2.21	-0.0136	-20.96
Price of fish	-0.0055	-12.26	0.0029	8.51	-0.0014	-8.12	0.0016	9.55	-0.0021	-7.38
Price of meat	-0.0009	-2.67	-0.0014	-8.12	-0.0053	-12.60	0.0013	8.36	-0.0016	-6.39
Price of eggs and milk	-0.0009	-2.21	0.0016	9.55	0.0013	8.36	-0.0078	-27.64	0.0029	9.60
Price of vegetables	-0.0136	-20.96	-0.0021	-7.38	-0.0016	-6.39	0.0029	9.60	0.0103	15.07
Price of fruits	-0.0014	-3.10	0.0021	11.07	0.0025	10.56	-0.0016	-8.18	0.0007	2.14
Price of oils and fats	0.0123	15.47	-0.0009	-2.55	-0.0029	-8.98	-0.0004	-1.20	-0.0117	-19.47
Price of prepared food and drink	-0.0243	-48.22	0.0002	0.88	0.0044	21.53	0.0011	4.04	0.0118	30.50
Price of other foods	-0.0177	-41.32	0.0046	24.76	0.0019	10.43	0.0011	6.38	-0.0003	-0.79
Price of tobacco	0.0043	13.01	-0.0016	-9.98	0.0020	7.23	0.0027	17.32	0.0036	12.73
Linear log of expenditure	-0.0334	-22.24	-0.0381	-39.43	-0.0189	-24.04	-0.0038	-4.49	-0.0423	-24.65
Quadratic log of expenditure	0.0021	14.13	0.0016	18.22	0.0017	23.63	-0.0006	-8.52	0.0019	11.00
$\Theta$ (cdf)	-0.0236	-15.89	0.0160	15.85	-0.0006	-0.58	0.0076	7.59	0.0293	18.36
$\Phi$ (pdf)	0.0865	65.56	0.0585	67.01	0.0086	11.19	0.0330	44.64	0.0385	14.82

Source: estimated

**Table III-13. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1191	38.07	-0.0662	-10.28	-0.1476	-29.22	0.0974	20.91	0.1135	31.84
Region 1 (Sumatra)	-0.0065	-2.59	-0.0042	-1.42	-0.0229	-6.21	0.0038	1.86	0.0055	3.65
Region 2 (Java)	-0.0032	-2.91	-0.0093	-6.00	0.0371	19.18	-0.0057	-4.80	-0.0127	-17.82
Region 4 (Kalimantan)	-0.0097	-7.15	0.0097	4.88	0.0068	2.97	0.0073	5.36	-0.0154	-19.09
Region 5 (Sulawesi)	-0.0021	-2.12	0.0095	6.62	0.0105	7.71	-0.0066	-6.13	-0.0039	-6.87
Region 6 (Papua)	0.0004	0.45	0.0344	28.34	0.0021	1.96	0.0100	10.20	0.0013	2.40
Quarter 2	0.0011	1.99	0.0065	8.66	0.0073	13.97	-0.0181	-31.37	0.0020	6.48
Quarter 3	0.0016	3.09	0.0008	1.00	-0.0004	-0.73	0.0007	1.41	0.0017	6.35
Household size	-0.0025	-11.64	0.0042	10.05	-0.0341	-48.66	-0.0011	-4.33	0.0014	21.80
Age of household head	0.0000	1.69	0.0003	11.70	0.0000	-0.45	-0.0002	-14.94	0.0000	1.40
Education of household head	0.0005	8.14	0.0004	3.64	-0.0018	-23.35	0.0003	4.74	-0.0015	-35.08
Gender	0.0026	4.15	-0.0054	-6.47	0.0246	24.61	-0.0048	-8.60	0.0402	46.12
Price of cereals	-0.0014	-3.10	0.0123	15.47	-0.0243	-48.22	-0.0177	-41.32	0.0043	13.01
Price of fish	0.0021	11.07	-0.0009	-2.55	0.0002	0.88	0.0046	24.76	-0.0016	-9.98
Price of meat	0.0025	10.56	-0.0029	-8.98	0.0044	21.53	0.0019	10.43	0.0020	7.23
Price of eggs and milk	-0.0016	-8.18	-0.0004	-1.20	0.0011	4.04	0.0011	6.38	0.0027	17.32
Price of vegetables	0.0007	2.14	-0.0117	-19.47	0.0118	30.50	-0.0003	-0.79	0.0036	12.73
Price of fruits	-0.0109	-29.40	0.0010	2.41	0.0042	15.33	0.0018	8.71	0.0016	7.13
Price of oils and fats	0.0010	2.41	0.0028	2.77	-0.0003	-0.48	0.0000	0.07	0.0001	0.31
Price of prepared food and drink	0.0042	15.33	-0.0003	-0.48	-0.0005	-1.04	-0.0031	-8.95	0.0064	29.61
Price of other foods	0.0018	8.71	0.0000	0.07	-0.0031	-8.95	0.0114	32.82	0.0001	0.36
Price of tobacco	0.0016	7.13	0.0001	0.31	0.0064	29.61	0.0001	0.36	-0.0192	-51.37
Linear log of expenditure	-0.0342	-42.62	0.0450	23.02	0.1458	144.40	-0.0042	-2.99	-0.0252	-30.69
Quadratic log of expenditure	0.0026	34.42	-0.0046	-23.97	-0.0045	-60.35	-0.0005	-3.76	0.0013	19.86
Θ (cdf)	0.0062	6.97	0.0012	0.73	-0.0581	-52.38	0.0058	5.09	0.0087	13.54
Φ (pdf)	0.0350	49.34	0.0453	15.75	0.4703	356.12	0.0402	31.22	0.0638	63.97

Source: estimated

**Table III-14. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 2, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1585	45.36	0.2064	74.18	0.0442	33.81	0.0614	31.21	0.3214	101.06
Region 1 (Sumatra)	0.0140	13.86	0.0111	13.37	0.0040	7.76	-0.0199	-40.34	0.0126	12.37
Region 2 (Java)	-0.0002	-0.17	0.0357	41.36	-0.0002	-0.46	-0.0082	-16.74	-0.0174	-17.31
Region 4 (Kalimantan)	-0.0085	-9.15	0.0273	31.13	0.0003	0.75	0.0048	8.00	-0.0141	-13.72
Region 5 (Sulawesi)	-0.0246	-31.12	0.0203	29.35	-0.0035	-11.09	0.0056	12.09	-0.0071	-8.30
Region 6 (Papua)	-0.0255	-37.22	-0.0095	-18.70	-0.0012	-4.17	0.0172	37.39	-0.0132	-17.20
Quarter 2	0.0133	32.38	-0.0001	-0.40	-0.0002	-0.99	0.0004	1.69	-0.0063	-13.93
Quarter 3	0.0073	16.35	0.0008	2.77	0.0004	2.44	-0.0012	-4.86	-0.0078	-16.42
Household size	0.0286	109.23	0.0007	4.01	-0.0006	-10.38	-0.0002	-2.05	-0.0030	-14.19
Age of household head	0.0004	27.32	-0.0001	-6.76	0.0001	20.01	-0.0002	-28.42	-0.0001	-3.38
Education of household head	0.0019	33.64	0.0000	-0.30	0.0006	25.83	0.0001	4.25	-0.0001	-1.20
Gender	-0.0197	-34.01	-0.0091	-20.31	-0.0082	-33.10	-0.0035	-9.50	-0.0076	-13.86
Price of cereals	0.0435	85.04	0.0018	8.03	-0.0014	-9.78	-0.0012	-5.63	-0.0121	-35.09
Price of fish	0.0018	8.03	-0.0018	-11.18	-0.0003	-4.15	-0.0005	-4.83	-0.0026	-14.80
Price of meat	-0.0014	-9.78	-0.0003	-4.15	-0.0023	-12.17	0.0013	23.17	-0.0007	-8.01
Price of eggs and milk	-0.0012	-5.63	-0.0005	-4.83	0.0013	23.17	-0.0049	-36.26	0.0015	9.16
Price of vegetables	-0.0121	-35.09	-0.0026	-14.80	-0.0007	-8.01	0.0015	9.16	0.0075	18.97
Price of fruits	-0.0006	-3.03	0.0004	4.62	0.0026	33.86	-0.0004	-4.76	-0.0004	-2.69
Price of oils and fats	-0.0004	-0.84	0.0012	4.91	-0.0016	-14.59	0.0015	7.08	-0.0069	-18.10
Price of prepared food and drink	-0.0105	-32.88	0.0029	16.22	0.0028	34.36	-0.0006	-3.92	0.0105	44.35
Price of other foods	-0.0154	-59.64	0.0035	25.63	0.0013	19.72	0.0010	10.99	0.0018	8.64
Price of tobacco	-0.0038	-22.61	-0.0046	-45.16	-0.0016	-18.98	0.0022	26.35	0.0015	12.90
Linear log of expenditure	-0.0343	-38.95	-0.0309	-45.59	-0.0092	-27.54	0.0008	1.61	-0.0584	-64.67
Quadratic log of expenditure	0.0018	19.39	0.0011	17.75	0.0007	21.99	-0.0008	-16.97	0.0042	44.40
$\Theta$ (cdf)	-0.0003	-0.49	0.0179	35.33	0.0025	9.23	0.0062	15.91	0.0087	10.22
$\Phi$ (pdf)	0.0662	97.62	0.0520	82.22	0.0055	15.09	0.0362	62.86	0.0254	31.47

Source: estimated

**Table III-14. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1209	64.48	-0.0551	-13.72	-0.0629	-20.54	0.0923	28.22	0.0889	44.90
Region 1 (Sumatra)	-0.0013	-2.50	-0.0099	-7.56	-0.0015	-2.24	0.0004	0.47	-0.0095	-25.28
Region 2 (Java)	0.0043	7.78	-0.0102	-8.99	0.0054	6.85	0.0051	6.48	-0.0091	-23.48
Region 4 (Kalimantan)	-0.0061	-12.01	-0.0015	-1.24	-0.0085	-10.58	0.0110	12.35	-0.0053	-15.70
Region 5 (Sulawesi)	0.0029	6.19	0.0009	1.01	0.0084	13.81	0.0002	0.26	0.0000	0.10
Region 6 (Papua)	0.0098	22.84	0.0150	17.37	0.0018	3.45	0.0099	15.32	0.0002	0.61
Quarter 2	0.0001	0.23	0.0053	11.01	0.0035	14.66	-0.0152	-39.16	-0.0007	-5.30
Quarter 3	-0.0016	-7.04	0.0029	5.58	-0.0040	-15.16	0.0028	7.51	0.0007	6.29
Household size	-0.0015	-19.41	0.0031	15.58	-0.0268	-100.24	-0.0011	-6.89	0.0009	30.09
Age of household head	-0.0001	-13.87	0.0002	14.51	0.0001	6.20	-0.0002	-14.31	-0.0002	-30.91
Education of household head	-0.0006	-15.67	0.0001	1.39	0.0000	0.28	-0.0003	-7.21	-0.0021	-64.37
Gender	0.0149	35.33	0.0007	1.25	0.0095	13.92	0.0000	0.06	0.0323	63.67
Price of cereals	-0.0006	-3.03	-0.0004	-0.84	-0.0105	-32.88	-0.0154	-59.64	-0.0038	-22.61
Price of fish	0.0004	4.62	0.0012	4.91	0.0029	16.22	0.0035	25.63	-0.0046	-45.16
Price of meat	0.0026	33.86	-0.0016	-14.59	0.0028	34.36	0.0013	19.72	-0.0016	-18.98
Price of eggs and milk	-0.0004	-4.76	0.0015	7.08	-0.0006	-3.92	0.0010	10.99	0.0022	26.35
Price of vegetables	-0.0004	-2.69	-0.0069	-18.10	0.0105	44.35	0.0018	8.64	0.0015	12.90
Price of fruits	-0.0069	-43.22	0.0002	0.89	0.0019	14.23	0.0015	14.45	0.0016	12.65
Price of oils and fats	0.0002	0.89	0.0066	10.55	-0.0052	-17.09	0.0030	11.19	0.0017	10.39
Price of prepared food and drink	0.0019	14.23	-0.0052	-17.09	-0.0005	-1.89	-0.0027	-10.83	0.0012	10.33
Price of other foods	0.0015	14.45	0.0030	11.19	-0.0027	-10.83	0.0074	33.57	-0.0015	-14.68
Price of tobacco	0.0016	12.65	0.0017	10.39	0.0012	10.33	-0.0015	-14.68	0.0033	19.89
Linear log of expenditure	-0.0401	-84.27	0.0433	35.86	0.1551	269.92	-0.0097	-10.56	-0.0186	-45.25
Quadratic log of expenditure	0.0034	79.61	-0.0051	-39.52	-0.0064	-146.91	0.0004	5.01	0.0009	25.80
$\Theta$ (cdf)	0.0051	13.31	-0.0020	-1.99	-0.0591	-106.64	0.0091	13.30	0.0089	33.50
$\Phi$ (pdf)	0.0452	84.05	0.0544	51.22	0.1869	156.60	0.0292	44.72	0.0585	71.02

Source: estimated



**Table III-15. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 3, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1628	40.99	0.1572	53.46	0.0457	28.32	0.0758	32.77	0.1170	31.30
Region 1 (Sumatra)	0.0170	17.58	0.0314	34.01	0.0021	3.78	-0.0218	-36.35	0.0150	16.54
Region 2 (Java)	0.0004	0.39	0.0612	64.07	0.0002	0.35	-0.0113	-16.92	-0.0054	-5.60
Region 4 (Kalimantan)	-0.0101	-11.41	0.0377	43.48	0.0011	2.74	0.0030	4.02	-0.0071	-7.76
Region 5 (Sulawesi)	-0.0198	-27.67	0.0348	50.50	-0.0023	-7.11	0.0034	6.07	0.0027	3.38
Region 6 (Papua)	-0.0332	-48.09	-0.0097	-16.28	-0.0009	-3.14	0.0167	30.12	-0.0127	-16.96
Quarter 2	0.0126	29.24	0.0000	-0.06	0.0001	0.50	-0.0007	-2.58	-0.0035	-8.21
Quarter 3	0.0080	18.77	-0.0015	-4.92	0.0012	8.68	-0.0030	-11.43	-0.0043	-9.79
Household size	0.0244	116.54	-0.0005	-3.15	-0.0003	-7.78	0.0023	21.78	0.0029	16.51
Age of household head	0.0005	29.78	-0.0001	-10.44	0.0000	10.34	-0.0003	-34.93	0.0001	8.17
Education of household head	-0.0003	-5.83	-0.0002	-4.70	0.0003	15.39	-0.0010	-26.01	-0.0007	-12.30
Gender	-0.0064	-12.47	0.0015	4.22	-0.0023	-11.19	0.0073	20.20	0.0034	6.15
Price of cereals	0.0360	74.98	0.0012	4.85	0.0010	7.05	0.0003	1.79	-0.0102	-27.84
Price of fish	0.0012	4.85	-0.0021	-11.46	-0.0012	-15.21	-0.0020	-16.88	-0.0004	-2.16
Price of meat	0.0010	7.05	-0.0012	-15.21	-0.0038	-23.53	0.0013	22.44	0.0003	3.50
Price of eggs and milk	0.0003	1.79	-0.0020	-16.88	0.0013	22.44	-0.0019	-15.10	0.0016	10.23
Price of vegetables	-0.0102	-27.84	-0.0004	-2.16	0.0003	3.50	0.0016	10.23	0.0177	44.68
Price of fruits	-0.0012	-5.12	0.0019	16.20	0.0008	9.92	0.0004	4.16	-0.0009	-5.40
Price of oils and fats	0.0072	16.68	0.0005	2.09	0.0019	16.50	-0.0012	-5.70	-0.0040	-11.35
Price of prepared food and drink	-0.0167	-47.29	0.0055	31.32	0.0018	20.90	-0.0017	-10.24	-0.0072	-30.79
Price of other foods	-0.0129	-46.57	0.0007	4.84	-0.0007	-11.12	0.0024	23.25	0.0034	16.87
Price of tobacco	-0.0047	-32.21	-0.0041	-47.61	-0.0014	-13.31	0.0008	12.76	-0.0003	-2.89
Linear log of expenditure	-0.0454	-38.16	-0.0161	-18.95	-0.0093	-17.76	0.0036	4.98	-0.0023	-1.92
Quadratic log of expenditure	0.0029	23.24	0.0008	9.23	0.0007	13.51	-0.0019	-26.78	-0.0011	-7.77
$\Theta$ (cdf)	0.0053	7.72	0.0112	20.36	0.0033	12.58	0.0133	29.44	0.0109	13.35
$\Phi$ (pdf)	0.0650	99.21	0.0484	80.00	0.0095	23.28	0.0570	86.55	0.0550	68.08

Source: estimated

**Table III-15. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1418	62.26	0.0172	3.72	0.1060	29.08	0.0952	26.21	0.0900	61.51
Region 1 (Sumatra)	-0.0078	-12.97	-0.0039	-4.00	-0.0336	-40.75	0.0095	11.57	-0.0074	-23.86
Region 2 (Java)	0.0001	0.12	-0.0002	-0.16	-0.0459	-45.23	0.0110	14.36	0.0001	0.28
Region 4 (Kalimantan)	-0.0084	-13.04	0.0042	4.32	-0.0304	-35.55	0.0150	18.95	-0.0038	-15.30
Region 5 (Sulawesi)	-0.0013	-2.32	0.0049	5.93	-0.0278	-39.01	0.0053	8.09	0.0044	19.16
Region 6 (Papua)	0.0089	17.42	0.0131	16.56	0.0146	23.44	0.0089	13.98	-0.0004	-1.79
Quarter 2	0.0003	1.00	0.0057	12.74	-0.0001	-0.36	-0.0134	-37.43	-0.0005	-4.80
Quarter 3	-0.0009	-3.32	0.0027	6.13	-0.0037	-14.46	0.0014	4.24	-0.0005	-5.08
Household size	-0.0014	-15.73	0.0038	23.84	-0.0324	-126.46	0.0001	1.01	0.0012	48.59
Age of household head	0.0000	1.89	0.0002	14.27	-0.0002	-14.60	-0.0001	-9.27	-0.0002	-32.28
Education of household head	0.0007	19.33	-0.0002	-3.54	0.0038	81.40	-0.0002	-5.70	-0.0022	-89.97
Gender	0.0008	2.07	0.0004	0.69	-0.0240	-55.95	-0.0015	-3.52	0.0201	80.40
Price of cereals	-0.0012	-5.12	0.0072	16.68	-0.0167	-47.29	-0.0129	-46.57	-0.0047	-32.21
Price of fish	0.0019	16.20	0.0005	2.09	0.0055	31.32	0.0007	4.84	-0.0041	-47.61
Price of meat	0.0008	9.92	0.0019	16.50	0.0018	20.90	-0.0007	-11.12	-0.0014	-13.31
Price of eggs and milk	0.0004	4.16	-0.0012	-5.70	-0.0017	-10.24	0.0024	23.25	0.0008	12.76
Price of vegetables	-0.0009	-5.40	-0.0040	-11.35	-0.0072	-30.79	0.0034	16.87	-0.0003	-2.89
Price of fruits	0.0017	10.00	-0.0028	-11.81	0.0012	7.76	0.0014	11.21	-0.0025	-29.60
Price of oils and fats	-0.0028	-11.81	0.0087	15.59	-0.0116	-40.41	0.0027	10.58	-0.0013	-10.66
Price of prepared food and drink	0.0012	7.76	-0.0116	-40.41	0.0325	70.80	-0.0007	-2.85	-0.0031	-32.88
Price of other foods	0.0014	11.21	0.0027	10.58	-0.0007	-2.85	0.0076	35.86	-0.0038	-56.41
Price of tobacco	-0.0025	-29.60	-0.0013	-10.66	-0.0031	-32.88	-0.0038	-56.41	0.0204	106.75
Linear log of expenditure	-0.0450	-62.28	0.0030	1.90	0.1297	179.68	-0.0141	-12.43	-0.0168	-42.27
Quadratic log of expenditure	0.0037	51.86	-0.0006	-3.52	-0.0057	-91.39	0.0009	8.10	0.0014	35.17
$\Theta$ (cdf)	0.0089	17.92	0.0001	0.11	-0.0610	-112.10	0.0068	11.94	0.0033	16.16
$\Phi$ (pdf)	0.0642	110.59	0.0342	31.00	0.1780	189.02	0.0222	35.79	0.0480	90.15

Source: estimated

**Table III-16. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 4, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1360	35.56	0.1409	51.52	0.0215	15.84	0.0594	23.54	0.0683	19.27
Region 1 (Sumatra)	0.0058	7.30	0.0231	37.83	0.0011	3.33	-0.0157	-37.47	0.0072	9.12
Region 2 (Java)	-0.0059	-6.44	0.0402	57.56	-0.0016	-3.94	-0.0002	-0.30	-0.0097	-11.04
Region 4 (Kalimantan)	-0.0056	-7.10	0.0233	35.52	-0.0027	-8.27	0.0155	25.43	-0.0074	-9.02
Region 5 (Sulawesi)	-0.0152	-22.46	0.0272	49.50	-0.0016	-5.51	0.0113	24.22	-0.0001	-0.08
Region 6 (Papua)	-0.0212	-31.05	-0.0070	-15.62	0.0005	1.81	0.0159	30.68	-0.0123	-17.57
Quarter 2	0.0105	29.11	0.0006	2.35	0.0003	3.51	-0.0017	-9.25	-0.0061	-16.22
Quarter 3	0.0040	10.32	0.0020	7.93	0.0005	5.67	-0.0005	-2.45	-0.0021	-5.44
Household size	0.0159	109.03	0.0029	26.71	-0.0001	-2.71	0.0014	18.23	0.0026	20.79
Age of household head	0.0004	24.90	0.0001	9.53	0.0000	2.26	-0.0001	-14.72	0.0001	6.15
Education of household head	-0.0003	-5.20	-0.0002	-6.99	-0.0001	-4.61	0.0001	4.39	-0.0006	-12.02
Gender	-0.0055	-12.55	0.0081	30.17	0.0006	3.95	0.0056	25.41	0.0048	10.30
Price of cereals	0.0355	93.87	-0.0019	-9.96	-0.0010	-12.60	0.0022	16.66	-0.0086	-31.16
Price of fish	-0.0019	-9.96	0.0035	26.69	0.0009	15.98	-0.0001	-1.12	0.0039	25.23
Price of meat	-0.0010	-12.60	0.0009	15.98	-0.0018	-21.91	0.0002	6.04	0.0011	15.96
Price of eggs and milk	0.0022	16.66	-0.0001	-1.12	0.0002	6.04	0.0002	2.46	0.0007	5.29
Price of vegetables	-0.0086	-31.16	0.0039	25.23	0.0011	15.96	0.0007	5.29	0.0111	32.52
Price of fruits	0.0016	9.49	0.0000	-0.06	-0.0004	-8.51	0.0007	9.20	-0.0024	-15.19
Price of oils and fats	0.0031	9.12	0.0012	6.48	0.0012	13.43	-0.0017	-11.16	-0.0036	-11.29
Price of prepared food and drink	-0.0093	-37.12	-0.0079	-45.46	0.0001	1.12	-0.0028	-21.27	-0.0088	-41.32
Price of other foods	-0.0182	-71.93	0.0019	12.13	-0.0004	-7.37	0.0008	7.55	0.0063	32.76
Price of tobacco	-0.0033	-47.56	-0.0015	-34.74	0.0002	2.64	-0.0001	-2.57	0.0003	5.98
Linear log of expenditure	-0.0162	-13.14	-0.0224	-28.44	-0.0055	-11.52	0.0032	3.74	0.0064	5.14
Quadratic log of expenditure	-0.0013	-10.07	0.0015	17.89	0.0006	12.11	-0.0017	-18.62	-0.0008	-5.90
$\Theta$ (cdf)	0.0194	35.93	0.0117	30.09	0.0003	1.58	0.0137	39.05	0.0013	2.04
$\Phi$ (pdf)	0.0854	138.50	0.0575	108.49	0.0030	9.66	0.0520	77.55	0.0269	36.40

Source: estimated

**Table III-16. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0715	24.52	0.0650	14.11	0.2955	79.08	0.1266	34.61	0.0316	34.27
Region 1 (Sumatra)	-0.0075	-15.38	-0.0102	-12.53	-0.0079	-14.22	0.0053	8.02	-0.0010	-7.37
Region 2 (Java)	0.0011	1.41	-0.0049	-5.60	-0.0272	-31.85	0.0111	15.69	0.0012	7.82
Region 4 (Kalimantan)	-0.0046	-8.58	0.0002	0.22	-0.0302	-36.26	0.0132	18.21	0.0001	0.72
Region 5 (Sulawesi)	0.0012	2.38	0.0004	0.55	-0.0312	-54.67	0.0086	15.08	0.0024	20.99
Region 6 (Papua)	0.0059	11.91	0.0093	12.63	-0.0007	-1.03	0.0114	19.96	0.0013	12.89
Quarter 2	0.0000	0.16	0.0018	4.65	0.0081	37.36	-0.0137	-42.90	0.0001	2.47
Quarter 3	-0.0016	-8.14	0.0018	4.43	-0.0071	-31.89	0.0023	7.32	0.0004	7.04
Household size	-0.0003	-5.83	0.0028	24.78	-0.0250	-215.03	-0.0003	-3.05	0.0003	25.07
Age of household head	0.0001	19.50	0.0003	18.68	-0.0008	-61.83	0.0000	-1.14	-0.0001	-18.98
Education of household head	0.0007	29.05	-0.0002	-3.25	0.0012	35.10	-0.0003	-7.78	-0.0005	-49.84
Gender	-0.0020	-7.81	0.0047	9.18	-0.0204	-63.40	0.0012	3.08	0.0033	35.83
Price of cereals	0.0016	9.49	0.0031	9.12	-0.0093	-37.12	-0.0182	-71.93	-0.0033	-47.56
Price of fish	0.0000	-0.06	0.0012	6.48	-0.0079	-45.46	0.0019	12.13	-0.0015	-34.74
Price of meat	-0.0004	-8.51	0.0012	13.43	0.0001	1.12	-0.0004	-7.37	0.0002	2.64
Price of eggs and milk	0.0007	9.20	-0.0017	-11.16	-0.0028	-21.27	0.0008	7.55	-0.0001	-2.57
Price of vegetables	-0.0024	-15.19	-0.0036	-11.29	-0.0088	-41.32	0.0063	32.76	0.0003	5.98
Price of fruits	0.0019	15.82	-0.0029	-15.16	0.0008	6.06	0.0012	11.21	-0.0005	-12.30
Price of oils and fats	-0.0029	-15.16	0.0063	13.53	-0.0092	-45.37	0.0054	21.70	0.0002	2.81
Price of prepared food and drink	0.0008	6.06	-0.0092	-45.37	0.0388	104.83	-0.0017	-7.50	0.0001	1.64
Price of other foods	0.0012	11.21	0.0054	21.70	-0.0017	-7.50	0.0061	23.80	-0.0015	-34.50
Price of tobacco	-0.0005	-12.30	0.0002	2.81	0.0001	1.64	-0.0015	-34.50	0.0061	69.43
Linear log of expenditure	-0.0123	-11.70	-0.0174	-10.16	0.0941	103.62	-0.0320	-27.40	-0.0089	-28.09
Quadratic log of expenditure	0.0006	5.90	0.0016	8.85	-0.0032	-38.96	0.0029	26.97	0.0007	23.15
$\Theta$ (cdf)	0.0061	16.53	0.0010	1.42	-0.0616	-141.02	0.0084	16.35	0.0019	17.58
$\Phi$ (pdf)	0.0417	76.37	0.0461	50.54	0.2037	252.67	0.0023	4.32	0.0096	54.49

Source: estimated

**Table III-17. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 5, Urban Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0766	17.38	0.1294	40.22	0.0471	27.67	0.0770	17.71	0.1303	35.33
Region 1 (Sumatra)	0.0059	6.52	0.0202	25.27	-0.0131	-27.49	-0.0094	-11.69	0.0112	14.60
Region 2 (Java)	-0.0103	-12.16	0.0393	44.16	-0.0166	-33.65	-0.0002	-0.22	-0.0095	-11.72
Region 4 (Kalimantan)	-0.0120	-14.69	0.0213	29.46	-0.0058	-12.00	0.0098	9.49	-0.0068	-8.63
Region 5 (Sulawesi)	-0.0172	-25.17	0.0218	37.80	-0.0051	-13.04	0.0044	6.04	-0.0018	-2.70
Region 6 (Papua)	-0.0244	-36.19	-0.0018	-3.84	0.0003	0.79	0.0131	16.68	-0.0067	-10.07
Quarter 2	0.0106	25.95	-0.0022	-8.18	0.0000	-0.29	-0.0008	-2.21	-0.0045	-13.51
Quarter 3	0.0116	26.15	-0.0012	-4.28	0.0008	6.37	-0.0019	-5.23	-0.0062	-16.46
Household size	0.0089	78.58	0.0031	31.63	0.0007	16.97	0.0031	27.54	0.0015	15.71
Age of household head	0.0002	14.12	0.0001	5.27	0.0000	9.79	-0.0002	-12.65	0.0001	8.90
Education of household head	-0.0001	-2.58	0.0003	9.36	0.0001	5.98	0.0001	1.59	-0.0002	-3.88
Gender	-0.0058	-10.32	0.0059	16.61	0.0016	9.30	0.0062	13.99	0.0007	1.34
Price of cereals	0.0317	75.23	-0.0044	-21.26	0.0012	10.94	0.0009	4.88	-0.0078	-22.92
Price of fish	-0.0044	-21.26	0.0055	34.19	0.0017	28.17	-0.0007	-6.25	0.0017	9.64
Price of meat	0.0012	10.94	0.0017	28.17	-0.0046	-47.90	-0.0005	-9.58	0.0007	8.79
Price of eggs and milk	0.0009	4.88	-0.0007	-6.25	-0.0005	-9.58	0.0018	11.37	-0.0004	-2.46
Price of vegetables	-0.0078	-22.92	0.0017	9.64	0.0007	8.79	-0.0004	-2.46	0.0107	30.85
Price of fruits	0.0004	1.71	-0.0003	-2.29	0.0002	2.74	0.0010	10.24	-0.0020	-10.46
Price of oils and fats	0.0035	7.96	-0.0016	-8.48	-0.0006	-6.26	-0.0005	-3.18	-0.0027	-9.70
Price of prepared food and drink	-0.0120	-31.47	-0.0015	-6.48	-0.0003	-3.96	-0.0018	-10.77	-0.0036	-14.47
Price of other foods	-0.0101	-33.25	0.0022	13.61	0.0017	21.16	0.0001	0.65	0.0033	17.35
Price of tobacco	-0.0033	-40.76	-0.0025	-46.01	0.0005	7.24	-0.0001	-1.82	0.0000	0.16
Linear log of expenditure	0.0019	1.27	-0.0181	-18.43	-0.0067	-12.59	0.0056	4.26	-0.0128	-9.36
Quadratic log of expenditure	-0.0015	-9.37	0.0007	6.80	0.0006	11.64	-0.0017	-12.90	0.0000	-0.19
$\Theta$ (cdf)	-0.0023	-4.29	0.0146	35.81	0.0007	3.71	0.0131	25.92	0.0127	23.39
$\Phi$ (pdf)	0.0755	118.54	0.0536	94.33	0.0171	44.32	0.0597	70.82	0.0507	67.66

Source: estimated

**Table III-17. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1007	30.49	0.1264	26.44	0.1449	34.24	0.1193	30.29	0.0510	39.66
Region 1 (Sumatra)	-0.0130	-21.03	-0.0017	-2.40	-0.0041	-5.20	0.0032	4.82	0.0009	4.39
Region 2 (Java)	-0.0041	-5.09	-0.0042	-5.66	0.0038	3.86	0.0020	3.02	0.0025	12.73
Region 4 (Kalimantan)	-0.0003	-0.48	-0.0019	-2.46	-0.0094	-9.50	0.0062	9.58	0.0003	1.71
Region 5 (Sulawesi)	-0.0002	-0.40	-0.0024	-3.66	0.0004	0.56	-0.0009	-1.63	0.0033	22.73
Region 6 (Papua)	0.0048	8.98	0.0089	14.58	0.0027	3.35	0.0046	8.44	0.0008	5.66
Quarter 2	-0.0018	-6.71	0.0019	5.17	0.0085	30.33	-0.0124	-38.96	0.0007	9.34
Quarter 3	-0.0005	-1.91	-0.0011	-2.92	-0.0012	-4.06	-0.0005	-1.59	0.0002	2.35
Household size	-0.0002	-2.08	0.0006	6.34	-0.0179	-123.30	0.0002	2.87	0.0002	13.78
Age of household head	0.0001	6.85	0.0001	8.93	-0.0003	-17.92	-0.0001	-6.20	-0.0001	-22.62
Education of household head	0.0011	30.46	0.0001	1.63	-0.0005	-10.44	0.0000	-0.54	-0.0006	-42.33
Gender	-0.0005	-1.40	-0.0006	-1.18	-0.0107	-28.35	0.0008	2.15	0.0031	24.52
Price of cereals	0.0004	1.71	0.0035	7.96	-0.0120	-31.47	-0.0101	-33.25	-0.0033	-40.76
Price of fish	-0.0003	-2.29	-0.0016	-8.48	-0.0015	-6.48	0.0022	13.61	-0.0025	-46.01
Price of meat	0.0002	2.74	-0.0006	-6.26	-0.0003	-3.96	0.0017	21.16	0.0005	7.24
Price of eggs and milk	0.0010	10.24	-0.0005	-3.18	-0.0018	-10.77	0.0001	0.65	-0.0001	-1.82
Price of vegetables	-0.0020	-10.46	-0.0027	-9.70	-0.0036	-14.47	0.0033	17.35	0.0000	0.16
Price of fruits	0.0024	14.55	-0.0026	-11.57	0.0028	14.46	-0.0006	-4.14	-0.0013	-27.79
Price of oils and fats	-0.0026	-11.57	0.0028	6.27	0.0004	1.56	0.0020	9.21	-0.0008	-9.47
Price of prepared food and drink	0.0028	14.46	0.0004	1.56	0.0168	43.60	-0.0016	-6.48	0.0009	14.55
Price of other foods	-0.0006	-4.14	0.0020	9.21	-0.0016	-6.48	0.0057	24.75	-0.0027	-47.50
Price of tobacco	-0.0013	-27.79	-0.0008	-9.47	0.0009	14.55	-0.0027	-47.50	0.0094	80.85
Linear log of expenditure	-0.0111	-10.82	-0.0314	-18.02	0.1010	100.47	-0.0251	-20.24	-0.0099	-26.15
Quadratic log of expenditure	-0.0004	-3.63	0.0028	15.49	-0.0023	-25.43	0.0018	15.27	0.0005	12.40
$\Theta$ (cdf)	0.0106	29.81	0.0041	7.42	-0.0703	-167.67	0.0136	33.89	0.0045	36.81
$\Phi$ (pdf)	0.0619	121.85	0.0008	0.88	0.2228	309.95	0.0143	26.35	0.0143	56.54

Source: estimated

**Table III-18. Parameters of the QUAIDS Model, Second-Stage Demand, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.8357	428.83	-0.1997	-125.61	-0.0650	-36.99	-0.0430	-29.89	0.1397	64.69
Region 1 (Sumatra)	-0.0416	-73.73	0.0341	57.92	-0.0090	-21.39	0.0112	28.03	0.0118	24.96
Region 2 (Java)	-0.0729	-133.81	-0.0194	-41.09	-0.0091	-21.64	0.0137	34.94	-0.0056	-11.38
Region 4 (Kalimantan)	-0.0530	-67.27	0.0641	84.89	-0.0022	-4.37	0.0089	17.99	-0.0077	-12.51
Region 5 (Sulawesi)	-0.0543	-86.91	0.0779	122.43	-0.0034	-6.49	0.0062	15.34	-0.0115	-21.94
Region 6 (Papua)	-0.0406	-73.10	0.0429	82.17	-0.0075	-15.67	-0.0016	-4.17	0.0245	48.69
Quarter 2	0.0124	38.81	0.0002	0.75	-0.0002	-0.99	0.0008	3.96	-0.0059	-20.11
Quarter 3	0.0111	32.46	0.0002	0.62	0.0021	8.83	-0.0001	-0.27	-0.0095	-31.55
Household size	0.0167	158.58	-0.0020	-21.98	0.0009	16.13	0.0005	8.77	-0.0060	-79.05
Age of household head	-0.0003	-27.02	0.0000	-1.25	0.0001	12.01	-0.0003	-40.92	0.0001	5.55
Education of household head	-0.0017	-40.46	0.0002	4.97	0.0001	3.70	0.0000	1.66	-0.0001	-2.96
Gender	0.0325	69.38	-0.0021	-6.22	-0.0014	-4.08	0.0018	6.64	-0.0011	-2.94
Price of cereals	0.0069	17.67	0.0064	31.63	0.0055	30.11	-0.0018	-9.93	-0.0195	-75.97
Price of fish	0.0064	31.63	0.0061	32.58	0.0034	35.33	-0.0015	-14.80	-0.0010	-6.93
Price of meat	0.0055	30.11	0.0034	35.33	-0.0225	-122.27	0.0004	4.60	0.0004	3.11
Price of eggs and milk	-0.0018	-9.93	-0.0015	-14.80	0.0004	4.60	-0.0052	-38.04	0.0020	15.94
Price of vegetables	-0.0195	-75.97	-0.0010	-6.93	0.0004	3.11	0.0020	15.94	0.0234	86.29
Price of fruits	-0.0015	-7.05	0.0016	14.77	0.0032	25.38	-0.0003	-2.72	0.0019	12.10
Price of oils and fats	0.0026	10.81	-0.0043	-32.33	0.0047	37.14	0.0005	4.54	-0.0014	-7.41
Price of prepared food and drink	0.0005	2.35	-0.0081	-55.25	0.0049	42.93	0.0002	1.55	-0.0071	-44.33
Price of other foods	-0.0124	-84.50	-0.0004	-4.37	-0.0005	-6.50	0.0010	13.14	-0.0001	-0.76
Price of tobacco	0.0133	65.86	-0.0024	-21.56	0.0004	2.96	0.0046	47.73	0.0014	9.19
Linear log of expenditure	-0.0984	-180.93	0.0671	156.76	0.0127	31.29	0.0114	33.14	0.0178	28.97
Quadratic log of expenditure	0.0013	26.82	-0.0052	-120.53	0.0008	21.28	0.0000	0.95	-0.0032	-52.24
$\Theta$ (cdf)	0.0007	1.23	0.0065	12.22	0.0085	19.17	-0.0026	-6.15	-0.0076	-12.82
$\Phi$ (pdf)	0.2565	273.12	0.0327	71.06	0.0448	101.29	0.0324	88.54	0.0457	44.72

Source: estimated

**Table III-18. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0094	7.10	-0.1681	-96.07	-0.0622	-40.35	0.0834	51.01	-0.0799	-51.78
Region 1 (Sumatra)	-0.0008	-2.19	0.0248	54.48	-0.0319	-48.08	0.0037	11.67	0.0012	3.79
Region 2 (Java)	-0.0064	-18.26	0.0443	100.76	0.0486	93.80	0.0082	25.91	-0.0031	-10.44
Region 4 (Kalimantan)	-0.0131	-28.98	0.0141	24.38	-0.0114	-12.40	0.0173	49.41	-0.0127	-30.31
Region 5 (Sulawesi)	-0.0007	-1.75	0.0095	18.90	-0.0211	-30.72	0.0081	24.79	-0.0009	-2.50
Region 6 (Papua)	0.0174	47.56	0.0091	18.61	-0.0511	-88.01	0.0032	9.07	0.0013	4.16
Quarter 2	0.0004	1.83	0.0035	13.46	0.0006	2.59	-0.0176	-90.62	0.0063	34.89
Quarter 3	-0.0031	-14.82	-0.0008	-2.98	-0.0070	-27.57	-0.0001	-0.82	0.0098	77.18
Household size	-0.0001	-1.96	-0.0019	-25.81	-0.0059	-66.22	-0.0007	-13.80	-0.0004	-17.48
Age of household head	0.0000	-2.34	0.0001	18.47	0.0006	80.81	-0.0001	-23.31	-0.0002	-34.84
Education of household head	0.0000	0.49	0.0006	19.15	0.0026	72.04	0.0001	6.52	-0.0017	-68.37
Gender	0.0000	0.11	-0.0045	-14.12	-0.0668	-201.67	-0.0020	-9.02	0.0530	113.33
Price of cereals	-0.0015	-7.05	0.0026	10.81	0.0005	2.35	-0.0124	-84.50	0.0133	65.86
Price of fish	0.0016	14.77	-0.0043	-32.33	-0.0081	-55.25	-0.0004	-4.37	-0.0024	-21.56
Price of meat	0.0032	25.38	0.0047	37.14	0.0049	42.93	-0.0005	-6.50	0.0004	2.96
Price of eggs and milk	-0.0003	-2.72	0.0005	4.54	0.0002	1.55	0.0010	13.14	0.0046	47.73
Price of vegetables	0.0019	12.10	-0.0014	-7.41	-0.0071	-44.33	-0.0001	-0.76	0.0014	9.19
Price of fruits	-0.0078	-43.77	-0.0002	-1.03	0.0018	13.37	0.0008	8.47	0.0005	3.90
Price of oils and fats	-0.0002	-1.03	0.0032	10.98	-0.0117	-71.00	0.0028	23.48	0.0038	25.42
Price of prepared food and drink	0.0018	13.37	-0.0117	-71.00	0.0241	124.89	-0.0051	-51.35	0.0005	4.35
Price of other foods	0.0008	8.47	0.0028	23.48	-0.0051	-51.35	0.0130	116.48	0.0009	9.78
Price of tobacco	0.0005	3.90	0.0038	25.42	0.0005	4.35	0.0009	9.78	-0.0230	-121.60
Linear log of expenditure	-0.0091	-26.93	0.0644	134.61	0.0540	130.85	-0.0039	-8.12	0.0182	48.48
Quadratic log of expenditure	0.0023	69.51	-0.0068	-130.11	-0.0015	-32.68	0.0001	2.31	0.0006	18.02
$\Theta$ (cdf)	0.0004	0.92	-0.0128	-25.17	0.0311	53.52	-0.0052	-15.38	0.0042	10.53
$\Phi$ (pdf)	0.0349	101.38	0.1173	148.15	0.1518	311.66	0.0886	133.21	0.0815	194.20

Source: estimated



**Table III-19. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 1, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.4174	99.84	0.1072	33.06	0.1619	46.21	0.0471	20.37	0.1262	26.65
Region 1 (Sumatra)	-0.0898	-51.33	0.0395	25.51	-0.0358	-23.81	0.0102	9.79	0.0089	6.40
Region 2 (Java)	-0.1298	-82.97	-0.0114	-8.51	-0.0229	-18.64	0.0154	16.40	-0.0154	-11.97
Region 4 (Kalimantan)	-0.1430	-59.61	0.1000	46.22	-0.0335	-15.96	0.0094	6.55	-0.0307	-14.40
Region 5 (Sulawesi)	-0.0847	-51.25	0.0937	58.99	-0.0353	-18.17	0.0025	2.40	-0.0152	-10.48
Region 6 (Papua)	0.0142	7.38	0.0160	9.63	-0.0336	-25.84	-0.0158	-15.08	0.0341	21.44
Quarter 2	0.0072	7.26	-0.0021	-2.49	-0.0015	-1.56	-0.0002	-0.29	-0.0020	-2.28
Quarter 3	0.0031	2.91	0.0000	-0.03	0.0081	8.97	-0.0013	-2.01	-0.0106	-11.31
Household size	0.0251	60.27	-0.0050	-14.27	-0.0051	-15.25	-0.0005	-2.05	-0.0100	-29.13
Age of household head	-0.0003	-9.87	-0.0001	-2.55	0.0001	4.95	-0.0002	-11.25	0.0000	0.55
Education of household head	-0.0033	-23.01	0.0003	2.64	0.0018	15.96	-0.0007	-8.75	0.0001	1.22
Gender	-0.0162	-14.99	-0.0123	-12.27	-0.0068	-6.02	-0.0016	-2.16	-0.0018	-1.99
Price of cereals	0.0550	60.48	-0.0059	-11.73	0.0044	7.83	-0.0047	-10.17	-0.0197	-29.97
Price of fish	-0.0059	-11.73	-0.0023	-4.66	0.0028	9.62	0.0017	7.55	-0.0006	-1.57
Price of meat	0.0044	7.83	0.0028	9.62	-0.0325	-47.02	0.0003	0.93	0.0009	2.24
Price of eggs and milk	-0.0047	-10.17	0.0017	7.55	0.0003	0.93	-0.0119	-32.55	0.0010	2.82
Price of vegetables	-0.0197	-29.97	-0.0006	-1.57	0.0009	2.24	0.0010	2.82	0.0233	31.66
Price of fruits	-0.0052	-10.16	0.0051	19.86	0.0045	11.67	0.0015	6.68	0.0021	5.08
Price of oils and fats	-0.0066	-10.48	0.0008	2.40	0.0056	15.74	0.0022	7.53	-0.0038	-7.76
Price of prepared food and drink	-0.0011	-2.06	-0.0030	-7.60	0.0096	29.55	0.0043	13.71	-0.0050	-10.74
Price of other foods	-0.0132	-35.61	-0.0001	-0.45	0.0014	5.57	-0.0005	-2.57	0.0001	0.41
Price of tobacco	-0.0029	-5.60	0.0014	4.81	0.0029	6.91	0.0060	23.05	0.0018	4.01
Linear log of expenditure	-0.0535	-24.38	-0.0011	-0.78	-0.0406	-17.66	0.0066	5.17	0.0246	8.90
Quadratic log of expenditure	0.0068	29.09	-0.0012	-7.23	0.0012	4.60	-0.0014	-9.53	-0.0015	-5.06
$\Theta$ (cdf)	-0.0524	-27.13	0.0609	37.22	0.0385	12.91	0.0095	6.60	-0.0277	-13.41
$\Phi$ (pdf)	0.1258	71.61	0.0721	69.89	0.0486	24.08	0.0290	33.01	0.0816	35.43

Source: estimated

**Table III-19. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0792	33.66	0.1110	28.46	0.0135	3.42	0.0092	2.31	0.1659	56.04
Region 1 (Sumatra)	-0.0039	-3.74	0.0285	19.51	0.0447	19.95	-0.0028	-3.32	-0.0109	-9.55
Region 2 (Java)	-0.0001	-0.15	0.0587	45.20	0.1040	58.89	0.0057	7.34	-0.0040	-3.99
Region 4 (Kalimantan)	-0.0084	-5.68	0.0071	3.28	0.1052	35.41	0.0141	14.52	-0.0246	-14.53
Region 5 (Sulawesi)	-0.0039	-3.69	-0.0016	-1.00	0.0435	19.82	0.0047	5.58	-0.0191	-16.18
Region 6 (Papua)	0.0144	12.61	-0.0036	-2.08	-0.0754	-38.64	-0.0040	-3.89	-0.0146	-13.05
Quarter 2	-0.0005	-0.83	0.0043	5.28	0.0086	9.32	-0.0161	-30.83	0.0018	3.11
Quarter 3	-0.0021	-3.17	-0.0011	-1.31	0.0065	7.15	-0.0011	-2.34	0.0051	12.75
Household size	-0.0015	-6.12	-0.0041	-12.23	-0.0012	-3.25	-0.0020	-10.37	0.0007	17.19
Age of household head	0.0000	0.48	0.0000	0.20	0.0007	25.17	-0.0002	-14.15	-0.0001	-5.86
Education of household head	0.0000	-0.48	0.0010	8.44	0.0040	32.60	0.0001	1.42	-0.0013	-16.24
Gender	0.0000	-0.06	-0.0097	-11.33	-0.0038	-3.28	-0.0045	-9.08	0.0643	49.58
Price of cereals	-0.0052	-10.16	-0.0066	-10.48	-0.0011	-2.06	-0.0132	-35.61	-0.0029	-5.60
Price of fish	0.0051	19.86	0.0008	2.40	-0.0030	-7.60	-0.0001	-0.45	0.0014	4.81
Price of meat	0.0045	11.67	0.0056	15.74	0.0096	29.55	0.0014	5.57	0.0029	6.91
Price of eggs and milk	0.0015	6.68	0.0022	7.53	0.0043	13.71	-0.0005	-2.57	0.0060	23.05
Price of vegetables	0.0021	5.08	-0.0038	-7.76	-0.0050	-10.74	0.0001	0.41	0.0018	4.01
Price of fruits	-0.0179	-34.64	0.0022	5.79	0.0003	0.92	-0.0004	-1.49	0.0077	22.12
Price of oils and fats	0.0022	5.79	-0.0014	-1.92	-0.0052	-11.75	0.0031	10.22	0.0033	8.44
Price of prepared food and drink	0.0003	0.92	-0.0052	-11.75	0.0001	0.21	-0.0013	-4.50	0.0012	3.59
Price of other foods	-0.0004	-1.49	0.0031	10.22	-0.0013	-4.50	0.0117	42.08	-0.0009	-3.34
Price of tobacco	0.0077	22.12	0.0033	8.44	0.0012	3.59	-0.0009	-3.34	-0.0204	-33.94
Linear log of expenditure	-0.0329	-26.96	-0.0211	-11.05	-0.0252	-14.65	0.0426	19.94	-0.0806	-56.17
Quadratic log of expenditure	0.0027	18.36	0.0005	2.48	0.0071	38.52	-0.0045	-20.98	0.0071	49.96
$\Theta$ (cdf)	0.0289	21.40	-0.0086	-4.52	-0.0246	-12.74	-0.0061	-5.13	0.0477	35.50
$\Phi$ (pdf)	0.0357	48.28	0.1595	91.58	0.1668	135.64	0.0986	67.48	0.0864	64.52

Source: estimated

**Table III-20. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 2, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.2881	71.84	0.1353	50.54	0.1318	62.49	0.0515	31.85	0.1297	31.15
Region 1 (Sumatra)	-0.0580	-40.74	0.0169	14.95	-0.0146	-18.94	0.0123	19.78	0.0115	10.09
Region 2 (Java)	-0.0939	-71.71	-0.0228	-27.48	-0.0044	-6.00	0.0191	31.54	-0.0072	-6.40
Region 4 (Kalimantan)	-0.0708	-36.61	0.0593	38.67	-0.0012	-1.01	0.0115	13.95	-0.0147	-9.84
Region 5 (Sulawesi)	-0.0608	-36.13	0.0659	53.39	-0.0129	-13.84	0.0037	6.14	-0.0074	-6.04
Region 6 (Papua)	0.0205	13.80	-0.0008	-0.81	-0.0164	-22.78	-0.0090	-16.32	0.0240	20.00
Quarter 2	0.0120	14.85	-0.0024	-4.18	-0.0011	-2.38	-0.0013	-4.26	-0.0011	-1.59
Quarter 3	0.0025	3.06	0.0000	0.05	0.0012	2.48	-0.0013	-3.92	-0.0093	-12.74
Household size	0.0281	99.36	-0.0036	-21.10	-0.0005	-3.70	-0.0011	-11.58	-0.0060	-28.71
Age of household head	-0.0001	-4.88	-0.0001	-5.81	0.0000	1.35	-0.0002	-17.52	0.0000	0.23
Education of household head	-0.0035	-34.97	0.0000	0.21	0.0004	6.77	0.0000	-0.93	-0.0001	-0.84
Gender	0.0022	2.16	-0.0185	-22.58	-0.0142	-21.50	-0.0061	-13.61	0.0113	11.59
Price of cereals	0.0486	61.90	0.0004	0.99	0.0000	0.05	-0.0034	-11.85	-0.0214	-41.21
Price of fish	0.0004	0.99	0.0004	1.25	0.0025	17.67	-0.0001	-0.97	0.0007	2.67
Price of meat	0.0000	0.05	0.0025	17.67	-0.0192	-45.28	0.0003	2.79	0.0005	2.30
Price of eggs and milk	-0.0034	-11.85	-0.0001	-0.97	0.0003	2.79	-0.0099	-47.79	0.0017	8.04
Price of vegetables	-0.0214	-41.21	0.0007	2.67	0.0005	2.30	0.0017	8.04	0.0221	38.64
Price of fruits	-0.0048	-14.59	0.0020	13.75	0.0057	30.18	0.0007	5.45	0.0015	5.74
Price of oils and fats	-0.0014	-2.68	-0.0011	-4.13	0.0010	5.18	0.0023	12.19	-0.0014	-3.40
Price of prepared food and drink	-0.0102	-25.48	-0.0018	-6.15	0.0021	13.51	0.0030	16.39	-0.0050	-13.90
Price of other foods	-0.0088	-26.22	-0.0006	-3.76	-0.0008	-6.36	0.0008	6.57	0.0012	4.72
Price of tobacco	0.0009	2.81	-0.0024	-15.11	0.0078	39.63	0.0047	36.61	0.0000	-0.01
Linear log of expenditure	-0.0249	-13.26	-0.0011	-0.99	-0.0495	-53.14	0.0004	0.61	-0.0146	-6.42
Quadratic log of expenditure	0.0018	8.95	-0.0007	-5.59	0.0050	43.85	-0.0003	-4.14	0.0038	15.60
$\Theta$ (cdf)	0.0200	14.43	0.0453	40.84	0.0161	15.77	0.0137	22.00	-0.0449	-30.68
$\Phi$ (pdf)	0.1244	104.29	0.0635	78.45	0.0398	40.00	0.0294	60.21	0.0261	18.51

Source: estimated

**Table III-20. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0960	54.24	0.0987	31.40	0.1882	61.02	-0.1396	-38.72	0.2381	115.41
Region 1 (Sumatra)	-0.0069	-10.97	0.0180	18.54	0.0201	12.86	0.0041	5.49	-0.0059	-9.92
Region 2 (Java)	-0.0004	-0.70	0.0378	41.54	0.0640	48.06	0.0085	11.78	0.0035	5.85
Region 4 (Kalimantan)	-0.0129	-15.99	0.0058	4.50	0.0382	18.76	0.0136	16.31	-0.0260	-33.16
Region 5 (Sulawesi)	-0.0042	-6.05	0.0034	3.22	0.0177	10.26	0.0091	11.81	-0.0172	-25.73
Region 6 (Papua)	0.0081	12.07	-0.0077	-7.19	-0.0322	-23.39	0.0069	8.54	-0.0096	-15.19
Quarter 2	-0.0012	-3.04	0.0053	9.01	0.0029	4.82	-0.0150	-34.45	0.0010	3.12
Quarter 3	-0.0022	-5.70	-0.0010	-1.58	0.0054	8.54	0.0012	3.28	0.0025	14.50
Household size	-0.0023	-21.53	-0.0025	-13.76	-0.0117	-55.88	-0.0004	-3.27	0.0002	9.96
Age of household head	-0.0001	-3.79	0.0002	9.47	0.0005	26.35	-0.0001	-8.41	-0.0003	-22.70
Education of household head	0.0000	0.83	0.0009	11.61	0.0047	57.99	0.0001	2.23	-0.0024	-54.26
Gender	-0.0030	-6.02	-0.0024	-3.07	-0.0226	-25.38	0.0035	6.71	0.0489	77.62
Price of cereals	-0.0048	-14.59	-0.0014	-2.68	-0.0102	-25.48	-0.0088	-26.22	0.0009	2.81
Price of fish	0.0020	13.75	-0.0011	-4.13	-0.0018	-6.15	-0.0006	-3.76	-0.0024	-15.11
Price of meat	0.0057	30.18	0.0010	5.18	0.0021	13.51	-0.0008	-6.36	0.0078	39.63
Price of eggs and milk	0.0007	5.45	0.0023	12.19	0.0030	16.39	0.0008	6.57	0.0047	36.61
Price of vegetables	0.0015	5.74	-0.0014	-3.40	-0.0050	-13.90	0.0012	4.72	0.0000	-0.01
Price of fruits	-0.0119	-42.74	0.0007	2.74	0.0033	16.37	-0.0013	-8.55	0.0041	21.81
Price of oils and fats	0.0007	2.74	0.0023	3.78	-0.0091	-26.06	0.0042	16.89	0.0024	9.46
Price of prepared food and drink	0.0033	16.37	-0.0091	-26.06	0.0175	38.69	-0.0025	-10.59	0.0025	11.99
Price of other foods	-0.0013	-8.55	0.0042	16.89	-0.0025	-10.59	0.0124	42.94	-0.0046	-25.78
Price of tobacco	0.0041	21.81	0.0024	9.46	0.0025	11.99	-0.0046	-25.78	-0.0155	-46.10
Linear log of expenditure	-0.0316	-40.01	-0.0272	-17.07	-0.0154	-11.21	0.0995	52.10	-0.0995	-99.13
Quadratic log of expenditure	0.0027	30.19	0.0023	13.10	0.0026	16.83	-0.0083	-41.19	0.0092	85.04
$\Theta$ (cdf)	0.0214	34.62	-0.0323	-24.03	-0.0180	-14.53	-0.0406	-44.67	0.0441	75.48
$\Phi$ (pdf)	0.0343	66.24	0.1423	101.02	0.0857	91.16	0.0897	82.40	0.1025	126.03

Source: estimated

**Table III-21. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 3, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.0992	22.98	0.1648	50.97	0.1980	69.68	0.0499	24.44	0.0619	13.62
Region 1 (Sumatra)	-0.0496	-41.85	0.0276	24.95	-0.0216	-23.52	0.0134	21.07	0.0187	18.69
Region 2 (Java)	-0.0878	-72.14	-0.0163	-19.17	-0.0086	-10.85	0.0238	37.16	0.0023	2.14
Region 4 (Kalimantan)	-0.0556	-28.85	0.0533	36.31	-0.0097	-10.07	0.0127	16.66	-0.0027	-2.09
Region 5 (Sulawesi)	-0.0457	-30.27	0.0635	50.78	-0.0210	-13.94	0.0047	7.53	-0.0028	-2.40
Region 6 (Papua)	-0.0218	-16.21	0.0114	11.64	-0.0085	-9.36	-0.0096	-16.74	0.0215	20.30
Quarter 2	0.0226	32.88	0.0019	3.54	-0.0010	-2.12	0.0000	0.01	-0.0057	-8.69
Quarter 3	0.0229	26.85	-0.0009	-1.57	0.0001	0.21	-0.0021	-6.53	-0.0040	-6.03
Household size	0.0285	127.88	-0.0034	-20.99	-0.0015	-11.50	-0.0009	-10.88	-0.0042	-23.46
Age of household head	0.0000	1.51	0.0000	-1.85	0.0000	2.34	-0.0002	-22.06	0.0000	1.97
Education of household head	-0.0021	-22.10	0.0002	2.25	0.0003	4.75	0.0002	4.45	-0.0001	-1.20
Gender	0.0149	15.92	-0.0073	-9.18	-0.0107	-16.59	-0.0047	-10.34	0.0116	12.56
Price of cereals	0.0618	68.93	-0.0020	-4.75	-0.0003	-1.31	-0.0044	-15.28	-0.0233	-40.89
Price of fish	-0.0020	-4.75	0.0079	22.33	-0.0006	-4.17	0.0001	0.55	0.0021	7.17
Price of meat	-0.0003	-1.31	-0.0006	-4.17	-0.0098	-24.43	0.0016	14.83	0.0003	1.99
Price of eggs and milk	-0.0044	-15.28	0.0001	0.55	0.0016	14.83	-0.0071	-38.42	0.0017	8.41
Price of vegetables	-0.0233	-40.89	0.0021	7.17	0.0003	1.99	0.0017	8.41	0.0221	38.55
Price of fruits	-0.0057	-16.15	0.0014	9.76	0.0070	41.21	0.0011	8.98	0.0015	5.80
Price of oils and fats	-0.0005	-1.00	-0.0027	-10.52	-0.0012	-6.60	0.0012	6.20	-0.0002	-0.48
Price of prepared food and drink	-0.0271	-64.09	-0.0022	-7.25	-0.0002	-1.53	0.0008	4.57	-0.0081	-21.61
Price of other foods	-0.0082	-24.46	-0.0002	-0.98	-0.0017	-14.81	0.0019	16.47	0.0021	7.85
Price of tobacco	0.0096	26.89	-0.0039	-22.78	0.0049	27.12	0.0032	28.55	0.0019	7.28
Linear log of expenditure	-0.0070	-3.32	-0.0228	-16.26	-0.0822	-69.53	0.0058	6.78	-0.0011	-0.57
Quadratic log of expenditure	0.0031	13.61	0.0016	10.71	0.0087	64.68	-0.0015	-15.90	0.0031	15.73
$\Theta$ (cdf)	-0.0541	-41.08	0.0374	33.17	0.0215	23.20	0.0135	24.66	-0.0536	-40.56
$\Phi$ (pdf)	0.1118	109.16	0.0581	63.37	0.0421	33.81	0.0358	68.34	0.0369	29.67

Source: estimated

**Table III-21. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1040	50.65	0.1380	40.77	0.2770	90.98	-0.1184	-31.39	0.2301	92.22
Region 1 (Sumatra)	-0.0067	-11.18	0.0145	16.11	-0.0053	-3.78	0.0025	3.69	-0.0012	-2.13
Region 2 (Java)	0.0003	0.47	0.0298	32.76	0.0470	39.86	0.0070	10.10	0.0013	2.20
Region 4 (Kalimantan)	-0.0139	-19.98	0.0005	0.41	0.0158	7.99	0.0149	19.98	-0.0203	-30.76
Region 5 (Sulawesi)	-0.0051	-7.27	0.0038	3.77	-0.0004	-0.23	0.0065	9.12	-0.0102	-15.23
Region 6 (Papua)	0.0076	11.73	-0.0025	-2.57	-0.0120	-9.43	0.0047	6.35	0.0106	17.05
Quarter 2	0.0000	-0.08	0.0020	4.00	-0.0043	-6.90	-0.0180	-43.19	0.0024	8.70
Quarter 3	-0.0047	-12.85	-0.0004	-0.68	-0.0150	-20.05	0.0015	4.40	0.0018	11.47
Household size	-0.0013	-13.17	-0.0026	-18.21	-0.0151	-73.53	-0.0008	-7.81	0.0005	26.34
Age of household head	-0.0001	-7.49	0.0001	7.26	0.0003	17.26	0.0000	-2.44	-0.0002	-21.48
Education of household head	-0.0001	-2.03	0.0005	6.86	0.0036	41.87	0.0003	6.74	-0.0026	-64.52
Gender	-0.0031	-6.06	-0.0011	-1.46	-0.0425	-45.12	-0.0011	-2.18	0.0396	67.72
Price of cereals	-0.0057	-16.15	-0.0005	-1.00	-0.0271	-64.09	-0.0082	-24.46	0.0096	26.89
Price of fish	0.0014	9.76	-0.0027	-10.52	-0.0022	-7.25	-0.0002	-0.98	-0.0039	-22.78
Price of meat	0.0070	41.21	-0.0012	-6.60	-0.0002	-1.53	-0.0017	-14.81	0.0049	27.12
Price of eggs and milk	0.0011	8.98	0.0012	6.20	0.0008	4.57	0.0019	16.47	0.0032	28.55
Price of vegetables	0.0015	5.80	-0.0002	-0.48	-0.0081	-21.61	0.0021	7.85	0.0019	7.28
Price of fruits	-0.0086	-35.94	0.0006	2.24	0.0022	11.23	-0.0005	-3.52	0.0010	5.74
Price of oils and fats	0.0006	2.24	0.0035	6.33	-0.0058	-17.72	0.0035	14.17	0.0017	6.49
Price of prepared food and drink	0.0022	11.23	-0.0058	-17.72	0.0407	100.88	-0.0035	-15.36	0.0032	15.99
Price of other foods	-0.0005	-3.52	0.0035	14.17	-0.0035	-15.36	0.0128	48.49	-0.0061	-34.11
Price of tobacco	0.0010	5.74	0.0017	6.49	0.0032	15.99	-0.0061	-34.11	-0.0155	-47.87
Linear log of expenditure	-0.0337	-35.26	-0.0358	-20.75	0.0267	21.88	0.0878	45.62	-0.0681	-56.61
Quadratic log of expenditure	0.0031	28.84	0.0029	15.83	-0.0042	-32.31	-0.0078	-39.42	0.0056	43.56
$\Theta$ (cdf)	0.0169	27.00	-0.0250	-22.17	0.0505	43.01	-0.0226	-25.98	0.0327	54.28
$\Phi$ (pdf)	0.0406	74.57	0.0708	57.55	0.0780	82.38	0.1010	89.01	0.0947	118.61

Source: estimated

**Table III-22. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 4, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.3396	89.15	-0.0790	-25.81	-0.0401	-21.68	0.0905	64.88	0.4118	89.76
Region 1 (Sumatra)	-0.0765	-71.33	0.0453	44.94	-0.0008	-1.66	0.0108	26.65	-0.0014	-1.51
Region 2 (Java)	-0.0860	-74.34	-0.0068	-8.79	0.0051	10.46	0.0164	30.18	-0.0136	-12.00
Region 4 (Kalimantan)	-0.0676	-51.35	0.0723	56.39	0.0045	8.53	0.0096	18.01	-0.0115	-10.39
Region 5 (Sulawesi)	-0.0712	-50.36	0.0775	62.21	-0.0024	-3.44	0.0050	12.78	-0.0189	-17.30
Region 6 (Papua)	-0.0316	-29.80	0.0313	42.24	-0.0061	-12.17	-0.0097	-28.30	0.0185	18.41
Quarter 2	0.0105	17.46	0.0024	5.96	0.0010	4.31	0.0003	1.83	-0.0110	-19.61
Quarter 3	0.0071	10.77	0.0031	6.92	0.0004	1.88	-0.0008	-3.99	-0.0108	-19.78
Household size	0.0123	63.74	0.0007	4.75	-0.0006	-10.32	-0.0006	-12.37	-0.0074	-51.02
Age of household head	0.0004	15.74	0.0000	0.57	0.0001	7.57	-0.0001	-20.06	0.0001	2.68
Education of household head	-0.0003	-3.98	0.0007	10.90	0.0007	23.76	0.0003	12.23	0.0001	1.01
Gender	-0.0269	-25.10	0.0041	5.69	-0.0050	-12.00	-0.0030	-9.11	-0.0065	-6.99
Price of cereals	0.0353	44.94	0.0065	18.61	0.0005	4.06	-0.0021	-10.52	-0.0279	-50.74
Price of fish	0.0065	18.61	-0.0010	-3.71	0.0004	5.38	0.0009	9.30	0.0013	4.88
Price of meat	-0.0021	-10.52	0.0009	9.30	0.0001	1.39	-0.0081	-54.82	0.0007	4.66
Price of eggs and milk	-0.0279	-50.74	0.0013	4.88	0.0006	6.04	0.0007	4.66	0.0194	35.76
Price of vegetables	-0.0016	-5.74	0.0029	23.07	0.0030	30.27	-0.0001	-0.64	-0.0003	-1.20
Price of fruits	0.0004	0.71	-0.0066	-25.85	-0.0007	-5.56	0.0015	9.78	0.0034	9.11
Price of oils and fats	0.0043	10.52	-0.0072	-34.30	-0.0010	-8.53	0.0005	3.52	0.0077	27.49
Price of prepared food and drink	-0.0181	-59.97	0.0011	6.77	0.0003	3.47	0.0032	34.53	-0.0020	-7.88
Price of other foods	0.0028	9.16	0.0017	10.94	0.0035	32.03	0.0033	36.49	-0.0030	-15.95
Price of tobacco	0.0005	4.06	0.0004	5.38	-0.0068	-40.57	0.0001	1.39	0.0006	6.04
Linear log of expenditure	-0.0219	-14.49	0.0714	60.06	0.0240	33.27	-0.0178	-27.51	-0.0848	-41.49
Quadratic log of expenditure	-0.0014	-6.95	-0.0091	-60.52	-0.0030	-29.91	0.0017	19.85	0.0068	25.94
$\Theta$ (cdf)	0.0299	25.64	0.0164	18.67	0.0054	10.52	-0.0004	-0.92	0.0089	7.59
$\Phi$ (pdf)	0.1282	142.84	0.0660	84.78	0.0178	33.09	0.0308	72.04	0.0136	11.97

Source: estimated

**Table III-22. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.2054	99.16	-0.2669	-82.45	-0.2730	-98.35	0.2514	57.90	0.3232	121.81
Region 1 (Sumatra)	-0.0013	-2.76	0.0152	18.10	0.0102	7.35	-0.0030	-3.94	0.0082	16.99
Region 2 (Java)	0.0009	1.62	0.0264	30.50	0.0508	41.68	0.0020	2.47	0.0116	24.66
Region 4 (Kalimantan)	-0.0058	-11.42	0.0072	7.64	-0.0159	-9.87	0.0143	18.03	0.0008	1.54
Region 5 (Sulawesi)	-0.0022	-3.96	0.0084	9.28	0.0151	9.19	0.0018	2.19	-0.0101	-19.45
Region 6 (Papua)	-0.0016	-3.46	0.0050	5.82	-0.0078	-7.55	0.0000	-0.05	-0.0017	-4.01
Quarter 2	-0.0002	-0.66	0.0036	8.88	0.0123	37.60	-0.0196	-52.28	0.0013	5.76
Quarter 3	-0.0025	-10.17	0.0008	1.84	-0.0001	-0.32	-0.0003	-0.83	0.0036	18.45
Household size	-0.0012	-19.76	-0.0021	-18.98	0.0009	4.59	-0.0022	-22.59	0.0001	4.07
Age of household head	0.0000	-1.35	0.0002	11.86	-0.0001	-3.46	-0.0001	-3.80	-0.0004	-41.95
Education of household head	0.0002	6.45	0.0007	13.63	0.0006	6.74	0.0003	7.01	-0.0032	-93.07
Gender	0.0012	2.92	-0.0072	-9.78	0.0101	8.11	-0.0081	-14.81	0.0451	87.52
Price of cereals	-0.0016	-5.74	0.0004	0.71	0.0043	10.52	-0.0181	-59.97	0.0028	9.16
Price of fish	0.0029	23.07	-0.0066	-25.85	-0.0072	-34.30	0.0011	6.77	0.0017	10.94
Price of meat	-0.0001	-0.64	0.0015	9.78	0.0005	3.52	0.0032	34.53	0.0033	36.49
Price of eggs and milk	-0.0003	-1.20	0.0034	9.11	0.0077	27.49	-0.0020	-7.88	-0.0030	-15.95
Price of vegetables	-0.0090	-50.21	0.0016	6.90	0.0058	29.79	0.0005	4.04	-0.0028	-19.48
Price of fruits	0.0016	6.90	-0.0021	-3.76	-0.0051	-17.83	0.0040	16.57	0.0036	15.43
Price of oils and fats	0.0058	29.79	-0.0051	-17.83	-0.0155	-33.74	0.0025	9.05	0.0080	41.69
Price of prepared food and drink	0.0005	4.04	0.0040	16.57	0.0025	9.05	0.0125	51.81	-0.0041	-27.14
Price of other foods	-0.0028	-19.48	0.0036	15.43	0.0080	41.69	-0.0041	-27.14	-0.0129	-53.05
Price of tobacco	0.0030	30.27	-0.0007	-5.56	-0.0010	-8.53	0.0003	3.47	0.0035	32.03
Linear log of expenditure	-0.0584	-60.40	0.1549	116.73	0.0749	54.88	-0.0607	-35.97	-0.0709	-74.70
Quadratic log of expenditure	0.0049	40.20	-0.0190	-105.14	0.0069	36.62	0.0050	25.35	0.0048	46.68
$\Theta$ (cdf)	0.0181	31.41	-0.0236	-26.27	-0.0802	-76.25	0.0093	11.42	0.0271	60.61
$\Phi$ (pdf)	0.0374	84.25	0.0766	89.94	0.1298	161.72	0.0366	39.40	0.1225	145.69

Source: estimated



**Table III-23. Parameters of the QUAIDS Model, Second-Stage Demand, Stratum 5, Rural Areas, Indonesia, 2011**

Item	Cereals		Fish		Meat		Eggs and Milk		Vegetables	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.3036	63.94	0.1564	36.00	0.0216	11.82	0.0618	28.32	0.2137	49.08
Region 1 (Sumatra)	-0.0496	-46.38	0.0265	26.39	-0.0043	-9.25	0.0132	23.38	0.0006	0.64
Region 2 (Java)	-0.0479	-36.20	-0.0204	-24.67	0.0013	2.52	0.0170	24.49	-0.0089	-8.53
Region 4 (Kalimantan)	-0.0470	-37.26	0.0470	37.97	0.0001	0.12	0.0088	12.72	-0.0125	-12.65
Region 5 (Sulawesi)	-0.0335	-27.23	0.0552	42.82	-0.0049	-8.14	0.0060	10.29	-0.0149	-14.77
Region 6 (Papua)	-0.0088	-7.74	0.0098	11.71	-0.0076	-14.20	-0.0023	-4.55	0.0185	19.04
Quarter 2	0.0283	45.86	-0.0024	-6.01	-0.0005	-2.92	-0.0001	-0.27	-0.0045	-8.99
Quarter 3	0.0203	32.09	-0.0028	-6.90	-0.0015	-8.02	-0.0008	-2.72	-0.0056	-11.10
Household size	0.0080	51.08	0.0010	7.48	-0.0009	-23.41	0.0009	15.43	-0.0045	-41.12
Age of household head	-0.0006	-21.59	-0.0007	-36.38	0.0001	8.05	-0.0002	-19.34	-0.0002	-7.51
Education of household head	-0.0028	-36.94	-0.0006	-9.91	0.0009	33.81	0.0003	9.88	-0.0013	-23.19
Gender	0.0072	6.74	0.0121	18.13	-0.0057	-18.93	0.0018	3.79	0.0023	2.75
Price of cereals	0.0524	65.04	-0.0011	-2.94	0.0016	9.88	-0.0005	-1.64	-0.0148	-28.88
Price of fish	-0.0011	-2.94	0.0004	1.54	-0.0003	-4.08	0.0007	5.78	-0.0010	-3.71
Price of meat	0.0016	9.88	-0.0003	-4.08	-0.0037	-29.57	-0.0008	-10.65	0.0005	4.11
Price of eggs and milk	-0.0005	-1.64	0.0007	5.78	-0.0008	-10.65	-0.0069	-45.95	0.0003	1.41
Price of vegetables	-0.0148	-28.88	-0.0010	-3.71	0.0005	4.11	0.0003	1.41	0.0229	45.49
Price of fruits	-0.0041	-12.07	0.0023	14.78	0.0018	18.66	0.0008	7.88	-0.0003	-1.42
Price of oils and fats	-0.0027	-5.71	-0.0055	-20.96	-0.0004	-3.69	0.0005	2.55	-0.0007	-2.01
Price of prepared food and drink	-0.0186	-41.62	0.0030	11.11	0.0004	4.62	0.0026	16.38	-0.0013	-4.37
Price of other foods	-0.0189	-61.05	0.0001	0.45	0.0001	0.65	0.0037	32.51	0.0007	3.09
Price of tobacco	0.0066	29.87	0.0014	12.23	0.0010	11.42	-0.0005	-5.09	-0.0062	-42.55
Linear log of expenditure	-0.0492	-26.07	0.0047	2.68	0.0020	2.39	-0.0049	-4.52	-0.0352	-16.88
Quadratic log of expenditure	0.0031	12.35	-0.0042	-17.48	-0.0005	-3.97	0.0006	3.49	0.0050	16.01
$\Theta$ (cdf)	0.0142	15.74	0.0275	46.92	0.0022	6.83	0.0006	1.21	-0.0019	-2.14
$\Phi$ (pdf)	0.1150	126.26	0.0649	85.87	0.0069	15.10	0.0317	65.09	0.0097	9.39

Source: estimated

**Table III-23. Continued**

Item	Fruits		Oils and fats		Prepared food and drink		Other foods		Tobacco	
	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat	Param.	T-stat
Constant	0.1473	45.47	0.0846	17.68	-0.2500	-92.89	0.1711	36.28	0.0891	35.78
Region 1 (Sumatra)	-0.0022	-3.72	0.0025	3.03	0.0091	8.04	-0.0020	-2.63	0.0064	13.97
Region 2 (Java)	-0.0011	-1.58	0.0218	25.44	0.0337	27.20	0.0047	5.71	0.0003	0.68
Region 4 (Kalimantan)	-0.0091	-14.06	-0.0028	-3.06	0.0067	4.66	0.0104	13.09	-0.0018	-3.80
Region 5 (Sulawesi)	-0.0034	-4.79	0.0005	0.57	0.0053	3.65	0.0051	6.35	-0.0146	-27.49
Region 6 (Papua)	0.0025	4.15	0.0029	3.44	-0.0189	-18.85	0.0063	7.82	-0.0048	-11.80
Quarter 2	0.0001	0.19	-0.0011	-2.69	-0.0029	-8.97	-0.0192	-51.04	0.0025	13.55
Quarter 3	-0.0041	-12.83	-0.0026	-5.92	-0.0050	-11.20	-0.0018	-5.45	0.0026	14.14
Household size	-0.0012	-16.32	-0.0015	-14.33	-0.0047	-24.89	-0.0019	-21.45	0.0038	89.56
Age of household head	-0.0003	-20.41	-0.0005	-21.39	0.0031	104.84	-0.0005	-24.51	-0.0002	-19.23
Education of household head	0.0011	27.14	-0.0002	-4.52	0.0073	115.99	-0.0004	-9.30	-0.0036	-119.33
Gender	-0.0031	-5.75	-0.0034	-4.55	-0.0527	-51.49	-0.0043	-7.04	0.0389	96.80
Price of cereals	-0.0041	-12.07	-0.0027	-5.71	-0.0186	-41.62	-0.0189	-61.05	0.0066	29.87
Price of fish	0.0023	14.78	-0.0055	-20.96	0.0030	11.11	0.0001	0.45	0.0014	12.23
Price of meat	0.0018	18.66	-0.0004	-3.69	0.0004	4.62	0.0001	0.65	0.0010	11.42
Price of eggs and milk	0.0008	7.88	0.0005	2.55	0.0026	16.38	0.0037	32.51	-0.0005	-5.09
Price of vegetables	-0.0003	-1.42	-0.0007	-2.01	-0.0013	-4.37	0.0007	3.09	-0.0062	-42.55
Price of fruits	-0.0007	-3.24	-0.0011	-4.46	0.0035	17.82	0.0023	17.16	-0.0046	-36.31
Price of oils and fats	-0.0011	-4.46	0.0081	15.93	-0.0004	-1.58	0.0032	14.12	-0.0010	-5.33
Price of prepared food and drink	0.0035	17.82	-0.0004	-1.58	0.0114	26.56	-0.0019	-6.88	0.0013	9.87
Price of other foods	0.0023	17.16	0.0032	14.12	-0.0019	-6.88	0.0121	49.86	-0.0014	-11.74
Price of tobacco	-0.0046	-36.31	-0.0010	-5.33	0.0013	9.87	-0.0014	-11.74	0.0034	20.27
Linear log of expenditure	-0.0361	-23.32	0.0313	15.00	0.1143	77.45	-0.0328	-15.65	0.0069	6.15
Quadratic log of expenditure	0.0031	14.41	-0.0085	-29.83	-0.0013	-5.62	0.0027	9.15	-0.0004	-2.23
$\Theta$ (cdf)	0.0165	31.02	0.0112	15.00	-0.0785	-107.02	0.0123	16.21	-0.0025	-6.46
$\Phi$ (pdf)	0.0465	90.46	0.0829	85.38	0.1352	182.23	0.0132	12.82	0.0812	91.62

Source: estimated

**Table III-24. Wald and Likelihood Ratio Tests, Second-Stage Demand, Indonesia, 2011**

Item	Test				Stratum 1		Stratum 2	
		All	Urban	Rural	Urban	Rural	Urban	Rural
					t-value			
Cereals	Wald	101.70***	-11.44***	26.82***	14.13***	29.09***	19.39***	8.95***
Fish	Wald	-81.12***	-55.88***	-120.53***	18.22***	-7.23***	17.75***	-5.59***
Meat	Wald	-46.72***	70.85***	21.28***	23.63***	4.60***	21.99***	43.85***
Eggs and milk	Wald	-40.29***	-55.93***	0.95	-8.52***	-9.53***	-16.97***	-4.14***
Vegetables	Wald	-65.94***	2.52***	-52.24***	11.00***	-5.06***	44.40***	15.60***
Fruits	Wald	-3.48***	69.31***	69.51*	34.42***	18.36***	79.61***	30.19***
Oils and fats	Wald	-202.19***	11.70***	-130.11***	-23.97***	2.48**	-39.52***	13.10***
Prepared food and drink	Wald	-53.17***	-118.40***	-32.68***	-60.35***	38.52***	-146.91***	16.83***
Other foods.	Wald	-40.56***	18.03***	2.31**	-3.76***	-20.98***	5.01***	-41.19***
Tobacco	Wald	29.64***	25.32***	18.02***	19.86***	49.96***	25.80***	85.04***
					Chi-squares			
Overall	LR	19685***	235170***	247809***	45137.4***	32634***	55960***	51879***

Note:

1. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.
2. Chi Square's critical value for food groups ( $\chi^2_{0.05,9}$ ) is 16.92

**Table III-24. Continued**

Item	Test	Stratum 3		Stratum 4		Stratum 5		
		Urban	Rural	Urban	Rural	Urban	Rural	
		t-value						
Cereal	Wald	23.24***	13.61***	-10.07***	-6.95***	-9.37***	12.35***	
Fish	Wald	9.23***	10.71***	17.89***	-60.52***	6.80***	-17.48***	
Meat	Wald	13.51***	64.68***	12.11***	-29.91***	11.64***	-3.97***	
Eggs and milks	Wald	-26.78***	-15.90***	-18.62***	19.85***	-12.90***	3.49***	
Vegetables	Wald	-7.77***	15.73***	-5.90***	25.94***	-0.19	16.01***	
Fruits	Wald	51.86***	28.84***	5.90***	40.20***	-3.63***	14.41***	
Oils and fats	Wald	-3.52***	15.83***	8.85***	-105.14***	15.49***	-29.83***	
Prepared food and drink	Wald	-91.39***	-32.31***	-38.96***	36.62***	-25.43***	-5.62***	
Other foods	Wald	8.10***	-39.42***	26.97***	25.35***	15.27***	9.15***	
Tobacco	Wald	35.17***	43.56***	23.15***	46.68***	12.40***	-2.23**	
		Chi-squares						
Overall	LR	63711***	60688***	9301***	65398***	9690***	72748***	

Note:

1. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.
2. Chi Square's critical value for food groups ( $\chi^2_{0.05,9}$ ) is 16.92

**Table III-25. Misspecification Test for the QUAIDS of Food Groups, Second-Stage Demand, Indonesia, 2011**

Hypotheses Test	All			Strata 1		Strata 2	
Normality	National	Urban	Rural	Urban	Rural	Urban	Rural
Cereals	0.06***	0.06***	0.05***	0.04***	0.04***	0.05***	0.05***
Fish	0.07***	0.08***	0.07***	0.13***	0.09***	0.09***	0.08***
Meat	0.25***	0.18***	0.29***	0.38***	0.46***	0.30***	0.39***
Eggs and milk	0.16***	0.16***	0.16***	0.16***	0.16***	0.17***	0.16***
Vegetables	0.07***	0.06***	0.06***	0.06***	0.04***	0.05***	0.05***
Fruits	0.10***	0.10***	0.11***	0.17***	0.19***	0.13***	0.13***
Oils and fats	0.07***	0.08***	0.07***	0.06***	0.05***	0.07***	0.06***
Prepared food and drink	0.09***	0.03***	0.11***	0.05***	0.14***	0.06***	0.12***
Other foods	0.08***	0.08***	0.08***	0.09***	0.08***	0.09***	0.07***
Tobacco	0.09***	0.11***	0.09***	0.20***	0.19***	0.14***	0.10***
Mardia Kurtosis	2253***	2030***	2097***	493.4***	640.8***	268.9***	491.7***
Henze-Zirkler T	2355***	1511***	1945***	844.7***	1024.0***	632.8***	899.0***
Homoscedasticity							
Cereals	29291***	8322***	16656***	1684***	2714***	1520***	3891***
Fish	19886***	7264***	12299***	2170***	3354***	1698***	3230***
Meat	20174***	5752***	14457***	1455***	2264***	1879***	3283***
Eggs and milk	25315***	8970***	16624***	3296***	2906***	2556***	4866***
Vegetables	20335***	9546***	11918***	1953***	2382***	1912***	2719***
Fruits	11593***	4132***	8071***	1419***	2750***	1517***	2927***
Oils and fats	18570***	8429***	10593***	1824***	1971***	899***	1337***
Prepared food and drink	42760***	18923***	20803***	4984***	6063***	4102***	4716***
Other foods	9718***	4200***	5942***	1165***	1168***	1046***	1851***
Tobacco	16405***	6519***	10788***	2115***	2533***	2010***	2836***

Note:

(1)The normality test for an individual equation and all equations in the system was performed with Kolmogorov-Smirnov and Mardia Kurtosis and Henze Zirkler respectively.

(2)The homoscedasticity test was conducted with the white's test.

(3) Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-25. Continued**

Hypotheses Test	Strata 3		Strata 4		Strata 5	
	Urban	Rural	Urban	Rural	Urban	Rural
Normality						
Cereals	0.05***	0.06***	0.07***	0.07***	0.08***	0.07***
Fish	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***
Meat	0.21***	0.32***	0.18***	0.31***	0.12***	0.19***
Eggs and milk	0.16***	0.16***	0.16***	0.17***	0.14***	0.17***
Vegetables	0.06***	0.06***	0.06***	0.07***	0.07***	0.06***
Fruits	0.11***	0.12***	0.09***	0.13***	0.09***	0.10***
Oils and fats	0.06***	0.07***	0.06***	0.07***	0.07***	0.07***
Prepared food and drink	0.05***	0.10***	0.06***	0.09***	0.06***	0.09***
Other foods	0.09***	0.07***	0.09***	0.08***	0.09***	0.08***
Tobacco	0.12***	0.08***	0.17***	0.06***	0.18***	0.06***
Mardia Kurtosis	297.5***	612.5***	603.2***	1028.0***	486.1***	1694.0***
Henze-Zirkler T	583.4***	839.6***	591.1***	785.1***	594.7***	738.5***
Homoscedasticity						
Cereals	1967***	5543***	2188***	4608***	2056***	3306***
Fish	1924***	2570***	1551***	2164***	1417***	2386***
Meat	1730***	4639***	1713***	4725***	1360***	3123***
Eggs and milk	2157***	4396***	1748***	3354***	1959***	2822***
Vegetables	1950***	2496***	1654***	1639***	1804***	1927***
Fruits	1163***	1835***	1238***	1658***	1166***	1230***
Oils and fats	1056***	1812***	1333***	1650***	1166***	1621***
Prepared food and drink	3786***	3779***	3168***	3402***	2438***	3837***
Other foods	975***	1849***	859***	1549***	981***	1421***
Tobacco	1248***	2689***	1424***	2067***	1578***	1722***

Note:

- (1)The normality test for an individual equation and all equations in the system was performed with Kolmogorov-Smirnov and Mardia Kurtosis and Henze Zirkler respectively.
- (2)The homoscedasticity test was conducted with the white's test.
- (3) Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively

**Table III-26. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, All Areas, Indonesia, SUSENAS, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.571*** -299.37	0.096*** 79.58	0.063*** 45.94	0.029*** 22.73	0.035*** 30.13	0.021*** 15.49	0.051*** 38.04	0.060*** 45.37	0.026*** 24.86	0.123*** 97.56
Fish	0.025*** 17.16	-0.889*** -677.74	0.041*** 59.28	0.006*** 6.85	-0.003*** -2.76	0.024*** 27.71	-0.007*** -8.25	-0.034*** -32.09	0.016*** 26.56	-0.038*** -42.81
Meat	-0.061*** -25.46	0.047*** 43.96	-1.171*** -574.84	0.024*** 22.49	-0.003** -1.90	0.029*** 21.63	0.067*** 49.52	0.087*** 65.41	0.007*** 8.00	-0.005*** -3.53
Eggs and milk	-0.142*** -55.50	-0.018*** -13.41	0.020*** 17.11	-0.973*** -558.44	0.024*** 15.72	0.002 1.42	0.018*** 13.08	-0.018*** -11.68	0.016*** 17.54	0.078*** 56.19
Vegetables	-0.039*** -18.80	-0.009*** -7.19	0.003*** 2.88	0.022*** 20.53	-0.759*** -380.68	0.012*** 9.17	-0.019*** -13.66	-0.042*** -34.45	0.011*** 11.22	0.007*** 5.33
Fruits	-0.373*** -89.80	0.016*** 7.35	0.039*** 18.19	0.002 0.96	-0.014*** -5.41	-0.921*** -289.90	-0.005** -1.96	0.048*** 20.51	0.016*** 9.88	0.037*** 14.00
Oils and fats	0.272*** 99.48	0.083*** 43.12	0.163*** 82.66	0.118*** 64.57	0.114*** 51.89	0.105*** 50.39	-0.819*** -288.95	-0.033*** -16.18	0.167*** 96.38	0.175*** 77.83
Prepared food and drink	-0.159*** -217.22	-0.015*** -25.27	0.048*** 83.64	0.018*** 33.90	-0.025*** -44.67	0.026*** 48.51	-0.014*** -26.41	-0.874*** -1124.20	-0.018*** -44.60	0.004*** 7.97
Other foods	-0.173*** -58.23	0.008*** 4.86	-0.002 -1.21	0.017*** 10.89	0.009*** 4.18	0.027*** 14.35	0.066*** 30.48	-0.159*** -87.74	-0.692*** -328.83	0.029*** 14.17
Tobacco	-0.028*** -23.24	-0.044*** -71.60	-0.002*** -3.59	0.033*** 60.63	-0.014*** -18.11	0.011*** 15.22	0.033*** 42.98	-0.013*** -20.45	0.002*** 3.55	-1.069*** -1062.2
Expenditure	0.589*** 611.50	1.043*** 1033.66	1.157*** 709.29	1.142*** 717.11	0.882*** 652.71	1.269*** 612.09	0.925*** 671.18	1.224*** 2531.39	0.906*** 461.76	1.120*** 1311.1

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-27. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, All Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.536	0.148	0.082	0.056	0.071	0.048	0.080	0.215	0.041	0.181
Fish	-0.011	-0.881	0.046	0.011	-0.004	0.032	-0.006	0.007	0.016	-0.026
Meat	-0.115	0.043	-1.171	0.024	-0.013	0.032	0.060	0.099	0.003	-0.004
Eggs and milk	-0.194	-0.020	0.022	-0.972	0.015	0.005	0.013	-0.002	0.013	0.080
Vegetables	-0.050	0.014	0.013	0.036	-0.747	0.026	-0.009	0.040	0.016	0.036
Fruits	-0.445	0.001	0.036	-0.003	-0.034	-0.923	-0.018	0.033	0.008	0.026
Oils and fats	0.255	0.101	0.171	0.130	0.123	0.118	-0.811	0.037	0.171	0.199
Prepared food and drink	-0.223	-0.025	0.046	0.015	-0.042	0.026	-0.024	-0.878	-0.024	-0.002
Other foods	-0.187	0.029	0.007	0.029	0.019	0.041	0.075	-0.083	-0.687	0.055
Tobacco	-0.075	-0.043	0.000	0.036	-0.021	0.016	0.029	0.009	-0.001	-1.064
Expenditure	0.449	0.796	0.882	0.871	0.673	0.969	0.706	0.934	0.691	0.854

Source: estimated using the 2011 SUSENAS household survey data



**Table III-28. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.622*** -315.44	0.004*** 3.39	0.010*** 10.91	-0.045*** -40.78	-0.046*** -31.77	-0.041*** -30.21	0.049*** 29.03	-0.273*** -281.92	-0.062*** -58.12	-0.012*** -12.21
Fish	0.029*** 19.01	-0.966*** -813.66	0.051*** 49.29	0.023*** 19.72	-0.013*** -8.78	0.092*** 62.92	0.007*** 4.57	0.035*** 31.91	0.037*** 34.45	-0.010*** -8.13
Meat	0.043*** 50.30	0.038*** 52.60	-1.033*** -1378.2	0.042*** 68.16	0.023*** 33.55	0.046*** 68.98	0.008*** 9.59	0.037*** 45.26	0.040*** 73.49	0.017*** 23.13
Eggs and milk	-0.076*** -38.44	0.039 33.82	0.083*** 72.54	-0.927*** -693.67	0.031 17.35	0.124*** 85.51	0.008*** 4.35	-0.020*** -10.99	0.030*** 23.39	0.077*** 69.32
Vegetables	-0.077*** -30.60	-0.045*** -34.07	0.002*** 2.58	-0.001 -0.50	-0.816*** -309.95	0.014*** 8.84	-0.029*** -12.93	-0.063*** -41.15	0.041*** 34.37	0.021*** 20.15
Fruits	0.071*** 18.90	0.239*** 75.43	0.221*** 83.69	0.192*** 68.78	0.169*** 50.19	-0.730*** -205.75	0.092*** 24.81	0.162*** 46.62	0.137*** 50.95	0.145*** 51.93
Oils and fats	0.130*** 32.33	-0.022*** -11.06	-0.028*** -17.09	-0.019*** -9.44	-0.035*** -11.80	-0.047*** -20.42	-0.876*** -179.02	-0.113*** -40.99	0.073*** 35.89	0.013*** 7.19
Prepared food and drink	-0.093*** -94.47	0.049*** 56.60	0.036*** 43.93	0.047*** 52.92	0.023*** 24.21	0.010*** 10.32	0.018*** 18.42	-0.746*** -697.40	0.022*** 32.59	0.022*** 26.65
Other foods	-0.224*** -48.30	0.066*** 24.90	0.104*** 55.10	0.016*** 6.94	0.125*** 40.18	0.026*** 12.30	0.155*** 40.26	-0.118*** -27.31	-0.687*** -156.00	-0.038*** -18.07
Tobacco	0.001* 1.65	-0.018*** -40.12	0.003*** 7.68	0.017*** 51.12	0.016*** 30.64	0.006*** 12.57	0.010*** 15.45	-0.011*** -23.85	-0.010*** -27.48	-0.921*** -1393.2
Expenditure	1.079*** 762.15	0.836*** 512.42	0.958*** 884.27	0.651*** 294.16	0.957*** 355.53	0.565*** 208.64	0.983*** 258.91	1.239*** 3112.41	0.793*** 202.30	0.935*** 1139.15

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-29. Unconditional Marshallian Price and Expenditure Elasticities of Food Demands, the QUAIDS Model, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.614	-0.002	0.009	-0.053	-0.046	-0.049	0.049	-0.237	-0.065	-0.014
Fish	0.076	-0.953	0.059	0.025	0.004	0.091	0.022	0.150	0.042	0.010
Meat	0.070	0.042	-1.029	0.039	0.032	0.042	0.016	0.112	0.041	0.026
Eggs and milk	0.000	0.067	0.097	-0.917	0.062	0.129	0.035	0.155	0.040	0.113
Vegetables	-0.050	-0.041	0.006	-0.004	-0.807	0.010	-0.021	0.013	0.042	0.030
Fruits	0.161	0.273	0.237	0.206	0.207	-0.722	0.123	0.365	0.149	0.189
Oils and fats	0.153	-0.020	-0.025	-0.023	-0.029	-0.052	-0.870	-0.046	0.073	0.020
Prepared food and drink	-0.111	0.031	0.031	0.032	0.011	-0.003	0.008	-0.762	0.014	0.006
Other foods	-0.171	0.082	0.113	0.020	0.146	0.027	0.172	0.011	-0.681	-0.015
Tobacco	0.032	-0.013	0.008	0.015	0.026	0.003	0.019	0.072	-0.008	-0.910
Expenditure	0.795	0.616	0.705	0.480	0.704	0.416	0.724	0.912	0.584	0.688

Source: estimated using the 2011 SUSENAS household survey data

**Table III-30. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.747*** -194.61	-0.005** -2.37	0.004*** 2.76	0.005*** 2.72	-0.035*** -11.76	0.007*** 3.67	0.058*** 16.42	-0.134*** -65.32	-0.069*** -35.73	0.035*** 23.01
Fish	0.083*** 16.34	-0.897*** -164.79	0.010*** 4.34	0.049*** 19.80	0.066*** 16.63	0.071*** 27.40	-0.002 -0.39	-0.098*** -24.31	0.087*** 35.08	0.038*** 15.90
Meat	0.054*** 7.20	0.006 1.48	-1.094*** -121.81	0.046*** 13.21	0.014** 2.49	0.077*** 15.38	-0.053*** -7.67	0.048*** 10.19	0.060*** 14.77	0.072*** 11.87
Eggs and milk	0.058*** 6.41	0.071*** 15.74	0.041*** 10.96	-1.172*** -164.79	0.115*** 14.72	-0.015*** -3.21	-0.010 -1.17	-0.037*** -5.45	0.039*** 9.21	0.092*** 22.41
Vegetables	-0.001 -0.08	0.042*** 11.63	0.010*** 3.62	0.057*** 15.66	-0.815*** -104.82	0.050*** 13.33	-0.106*** -17.31	0.028*** 6.81	0.027*** 7.66	0.087*** 25.26
Fruits	0.202*** 15.97	0.183*** 27.15	0.131*** 18.21	0.017*** 2.71	0.177*** 16.83	-1.235*** -105.13	0.061*** 4.93	-0.013 -1.42	0.118*** 19.00	0.152*** 20.17
Oils and fats	0.099*** 11.00	-0.013*** -2.79	-0.016*** -4.02	0.011** 2.34	-0.146*** -21.00	0.019*** 3.67	-0.943*** -80.99	0.075*** 12.34	0.015*** 3.30	0.004 0.96
Prepared food and drink	-0.223*** -116.40	-0.046*** -32.39	0.016*** 13.23	0.002 1.21	-0.035*** -19.38	-0.008*** -5.56	0.022*** 10.64	-0.849*** -280.73	-0.014*** -10.22	-0.012*** -10.33
Other foods	-0.343*** -34.02	0.142*** 30.47	0.056*** 12.76	0.038*** 8.85	0.038*** 4.63	0.062*** 12.88	0.001 0.08	-0.131*** -15.59	-0.718*** -81.60	0.027*** 6.29
Tobacco	0.120*** 33.38	0.019*** 9.38	0.034*** 11.55	0.043*** 22.77	0.082*** 25.95	0.040*** 16.15	0.005 1.40	0.013*** 5.88	0.017*** 8.35	-1.167*** -311.81
Expenditure	0.914*** 342.82	0.675*** 128.39	0.846*** 123.78	0.813*** 93.33	0.711*** 105.49	0.503*** 48.09	1.154*** 124.20	1.383*** 738.38	0.825*** 61.48	0.833*** 201.51

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-31. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.735	-0.012	0.005	0.005	-0.042	0.002	0.075	-0.035	-0.069	0.036
Fish	0.146	-0.888	0.014	0.057	0.080	0.071	0.037	0.084	0.096	0.056
Meat	0.080	0.004	-1.093	0.048	0.013	0.073	-0.030	0.170	0.062	0.078
Eggs and milk	0.091	0.071	0.043	-1.169	0.117	-0.018	0.016	0.096	0.043	0.100
Vegetables	0.054	0.048	0.014	0.064	-0.805	0.049	-0.070	0.198	0.035	0.103
Fruits	0.301	0.202	0.138	0.031	0.206	-1.231	0.117	0.229	0.134	0.183
Oils and fats	0.059	-0.035	-0.020	0.002	-0.174	0.009	-0.948	0.090	0.006	-0.013
Prepared food and drink	-0.311	-0.083	0.009	-0.015	-0.082	-0.024	-0.004	-0.913	-0.032	-0.046
Other foods	-0.312	0.140	0.057	0.040	0.039	0.058	0.026	-0.002	-0.715	0.034
Tobacco	0.148	0.017	0.035	0.045	0.083	0.036	0.030	0.140	0.020	-1.161
Expenditure	0.796	0.587	0.737	0.708	0.619	0.438	1.005	1.204	0.719	0.725

Source: estimated using the 2011 SUSENAS household survey data

**Table III-32. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2 Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.718*** -262.78	0.035*** 26.65	0.000 0.60	0.004*** 3.59	-0.031*** -16.18	0.015*** 13.14	0.003 1.12	-0.081*** -53.12	-0.068*** -48.13	-0.004*** -4.56
Fish	0.131*** 48.89	-0.968*** -410.91	0.010*** 10.52	0.015*** 11.96	0.040*** 17.84	0.041*** 33.79	0.020*** 7.30	-0.031*** -13.87	0.064*** 42.75	-0.020*** -18.79
Meat	0.009*** 2.97	0.012*** 7.49	-1.044*** -259.44	0.034*** 27.58	0.008*** 3.74	0.069*** 39.51	-0.032*** -13.45	0.038*** 21.87	0.035*** 25.84	-0.023*** -13.11
Eggs and milk	0.016*** 3.73	0.009*** 4.47	0.028*** 25.60	-1.090*** -417.43	0.054*** 15.47	0.004** 2.37	0.031*** 7.30	-0.036*** -12.34	0.028*** 14.90	0.052*** 31.80
Vegetables	0.030*** 6.88	0.063*** 23.73	0.037*** 21.08	0.070*** 29.41	-0.804*** -163.57	0.068*** 27.64	-0.040*** -8.90	0.069*** 26.72	0.079*** 31.66	0.084*** 41.40
Fruits	0.160*** 35.07	0.108*** 40.78	0.105*** 49.03	0.049*** 22.05	0.110*** 26.56	-1.069*** -302.92	0.044*** 9.48	-0.008*** -2.60	0.097*** 38.84	0.106*** 35.57
Oils and fats	-0.003 -0.43	0.039*** 11.10	0.014*** 5.80	0.055*** 15.37	-0.077*** -14.10	0.030*** 9.56	-0.872*** -101.11	-0.009** -2.19	0.073*** 18.00	0.053*** 19.30
Prepared food and drink	-0.142*** -112.78	-0.014*** -14.26	0.041*** 64.40	0.019*** 23.61	-0.012*** -11.52	0.005*** 5.73	0.023*** 18.21	-0.863*** -478.85	0.005*** 4.80	0.010*** 12.52
Other foods	-0.318*** -43.85	0.121*** 37.34	0.038*** 23.25	0.038*** 14.63	0.088*** 16.33	0.061*** 22.95	0.078*** 11.51	-0.111*** -18.10	-0.797*** -126.23	-0.018*** -7.43
Tobacco	0.012*** 8.70	-0.018*** -21.96	-0.008*** -11.68	0.025*** 33.94	0.038*** 35.61	0.027*** 25.76	0.016*** 11.75	-0.014*** -15.89	-0.002*** -2.64	-0.962*** -684.92
Expenditure	0.886*** 484.94	0.743*** 219.78	0.912*** 342.0	0.904*** 230.01	0.688*** 166.90	0.673*** 149.08	1.087*** 156.02	1.362*** 1315.22	0.831*** 92.61	0.902*** 503.55

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-33. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.700	0.035	0.003	0.009	-0.034	0.014	0.019	0.033	-0.066	0.007
Fish	0.174	-0.957	0.016	0.027	0.048	0.044	0.046	0.131	0.072	0.005
Meat	0.023	0.011	-1.042	0.038	0.004	0.067	-0.018	0.143	0.037	-0.014
Eggs and milk	0.030	0.008	0.031	-1.085	0.050	0.002	0.046	0.072	0.030	0.062
Vegetables	0.082	0.079	0.045	0.084	-0.792	0.073	-0.009	0.249	0.089	0.115
Fruits	0.214	0.124	0.113	0.063	0.123	-1.064	0.075	0.177	0.107	0.138
Oils and fats	-0.019	0.025	0.012	0.051	-0.094	0.023	-0.871	0.039	0.068	0.045
Prepared food and drink	-0.205	-0.048	0.032	0.004	-0.049	-0.010	0.004	-0.906	-0.009	-0.025
Other foods	-0.291	0.126	0.043	0.046	0.090	0.062	0.098	0.021	-0.793	-0.001
Tobacco	0.027	-0.018	-0.006	0.029	0.035	0.025	0.031	0.095	0.000	-0.952
Expenditure	0.755	0.633	0.777	0.770	0.586	0.573	0.926	1.160	0.708	0.769

Source: estimated using the 2011 SUSENAS household survey data

**Table III-34. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.718*** -221.04	0.045*** 25.42	0.024*** 19.96	0.025*** 16.80	-0.034*** -14.27	0.023*** 13.90	0.065*** 22.96	-0.107*** -50.24	-0.056*** -28.93	-0.003** -2.50
Fish	0.050*** 17.52	-1.001*** -514.92	-0.006*** -6.67	-0.010*** -8.07	0.009*** 4.57	0.034*** 26.87	0.013*** 5.52	0.045*** 24.39	0.016*** 12.36	-0.030*** -31.87
Meat	0.028*** 15.36	-0.006*** -5.40	-1.043*** -530.97	0.020*** 25.95	0.010*** 8.52	0.017*** 15.66	0.028*** 18.33	0.018*** 16.53	-0.004*** -4.87	-0.012*** -9.24
Eggs and milk	0.074*** 22.18	0.004** 2.02	0.030*** 27.30	-1.015*** -484.90	0.049*** 18.30	0.032*** 18.97	-0.006 -1.61	-0.050*** -16.23	0.055*** 31.78	0.032*** 28.34
Vegetables	-0.076*** -17.13	0.018*** 7.84	0.009*** 8.03	0.028*** 14.30	-0.775*** -161.04	0.005** 2.31	-0.040*** -9.41	-0.103*** -39.62	0.050*** 21.78	0.009*** 8.06
Fruits	0.117*** 26.56	0.124*** 44.55	0.069*** 30.21	0.071*** 27.95	0.059*** 16.92	-0.892*** -267.41	0.013*** 2.92	0.033*** 10.25	0.089*** 36.49	0.028*** 12.20
Oils and fats	0.120*** 17.78	0.013*** 3.69	0.031*** 17.23	-0.016*** -4.77	-0.058*** -10.68	-0.039*** -10.46	-0.864*** -99.84	-0.182*** -45.76	0.043*** 11.36	-0.017*** -8.54
Prepared food and drink	-0.116*** -90.22	0.006*** 7.19	0.032*** 42.01	0.011*** 11.61	-0.018*** -16.26	0.006*** 7.36	-0.018*** -14.62	-0.820*** -434.80	0.013*** 16.01	0.001 1.11
Other foods	-0.272*** -32.57	0.058*** 15.07	-0.005*** -2.47	0.083*** 27.52	0.119*** 21.62	0.067*** 20.54	0.089*** 12.83	-0.038*** -5.69	-0.776*** -120.85	-0.078*** -33.78
Tobacco	-0.016*** -15.75	-0.019*** -32.25	-0.006*** -7.23	0.011*** 21.77	0.006*** 8.88	-0.010*** -15.20	-0.004*** -4.29	-0.025*** -37.62	-0.021*** -44.64	-0.847*** -595.5
Expenditure	0.861*** 360.66	0.901*** 273.35	0.958*** 500.93	0.813*** 204.78	0.873*** 169.43	0.739*** 172.19	0.972*** 121.66	1.277*** 1106.96	0.807*** 82.44	0.957*** 918.37

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-35. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.697	0.059	0.031	0.030	-0.023	0.025	0.078	0.004	-0.052	0.017
Fish	0.065	-0.990	-0.001	-0.007	0.017	0.035	0.023	0.144	0.019	-0.013
Meat	0.035	0.001	-1.039	0.021	0.014	0.016	0.034	0.098	-0.003	-0.001
Eggs and milk	0.101	0.022	0.038	-1.007	0.064	0.036	0.009	0.077	0.060	0.058
Vegetables	-0.057	0.031	0.015	0.033	-0.765	0.007	-0.028	0.005	0.054	0.028
Fruits	0.154	0.149	0.080	0.082	0.079	-0.886	0.033	0.184	0.096	0.061
Oils and fats	0.125	0.018	0.034	-0.016	-0.055	-0.041	-0.858	-0.106	0.044	-0.008
Prepared food and drink	-0.153	-0.015	0.025	-0.003	-0.037	-0.006	-0.031	-0.842	0.004	-0.021
Other foods	-0.244	0.076	0.003	0.091	0.134	0.071	0.104	0.091	-0.770	-0.052
Tobacco	-0.009	-0.013	-0.002	0.012	0.010	-0.010	0.003	0.056	-0.021	-0.836
Expenditure	0.669	0.700	0.744	0.632	0.678	0.575	0.756	0.992	0.627	0.743

Source: estimated using the 2011 SUSENAS household survey data



**Table III-36. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.712*** -297.70	0.015*** 10.69	-0.008*** -12.84	0.024*** 22.60	-0.052*** -25.70	0.022*** 19.45	0.035*** 14.37	-0.031*** -16.30	-0.105*** -54.60	-0.021*** -46.43
Fish	0.004*** 2.79	-0.965*** -1128.5	0.013*** 18.84	0.009*** 11.02	0.034*** 28.59	0.010*** 11.39	0.018*** 13.39	-0.038*** -26.32	0.023*** 22.67	-0.002** -2.32
Meat	-0.014*** -14.79	0.007*** 12.44	-1.018*** -1186.9	0.002*** 5.62	0.011*** 15.90	-0.005*** -8.76	0.012*** 12.52	-0.001* -1.88	-0.005*** -9.10	0.003*** 3.44
Eggs and milk	0.085*** 35.40	0.033*** 18.69	0.009*** 8.65	-0.981*** -872.01	0.021*** 11.23	0.028*** 17.64	0.000*** -0.18	0.002*** 1.16	0.034*** 20.36	0.007*** 7.82
Vegetables	-0.081*** -20.96	0.048*** 22.42	0.014*** 13.15	0.011*** 6.93	-0.878*** -232.03	-0.020*** -10.35	-0.034*** -9.37	-0.086*** -31.60	0.073*** 34.37	0.006*** 6.19
Fruits	0.044*** 18.27	0.014*** 9.58	-0.001 -1.07	0.018*** 14.13	-0.026*** -11.10	-0.963*** -504.27	-0.030*** -10.47	0.027*** 12.38	0.028*** 18.47	-0.001 -1.31
Oils and fats	0.056*** 9.28	0.030*** 8.13	0.034*** 10.23	-0.014*** -3.61	-0.043*** -7.48	-0.032*** -8.31	-0.889*** -113.59	-0.133*** -30.84	0.096*** 22.12	0.017*** 5.45
Prepared food and drink	-0.041*** -28.54	-0.019*** -14.18	0.029*** 24.04	0.012*** 9.75	-0.004*** -2.79	0.020*** 20.25	-0.012*** -7.90	-0.880*** -502.34	0.009*** 7.86	0.027*** 24.88
Other foods	-0.411*** -43.50	0.125*** 19.04	0.074*** 11.24	0.100*** 15.91	0.248*** 30.73	0.111*** 17.46	0.220*** 24.98	0.028*** 2.85	-0.761*** -88.94	0.044*** 6.96
Tobacco	-0.003*** -45.21	-0.001*** -31.11	0.000*** 5.41	0.000*** 5.50	0.000*** 9.99	0.000*** -6.19	0.000*** 6.00	0.000*** 5.67	-0.001*** -31.20	-0.994*** -12093
Expenditure	0.789*** 271.88	0.966*** 418.77	1.018*** 535.53	0.789*** 179.44	0.967*** 160.40	0.930*** 206.08	1.027*** 94.07	1.181*** 1134.57	1.072*** 120.80	0.999*** 10864

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-37. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.688	0.043	0.006	0.035	-0.031	0.035	0.053	0.093	-0.093	0.011
Fish	0.008	-0.953	0.020	0.011	0.043	0.015	0.027	0.031	0.029	0.013
Meat	-0.015	0.015	-1.013	0.002	0.017	-0.002	0.018	0.052	0.000	0.012
Eggs and milk	0.109	0.061	0.023	-0.970	0.043	0.040	0.017	0.126	0.046	0.039
Vegetables	-0.077	0.060	0.020	0.013	-0.869	-0.016	-0.025	-0.017	0.079	0.021
Fruits	0.052	0.030	0.007	0.022	-0.014	-0.957	-0.020	0.108	0.035	0.017
Oils and fats	0.054	0.036	0.038	-0.015	-0.038	-0.029	-0.883	-0.083	0.100	0.026
Prepared food and drink	-0.061	-0.026	0.026	0.002	-0.009	0.016	-0.015	-0.877	0.007	0.021
Other foods	-0.418	0.128	0.076	0.097	0.250	0.111	0.223	0.064	-0.759	0.048
Tobacco	-0.002	0.008	0.006	0.001	0.008	0.003	0.007	0.060	0.004	-0.983
Expenditure	0.561	0.687	0.724	0.562	0.688	0.662	0.731	0.840	0.763	0.711

Source: estimated using the 2011 SUSENAS household survey data

**Table III-38. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.742*** -229.69	-0.019*** -11.26	0.014*** 14.59	0.018*** 11.36	-0.048*** -17.50	0.015*** 8.59	0.041*** 11.32	-0.092*** -31.80	-0.068*** -27.38	-0.019*** -24.44
Fish	-0.021*** -12.49	-0.942*** -731.94	0.020*** 33.24	0.007*** 6.37	0.026*** 19.69	0.011*** 10.04	0.002 1.08	-0.009*** -4.20	0.029*** 26.23	-0.011*** -21.89
Meat	0.021*** 12.26	0.030*** 31.17	-1.069*** -704.16	-0.005*** -5.52	0.014*** 10.37	0.005*** 5.38	-0.007*** -4.22	-0.004*** -2.53	0.029*** 23.72	0.009*** 9.01
Eggs and milk	0.029*** 10.93	0.013*** 8.23	0.002*** 2.38	-0.962*** -443.71	0.014*** 6.93	0.030*** 20.71	0.013*** 5.22	-0.018*** -8.39	0.017*** 9.82	0.010*** 11.76
Vegetables	-0.076*** -17.43	0.045*** 21.17	0.016*** 14.41	0.013*** 6.63	-0.850*** -196.42	-0.004* -1.81	-0.011*** -3.18	-0.042*** -13.48	0.058*** 26.11	0.011*** 12.10
Fruits	0.033*** 9.27	0.030*** 14.34	0.013*** 11.11	0.041*** 21.79	-0.004 -1.25	-0.933*** -339.85	-0.011*** -3.05	0.047*** 15.27	0.015*** 6.44	-0.008*** -8.45
Oils and fats	0.108*** 11.76	0.019*** 3.54	0.028*** 6.08	0.034*** 6.48	-0.003 -0.39	-0.001 -0.22	-0.903*** -99.17	0.042*** 6.58	0.080*** 14.49	0.027*** 6.17
Prepared food and drink	-0.047*** -36.83	-0.025*** -24.23	0.003*** 3.13	-0.016*** -16.54	-0.024*** -23.11	-0.006*** -6.43	-0.015*** -10.55	-0.941*** -671.75	-0.015*** -17.15	0.002*** 2.81
Other foods	-0.234*** -23.44	0.130*** 25.37	0.088*** 22.12	0.057*** 11.26	0.154*** 24.17	0.041*** 8.33	0.120*** 16.68	-0.015* -1.78	-0.780*** -100.98	-0.035*** -9.46
Tobacco	-0.027*** -31.12	-0.017*** -31.09	0.009*** 12.19	0.007*** 15.05	0.008*** 12.25	-0.006*** -10.54	0.001 1.22	0.011*** 16.34	-0.021*** -36.42	-0.895*** -676.29
Expenditure	0.906*** 368.70	0.912*** 405.87	0.990*** 446.31	0.878*** 212.02	0.841*** 191.55	0.766*** 188.97	0.914*** 135.69	1.232*** 1285.40	0.752*** 82.25	0.942*** 864.47

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-39. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.722	0.000	0.032	0.030	-0.039	0.021	0.104	-0.081	-0.057	-0.007
Fish	-0.001	-0.924	0.037	0.018	0.035	0.017	0.063	0.002	0.039	0.000
Meat	0.034	0.042	-1.057	0.002	0.020	0.009	0.034	0.004	0.034	0.017
Eggs and milk	0.052	0.034	0.022	-0.948	0.024	0.037	0.084	-0.006	0.030	0.023
Vegetables	-0.049	0.069	0.038	0.029	-0.838	0.005	0.071	-0.030	0.073	0.026
Fruits	0.066	0.060	0.040	0.060	0.012	-0.922	0.090	0.062	0.035	0.011
Oils and fats	0.127	0.037	0.044	0.046	0.007	0.005	-0.842	0.053	0.091	0.038
Prepared food and drink	-0.055	-0.033	-0.002	-0.021	-0.029	-0.011	-0.041	-0.942	-0.025	-0.002
Other foods	-0.200	0.161	0.116	0.077	0.170	0.052	0.226	0.001	-0.759	-0.016
Tobacco	-0.010	-0.001	0.024	0.017	0.016	-0.001	0.055	0.020	-0.013	-0.885
Expenditure	0.459	0.463	0.502	0.445	0.426	0.389	0.463	0.625	0.381	0.478

Source: estimated using the 2011 SUSENAS household survey data

**Table III-40. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.643*** -326.55	-0.007*** -4.53	0.009*** 7.01	-0.006*** -4.29	-0.017*** -13.81	0.024*** 16.90	-0.021*** -14.48	-0.036*** -24.99	-0.006*** -6.19	0.058*** 41.89
Fish	0.068*** 26.75	-0.839*** -390.64	0.136*** 90.18	0.156*** 35.32	0.084*** 48.69	0.111*** 65.93	0.083*** 52.90	0.056*** 27.89	0.093*** 59.36	0.088*** 51.26
Meat	-0.189*** -52.15	0.083*** 62.92	-1.271*** -478.84	0.016*** 12.05	-0.033*** -16.97	0.028*** 16.36	0.099*** 54.18	0.107*** 63.09	-0.031*** -25.20	0.012*** 6.77
Eggs and milk	-0.141*** -51.65	0.004*** 3.61	0.017*** 16.40	-1.050*** -647.84	0.006*** 4.45	-0.007*** -6.51	0.026*** 19.79	0.025*** 18.07	0.002* 1.73	0.056*** 50.60
Vegetables	-0.014*** -4.25	-0.013*** -7.46	0.009*** 4.93	0.031*** 19.73	-0.739*** -275.07	0.044*** 23.60	-0.017*** -8.42	-0.073*** -39.01	0.031*** 18.67	0.027*** 14.62
Fruits	-0.378*** -53.08	0.120*** 37.96	0.136*** 38.31	0.036*** 14.63	0.019*** 4.68	-1.181*** -281.47	0.076*** 18.27	0.131*** 39.00	0.012*** 4.73	0.049*** 14.18
Oils and fats	0.356*** 65.57	0.150*** 40.40	0.273*** 70.91	0.223*** 61.31	0.217*** 50.90	0.223*** 55.33	-0.753*** -176.90	0.050*** 12.15	0.266*** 69.12	0.267*** 68.12
Prepared food and drink	-0.155*** -100.55	0.005*** 5.09	0.057*** 57.98	0.027*** 31.68	-0.041*** -39.89	0.018*** 19.42	-0.013*** -14.84	-0.836*** -703.38	-0.022*** -28.17	0.026*** 28.77
Other foods	-0.240*** -60.52	-0.019*** -8.98	-0.019*** -9.54	0.020*** 11.05	0.006** 2.17	0.021*** 9.50	0.058*** 19.05	-0.134*** -56.48	-0.679*** -245.52	0.020*** 8.69
Tobacco	-0.082*** -34.13	0.008*** 8.33	0.019*** 17.81	0.045*** 53.02	-0.016*** -11.83	-0.005*** -4.71	0.058*** 45.41	0.036*** 33.47	-0.009*** -10.78	-1.182*** -700.60
Expenditure	0.668*** 760.08	1.088*** 897.65	1.275*** 568.64	1.130*** 781.98	0.841*** 482.76	1.387*** 447.52	0.893*** 393.75	1.183*** 1367.19	0.934*** 385.12	1.200*** 924.14

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-41. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.602	0.045	0.027	0.014	0.013	0.051	0.003	0.072	0.008	0.118
Fish	0.027	-0.830	0.142	0.160	0.077	0.121	0.081	0.082	0.093	0.103
Meat	-0.267	0.072	-1.271	0.013	-0.056	0.030	0.085	0.097	-0.038	0.007
Eggs and milk	-0.190	0.008	0.021	-1.048	-0.004	0.001	0.021	0.042	0.000	0.067
Vegetables	-0.007	0.021	0.022	0.044	-0.724	0.063	-0.004	0.001	0.040	0.069
Fruits	-0.477	0.097	0.133	0.029	-0.014	-1.184	0.055	0.099	0.001	0.032
Oils and fats	0.353	0.178	0.284	0.234	0.227	0.241	-0.743	0.114	0.272	0.303
Prepared food and drink	-0.214	0.003	0.060	0.027	-0.057	0.024	-0.022	-0.828	-0.026	0.031
Other foods	-0.252	0.005	-0.009	0.029	0.013	0.037	0.065	-0.078	-0.674	0.052
Tobacco	-0.144	0.005	0.021	0.045	-0.033	0.000	0.049	0.040	-0.014	-1.179
Expenditure	0.521	0.849	0.995	0.882	0.656	1.083	0.697	0.924	0.729	0.937

Source: estimated using the 2011 SUSENAS household survey data

**Table III-42. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.811*** -240.77	-0.007*** -3.36	0.027*** 11.81	-0.002 -1.21	-0.051*** -21.34	-0.004*** -2.31	-0.010*** -3.99	0.008*** 3.92	-0.030*** -18.08	0.002 1.14
Fish	-0.019*** -4.29	-1.014*** -225.03	0.033*** 12.36	0.551*** 37.46	-0.001 -0.42	0.053*** 22.54	0.024*** 7.72	-0.007* -1.82	-0.003 -1.51	0.033*** 11.85
Meat	0.171*** 26.23	0.060*** 15.43	-1.315*** -173.75	0.018*** 5.01	0.030*** 5.89	0.079*** 16.85	0.124*** 26.49	0.181*** 42.80	0.014*** 4.17	0.109*** 18.67
Eggs and milk	-0.072*** -5.77	0.058*** 9.41	0.021*** 2.93	-1.305*** -134.79	0.035*** 3.68	0.052*** 8.74	0.086*** 10.93	0.146*** 17.33	-0.013*** -2.47	0.189*** 26.07
Vegetables	-0.185*** -34.61	-0.008** -2.59	0.002 0.77	0.008*** 2.82	-0.818*** -137.03	0.012*** 3.63	-0.044*** -10.76	-0.057*** -14.77	0.006*** 2.50	-0.004 -0.92
Fruits	-0.004 -0.56	0.106*** 24.03	0.100*** 15.18	0.043*** 11.03	0.054*** 8.50	-1.247*** -154.30	0.078*** 12.61	0.057*** 10.51	0.006* 1.68	0.170*** 28.78
Oils and fats	-0.005 -0.67	0.023*** 5.97	0.078*** 18.59	0.031*** 9.19	-0.032*** -6.03	0.038*** 9.10	-0.982*** -115.06	-0.015*** -3.26	0.031*** 9.35	0.076*** 16.76
Prepared food and drink	-0.055*** -18.35	-0.017*** -6.97	0.045*** 20.82	0.027*** 13.24	-0.023*** -8.22	-0.001 -0.29	-0.046*** -15.56	-1.025*** -344.30	0.007*** 3.37	-0.020*** -8.67
Other foods	-0.295*** -33.08	0.037*** 5.81	0.068*** 11.15	0.034*** 5.50	0.046*** 6.08	0.031*** 4.36	0.095*** 12.28	-0.008 -1.03	-0.684*** -99.31	0.001 0.11
Tobacco	0.095*** 19.62	0.078*** 21.58	0.093*** 19.91	0.108*** 33.18	0.075*** 18.43	0.130*** 34.64	0.112*** 27.48	0.103*** 28.34	0.042*** 14.50	-1.076*** -193.20
Expenditure	1.007*** 587.21	0.905*** 372.68	0.669*** 122.52	0.864*** 115.22	1.095*** 237.52	0.832*** 213.04	0.816*** 152.49	1.171*** 436.63	1.126*** 101.22	0.816*** 184.57

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-43. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 1, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.801	-0.010	0.024	-0.004	-0.040	-0.007	-0.018	0.035	-0.025	-0.005
Fish	0.021	-1.008	0.032	0.552	0.023	0.053	0.024	0.040	0.006	0.033
Meat	0.282	0.087	-1.313	0.025	0.084	0.086	0.144	0.274	0.033	0.124
Eggs and milk	-0.019	0.068	0.020	-1.303	0.064	0.053	0.089	0.201	-0.002	0.192
Vegetables	-0.201	-0.020	-0.001	0.004	-0.818	0.008	-0.059	-0.047	0.007	-0.016
Fruits	0.058	0.119	0.099	0.046	0.088	-1.245	0.084	0.118	0.019	0.174
Oils and fats	0.062	0.037	0.077	0.034	0.003	0.041	-0.975	0.049	0.044	0.082
Prepared food and drink	-0.094	-0.036	0.041	0.021	-0.032	-0.008	-0.068	-1.030	0.005	-0.037
Other foods	-0.320	0.023	0.064	0.029	0.042	0.025	0.077	-0.004	-0.685	-0.014
Tobacco	0.162	0.092	0.092	0.111	0.111	0.133	0.119	0.167	0.055	-1.070
Expenditure	0.937	0.842	0.623	0.805	1.019	0.775	0.760	1.090	1.048	0.759

Source: estimated using the 2011 SUSENAS household survey data



**Table III-44. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.821*** -284.03	0.008*** 5.60	0.005*** 4.52	-0.009*** -8.08	-0.069*** -37.46	-0.012*** -10.79	0.000 0.15	-0.028*** -20.10	-0.031*** -22.69	0.012*** 11.14
Fish	0.029*** 8.20	-0.985*** -312.91	0.028*** 21.65	0.419*** 41.05	0.014*** 5.32	0.024*** 17.05	-0.002 -0.83	-0.004 -1.56	-0.016*** -9.95	-0.003* -1.90
Meat	0.020*** 16.68	0.031*** 32.11	-1.071*** -494.59	0.021*** 20.82	0.022*** 18.22	0.046*** 41.88	0.024*** 20.23	0.029*** 28.95	0.015*** 12.66	0.056*** 43.91
Eggs and milk	-0.018*** -8.03	0.003*** 2.46	0.005*** 4.78	-1.079*** -650.72	0.016*** 9.32	0.007*** 6.98	0.021*** 13.80	0.028*** 18.33	0.003*** 2.75	0.043*** 35.33
Vegetables	-0.254*** -50.11	-0.019*** -5.77	-0.004 -1.51	0.020*** 7.31	-0.817*** -161.50	0.005* 1.88	-0.027*** -6.45	-0.072*** -20.40	0.048*** 14.27	-0.046*** -14.37
Fruits	-0.014*** -4.90	0.039*** 25.58	0.069*** 35.57	0.020*** 13.77	0.031*** 12.99	-1.093*** -385.87	0.024*** 9.99	0.051*** 26.13	-0.006*** -3.47	0.063*** 33.12
Oils and fats	0.015*** 2.21	0.009** 2.43	0.029*** 9.51	0.042*** 14.01	0.001 0.28	0.025*** 7.59	-0.953*** -122.43	-0.088*** -20.18	0.056*** 14.78	0.057*** 14.56
Prepared food and drink	-0.069*** -32.30	-0.015*** -8.53	0.011*** 9.84	0.018*** 16.38	-0.028*** -14.65	0.017*** 14.26	-0.050*** -25.27	-0.913*** -382.59	-0.002 -1.44	0.003** 2.35
Other foods	-0.048*** -2.95	0.236*** 16.02	0.268*** 19.84	0.336*** 24.13	0.308*** 20.59	0.258*** 17.02	0.376*** 24.20	0.186*** 11.45	-0.314*** -23.13	0.095*** 5.72
Tobacco	0.125*** 43.98	0.092*** 38.27	0.153*** 57.95	0.129*** 50.74	0.104*** 39.91	0.129*** 50.05	0.120*** 43.88	0.124*** 49.37	0.060*** 21.92	-0.987*** -330.84
Expenditure	0.976*** 835.83	0.929*** 396.69	0.999*** 531.23	0.977*** 555.40	1.204*** 280.62	0.955*** 474.80	0.945*** 154.43	1.051*** 590.04	1.446*** 148.75	0.943*** 441.53

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-45. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 2, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.799	0.013	0.006	-0.006	-0.043	-0.010	0.005	-0.005	-0.015	0.018
Fish	0.063	-0.976	0.031	0.423	0.045	0.027	0.006	0.027	0.002	0.007
Meat	0.036	0.033	-1.069	0.023	0.045	0.047	0.027	0.049	0.030	0.060
Eggs and milk	0.003	0.007	0.006	-1.076	0.041	0.009	0.025	0.051	0.019	0.049
Vegetables	-0.293	-0.036	-0.007	0.016	-0.817	0.000	-0.039	-0.088	0.054	-0.062
Fruits	0.014	0.046	0.071	0.023	0.059	-1.090	0.030	0.079	0.011	0.070
Oils and fats	0.045	0.016	0.032	0.045	0.030	0.028	-0.947	-0.060	0.074	0.065
Prepared food and drink	-0.067	-0.017	0.011	0.019	-0.011	0.017	-0.051	-0.903	0.010	0.002
Other foods	-0.152	0.196	0.261	0.324	0.281	0.246	0.347	0.127	-0.318	0.056
Tobacco	0.155	0.100	0.156	0.133	0.133	0.132	0.127	0.154	0.077	-0.979
Expenditure	0.858	0.817	0.878	0.859	1.059	0.839	0.831	0.924	1.272	0.829

Source: estimated using the 2011 SUSENAS household survey data

**Table III-46. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.778*** -221.18	-0.024*** -14.10	-0.015*** -14.25	-0.020*** -16.37	-0.094*** -38.42	-0.028*** -20.15	-0.013*** -6.20	-0.122*** -72.66	-0.018*** -11.35	0.015*** 10.32
Fish	-0.001 -0.24	-0.913*** -251.85	0.010*** 6.90	0.342*** 33.33	0.028*** 10.33	0.024*** 16.74	-0.011*** -4.55	-0.002 -0.71	-0.002 -0.86	-0.015*** -8.77
Meat	0.125*** 28.99	0.121*** 28.88	-0.971*** -173.80	0.154*** 33.01	0.140*** 31.08	0.206*** 45.86	0.119*** 26.14	0.124*** 29.65	0.132*** 25.37	0.174*** 38.86
Eggs and milk	-0.058*** -8.07	0.051*** 13.65	0.08*** 25.06	-1.155*** -268.71	0.058*** 11.18	0.051*** 15.15	0.064*** 13.38	0.071*** 14.93	0.020*** 6.95	0.139*** 40.11
Vegetables	-0.276*** -48.56	-0.036*** -10.68	-0.043*** -16.71	0.002 1.02	-0.805*** -148.64	-0.010*** -3.72	-0.040*** -9.38	-0.135*** -32.69	0.056*** 18.69	-0.053*** -16.45
Fruits	-0.053*** -9.55	0.062*** 21.96	0.151*** 47.33	0.052*** 17.87	0.058*** 13.22	-1.104*** -234.30	0.047*** 9.72	0.075*** 20.46	0.020*** 5.69	0.057*** 17.45
Oils and fats	0.036*** 4.65	0.005 1.12	0.025*** 5.92	0.048*** 11.82	0.030*** 5.08	0.044*** 9.37	-0.911*** -105.54	-0.037*** -6.88	0.067*** 12.76	0.072*** 15.02
Prepared food and drink	-0.111*** -45.59	0.017*** 8.91	0.024*** 20.51	0.019*** 15.61	-0.025*** -11.17	0.030*** 21.11	-0.007*** -3.81	-0.764*** -317.15	-0.017*** -12.87	0.048*** 32.05
Other foods	0.096*** 5.51	0.300*** 17.86	0.267*** 16.80	0.378*** 23.24	0.381*** 24.17	0.311*** 18.54	0.403*** 22.75	0.213*** 11.68	-0.312*** -21.97	0.139*** 7.68
Tobacco	0.135*** 45.65	0.040*** 17.32	0.099*** 42.70	0.079*** 35.05	0.070*** 27.60	0.066*** 28.72	0.075*** 26.43	0.090*** 37.13	0.000 -0.17	-1.039*** -314.85
Expenditure	1.095*** 569.40	0.946*** 282.79	1.071*** 189.68	0.765*** 138.66	1.289*** 282.15	0.964*** 240.26	0.922*** 133.49	0.914*** 547.53	1.180*** 111.83	0.925*** 435.09

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-47. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 3, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.765	-0.029	-0.014	-0.025	-0.076	-0.030	-0.017	-0.134	-0.014	0.009
Fish	0.049	-0.903	0.015	0.341	0.062	0.028	-0.005	0.012	0.008	-0.005
Meat	0.144	0.119	-0.970	0.149	0.161	0.206	0.117	0.117	0.137	0.170
Eggs and milk	0.037	0.080	0.090	-1.151	0.110	0.061	0.081	0.117	0.037	0.167
Vegetables	-0.311	-0.060	-0.047	-0.009	-0.808	-0.018	-0.056	-0.180	0.052	-0.079
Fruits	-0.007	0.071	0.155	0.050	0.090	-1.100	0.051	0.086	0.029	0.064
Oils and fats	0.092	0.018	0.030	0.048	0.066	0.048	-0.904	-0.019	0.078	0.084
Prepared food and drink	-0.053	0.031	0.030	0.020	0.012	0.035	0.001	-0.744	-0.006	0.061
Other foods	0.088	0.287	0.266	0.369	0.390	0.307	0.394	0.187	-0.311	0.124
Tobacco	0.191	0.052	0.105	0.078	0.106	0.071	0.082	0.108	0.010	-1.028
Expenditure	0.938	0.810	0.917	0.656	1.104	0.826	0.790	0.783	1.010	0.792

Source: estimated using the 2011 SUSENAS household survey data

**Table III-48. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.793*** -231.03	0.022*** 12.89	-0.008*** -10.15	-0.003*** -3.61	-0.070*** -26.95	0.020*** 15.03	-0.038*** -15.70	-0.02*** -10.71	-0.051*** -35.77	0.057*** 40.68
Fish	0.153*** 34.58	-0.919*** -299.65	0.091*** 29.89	0.218*** 26.64	0.113*** 26.34	0.119*** 33.90	0.031*** 9.22	0.026*** 7.47	0.106*** 28.13	0.114*** 28.35
Meat	0.018*** 11.47	0.014*** 15.66	-1.046*** -645.06	0.012*** 11.95	0.019*** 12.54	0.038*** 31.71	0.003*** 2.63	0.001 0.68	0.014*** 12.11	0.042*** 29.89
Eggs and milk	-0.002 -1.08	0.011*** 11.82	0.004*** 4.95	-1.062*** -793.24	0.022*** 15.31	0.010*** 13.26	0.010*** 5.79	0.001 1.13	0.038*** 46.22	0.042*** 42.93
Vegetables	-0.072*** -8.52	0.112*** 15.25	0.098*** 14.79	0.130*** 20.26	-0.586*** -68.70	0.163*** 24.74	0.069*** 7.77	0.113*** 15.64	0.146*** 23.71	0.169*** 28.60
Fruits	0.217*** 28.66	0.160*** 29.69	0.155*** 30.16	0.130*** 28.84	0.248*** 37.25	-1.005*** -162.50	0.049*** 6.15	0.138*** 27.51	0.200*** 44.14	0.173*** 34.35
Oils and fats	0.820*** 49.02	0.690*** 48.80	0.775*** 57.78	0.816*** 57.46	0.865*** 51.93	0.827*** 54.55	-0.259*** -19.32	0.697*** 50.15	0.863*** 54.81	0.865*** 55.06
Prepared food and drink	-0.257*** -90.79	-0.059*** -28.61	-0.016*** -12.82	-0.077*** -50.57	-0.244*** -74.33	-0.145*** -76.38	0.090*** 41.35	-0.960*** -363.36	-0.163*** -69.07	-0.210*** -89.45
Other foods	-0.134*** -10.87	0.148*** 13.74	0.116*** 12.09	0.241*** 26.97	0.266*** 25.42	0.245*** 28.47	0.114*** 9.23	0.077*** 6.30	-0.457*** -41.51	0.188*** 20.61
Tobacco	0.126*** 56.99	0.043*** 24.87	0.050*** 29.65	0.069*** 46.84	0.092*** 50.41	0.060*** 34.58	0.013*** 5.29	0.040*** 25.10	0.052*** 29.89	-0.980*** -443.54
Expenditure	0.854*** 422.13	0.966*** 309.76	0.994*** 480.16	0.971*** 571.45	0.715*** 111.98	0.623*** 94.48	0.932*** 91.17	1.643*** 694.41	0.526*** 43.59	0.811*** 433.66

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-49. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 4, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.761	0.047	0.000	0.006	-0.065	0.020	-0.025	0.115	-0.054	0.072
Fish	0.164	-0.905	0.096	0.223	0.110	0.115	0.037	0.136	0.100	0.117
Meat	0.023	0.025	-1.043	0.016	0.013	0.033	0.008	0.104	0.007	0.042
Eggs and milk	0.008	0.025	0.008	-1.057	0.017	0.006	0.016	0.110	0.032	0.044
Vegetables	-0.013	0.152	0.111	0.145	-0.571	0.166	0.089	0.282	0.147	0.198
Fruits	0.293	0.210	0.170	0.148	0.270	-0.998	0.075	0.328	0.204	0.211
Oils and fats	0.837	0.707	0.781	0.822	0.863	0.824	-0.251	0.815	0.858	0.871
Prepared food and drink	-0.376	-0.117	-0.032	-0.097	-0.300	-0.170	0.058	-1.009	-0.187	-0.278
Other foods	-0.039	0.208	0.134	0.263	0.295	0.255	0.145	0.290	-0.451	0.236
Tobacco	0.166	0.073	0.060	0.080	0.100	0.060	0.028	0.186	0.051	-0.961
Expenditure	0.680	0.769	0.791	0.773	0.569	0.496	0.742	1.308	0.419	0.646

Source: estimated using the 2011 SUSENAS household survey data

**Table III-50. Conditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.669*** -144.34	0.029*** 12.60	0.019*** 13.65	0.016*** 8.79	-0.046*** -16.28	0.007*** 3.53	0.002 0.80	-0.106*** -40.67	-0.074*** -41.05	0.061*** 38.01
Fish	0.046*** 15.56	-0.966*** -407.18	0.001 1.52	0.231*** 48.01	0.020*** 8.41	0.043*** 28.92	-0.033*** -13.77	0.006*** 2.96	0.021*** 12.74	0.033*** 28.68
Meat	0.038*** 11.27	-0.002*** -1.42	-1.072*** -436.92	-0.013*** -8.82	0.013*** 5.51	0.038*** 20.17	-0.006*** -2.97	0.005*** 2.93	0.004** 2.40	0.022*** 13.33
Eggs and milk	-0.001 -0.11	0.017*** 7.03	-0.013*** -9.94	-1.122*** -390.06	0.009** 2.46	0.019*** 9.78	0.010*** 2.97	0.045*** 15.27	0.069*** 35.55	-0.005*** -2.98
Vegetables	-0.128*** -19.95	0.014*** 3.63	0.025*** 9.57	0.025*** 7.60	-0.732*** -124.37	0.020*** 5.53	0.014*** 2.90	0.002 0.63	0.031*** 9.90	-0.043*** -14.15
Fruits	0.037*** 4.75	0.118*** 28.37	0.062*** 20.00	0.059*** 17.05	0.063*** 11.04	-0.948*** -175.14	0.019*** 3.47	0.057*** 13.15	0.102*** 31.65	-0.030*** -7.69
Oils and fats	0.121*** 12.81	0.021*** 3.37	0.045*** 9.05	0.080*** 14.16	0.093*** 11.50	0.082*** 13.11	-0.798*** -92.01	-0.004 -0.65	0.142*** 21.50	0.076*** 14.16
Prepared food and drink	-0.210*** -88.16	-0.056*** -30.99	0.002 1.15	-0.012*** -6.80	-0.066*** -29.67	-0.039*** -23.16	-0.019*** -8.47	-0.895*** -334.77	-0.050*** -30.54	-0.040*** -25.86
Other foods	-0.331*** -34.53	0.089*** 15.60	0.030*** 6.76	0.139*** 26.67	0.098*** 13.34	0.133*** 26.93	0.124*** 18.47	-0.066*** -7.66	-0.634*** -79.25	0.032*** 5.46
Tobacco	0.029*** 21.35	0.004*** 5.40	0.005*** 10.71	-0.004*** -7.62	-0.038*** -44.09	-0.029*** -39.82	-0.007*** -6.61	0.010*** 15.34	-0.011*** -15.95	-0.984*** -1080.4
Expenditure	0.847*** 289.32	0.826*** 236.38	0.976*** 230.2	0.977*** 195.12	0.969*** 153.48	0.690*** 96.42	0.608*** 68.86	1.463*** 977.98	0.622*** 41.88	1.026*** 589.80

Note: Numbers in the first and second row are the estimated elasticities and t values respectively. Single, double and triple asterisk denote statistical significance at the 10%, 5% and 1% respectively.

**Table III-51. Unconditional Marshallian Price and Expenditure Elasticities of Food Demand, the QUAIDS Model, Stratum 5, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Cereals	-0.625	0.057	0.037	0.044	-0.030	0.016	0.026	-0.083	-0.060	0.078
Fish	0.093	-0.936	0.020	0.260	0.037	0.053	-0.006	0.030	0.037	0.051
Meat	0.066	0.015	-1.060	0.006	0.024	0.042	0.000	0.023	0.008	0.034
Eggs and milk	0.027	0.034	-0.001	-1.102	0.020	0.023	0.016	0.063	0.073	0.007
Vegetables	-0.100	0.032	0.037	0.045	-0.721	0.025	0.021	0.021	0.036	-0.031
Fruits	0.101	0.160	0.086	0.098	0.085	-0.933	0.064	0.087	0.128	-0.006
Oils and fats	0.195	0.069	0.073	0.125	0.119	0.100	-0.742	0.029	0.175	0.103
Prepared food and drink	-0.245	-0.081	-0.007	-0.026	-0.074	-0.053	-0.079	-0.896	-0.083	-0.047
Other foods	-0.258	0.136	0.058	0.183	0.123	0.150	0.178	-0.034	-0.602	0.058
Tobacco	0.050	0.017	0.015	0.012	-0.029	-0.027	-0.007	0.027	-0.010	-0.974
Expenditure	0.463	0.452	0.534	0.534	0.530	0.378	0.332	0.800	0.340	0.561

Source: estimated using the 2011 SUSENAS household survey data



**Table IV-1. Share of Nutrients Consumed by Households, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Source of calorie (%)										
All	0.5046	0.0296	0.0201	0.0262	0.0210	0.0216	0.1508	0.1909	0.0350	0.0000
Urban	0.4399	0.0276	0.0255	0.0345	0.0184	0.0207	0.1520	0.2410	0.0404	0.0000
Rural	0.5504	0.0311	0.0163	0.0204	0.0228	0.0223	0.1499	0.1555	0.0313	0.0000
Source of protein (%)										
All	0.4162	0.1665	0.0405	0.0519	0.0505	0.0085	0.0816	0.1531	0.0312	0.0000
Urban	0.3525	0.1509	0.0513	0.0647	0.0390	0.0078	0.0910	0.2084	0.0343	0.0000
Rural	0.4612	0.1776	0.0328	0.0428	0.0585	0.0090	0.0750	0.1140	0.0291	0.0000
Source of fats (%)										
All	0.1078	0.0407	0.0639	0.0604	0.0173	0.0061	0.4361	0.2056	0.0622	0.0000
Urban	0.0824	0.0336	0.0759	0.0740	0.0137	0.0055	0.3854	0.2626	0.0668	0.0000
Rural	0.1257	0.0456	0.0554	0.0508	0.0198	0.0065	0.4719	0.1653	0.0590	0.0000
Source of carbohydrate (%)										
All	0.6752	0.0016	0.0001	0.0116	0.0236	0.0333	0.0135	0.2103	0.0309	0.0000
Urban	0.6165	0.0015	0.0002	0.0164	0.0216	0.0338	0.0139	0.2592	0.0369	0.0000
Rural	0.7167	0.0018	0.0000	0.0081	0.0250	0.0330	0.0132	0.1756	0.0266	0.0000

Source: Calculated based on 86,283 household urban areas and 122,017 household rural areas, SUSENAS, Indonesia, 2011

**Table IV-2. Share of Nutrients Consumed by Households and Income Groups, Urban Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Source of calorie (%)										
Stratum1	0.4912	0.0207	0.0092	0.0186	0.0206	0.0154	0.1493	0.2399	0.0351	0.0000
Stratum2	0.4691	0.0250	0.0164	0.0266	0.0184	0.0174	0.1503	0.2373	0.0395	0.0000
Stratum3	0.4442	0.0283	0.0236	0.0332	0.0178	0.0199	0.1529	0.2392	0.0409	0.0000
Stratum4	0.4188	0.0315	0.0324	0.0415	0.0178	0.0229	0.1546	0.2376	0.0430	0.0000
Stratum5	0.3764	0.0327	0.0458	0.0523	0.0174	0.0280	0.1530	0.2509	0.0434	0.0000
Source of protein (%)										
Stratum1	0.4110	0.1148	0.0198	0.0424	0.0471	0.0060	0.1089	0.2171	0.0328	0.0000
Stratum2	0.3866	0.1407	0.0345	0.0546	0.0405	0.0067	0.0958	0.2054	0.0353	0.0000
Stratum3	0.3572	0.1572	0.0486	0.0639	0.0378	0.0076	0.0884	0.2041	0.0351	0.0000
Stratum4	0.3272	0.1712	0.0652	0.0752	0.0363	0.0086	0.0824	0.1986	0.0352	0.0000
Stratum5	0.2807	0.1706	0.0884	0.0875	0.0334	0.0102	0.0794	0.2167	0.0331	0.0000
Source of fats (%)										
Stratum1	0.1034	0.0290	0.0305	0.0500	0.0178	0.0039	0.4158	0.2857	0.0640	0.0000
Stratum2	0.0915	0.0326	0.0526	0.0627	0.0145	0.0044	0.3992	0.2731	0.0693	0.0000
Stratum3	0.0824	0.0348	0.0730	0.0730	0.0132	0.0052	0.3900	0.2603	0.0682	0.0000
Stratum4	0.0733	0.0371	0.0960	0.0847	0.0122	0.0062	0.3764	0.2459	0.0682	0.0000
Stratum5	0.0612	0.0347	0.1274	0.0994	0.0110	0.0080	0.3457	0.2480	0.0645	0.0000
Source of carbohydrate (%)										
Stratum1	0.6558	0.0014	0.0001	0.0054	0.0228	0.0237	0.0140	0.2466	0.0302	0.0000
Stratum2	0.6415	0.0015	0.0001	0.0111	0.0209	0.0274	0.0133	0.2495	0.0348	0.0000
Stratum3	0.6217	0.0015	0.0002	0.0156	0.0208	0.0321	0.0134	0.2578	0.0370	0.0000
Stratum4	0.6014	0.0014	0.0002	0.0211	0.0215	0.0377	0.0138	0.2626	0.0402	0.0000
Stratum5	0.5620	0.0015	0.0005	0.0288	0.0221	0.0480	0.0149	0.2797	0.0425	0.0000

Source: Calculated based on 86,283 household urban areas, SUSENAS, Indonesia, 2011

**Table IV-3. Share of Nutrients Consumed by Households and Income Groups, Rural Areas, Indonesia, 2011**

	Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
Source of calorie(%)										
Stratum1	0.5867	0.0267	0.0063	0.0122	0.0269	0.0196	0.1504	0.1464	0.0248	0.0000
Stratum2	0.5829	0.0284	0.0103	0.0152	0.0238	0.0216	0.1469	0.1425	0.0283	0.0000
Stratum3	0.5616	0.0309	0.0142	0.0187	0.0221	0.0218	0.1491	0.1512	0.0304	0.0000
Stratum4	0.5349	0.0338	0.0199	0.0236	0.0208	0.0226	0.1512	0.1595	0.0337	0.0000
Stratum5	0.4857	0.0356	0.0311	0.0326	0.0202	0.0256	0.1522	0.1779	0.0391	0.0000
Source of protein(%)										
Stratum1	0.4969	0.1515	0.0126	0.0295	0.0739	0.0082	0.0860	0.1161	0.0253	0.0000
Stratum2	0.4959	0.1650	0.0209	0.0347	0.0644	0.0091	0.0778	0.1047	0.0276	0.0000
Stratum3	0.4747	0.1793	0.0290	0.0407	0.0572	0.0090	0.0724	0.1089	0.0287	0.0000
Stratum4	0.4455	0.1940	0.0400	0.0481	0.0510	0.0089	0.0690	0.1129	0.0305	0.0000
Stratum5	0.3930	0.1981	0.0615	0.0609	0.0460	0.0099	0.0697	0.1275	0.0333	0.0000
Source of fats (%)										
Stratum1	0.1554	0.0446	0.0234	0.0372	0.0274	0.0064	0.4940	0.1606	0.0510	0.0000
Stratum2	0.1418	0.0444	0.0377	0.0426	0.0224	0.0065	0.4889	0.1590	0.0567	0.0000
Stratum3	0.1272	0.0455	0.0506	0.0487	0.0192	0.0063	0.4800	0.1639	0.0586	0.0000
Stratum4	0.1119	0.0476	0.0674	0.0564	0.0160	0.0061	0.4671	0.1658	0.0618	0.0000
Stratum5	0.0922	0.0462	0.0977	0.0691	0.0138	0.0071	0.4297	0.1775	0.0667	0.0000
Source of carbohydrate (%)										
Stratum1	0.7432	0.0019	0.0000	0.0025	0.0286	0.0279	0.0134	0.1621	0.0204	0.0000
Stratum2	0.7422	0.0017	0.0000	0.0048	0.0254	0.0311	0.0127	0.1588	0.0233	0.0000
Stratum3	0.7269	0.0017	0.0000	0.0068	0.0241	0.0321	0.0127	0.1702	0.0255	0.0000
Stratum4	0.7068	0.0017	0.0000	0.0101	0.0234	0.0341	0.0129	0.1822	0.0288	0.0000
Stratum5	0.6642	0.0017	0.0001	0.0164	0.0236	0.0400	0.0142	0.2049	0.0348	0.0000

Source: Calculated based on 122,017 household rural areas, SUSENAS, Indonesia, 2011

**Table IV-4. Nutrient Elasticity, Indonesia, 2011**

	Nutrient Expenditure Elasticity	Nutrient Price Elasticity									
		Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
<b>Calorie</b>											
All	0.6349	-0.2057	-0.0289	-0.0373	-0.5857	-0.0317	-0.2405	0.0342	-0.2843	-0.1201	-0.0324
Urban	0.7761	-0.3260	0.0524	0.0603	-0.3508	-0.0361	0.1929	-0.0767	-0.2276	-0.0650	0.0348
Rural	0.6575	-0.3162	0.0270	-0.1293	-0.6710	-0.0163	-0.2596	0.1344	-0.2499	-0.1602	-0.0656
<b>Protein</b>											
All	0.6648	-0.1473	-0.1477	-0.0594	-0.4855	-0.0475	-0.1892	0.0886	-0.2333	-0.0981	-0.0340
Urban	0.7470	-0.2691	-0.0769	0.0208	-0.2678	-0.0529	0.2182	-0.0397	-0.1878	-0.0404	0.0281
Rural	0.6885	-0.2585	-0.0996	-0.1332	-0.5626	-0.0378	-0.1931	0.1943	-0.1950	-0.1366	-0.0570
<b>Fats</b>											
All	0.7501	0.0401	-0.0334	0.0025	-0.1187	-0.0091	-0.0526	-0.2823	-0.2142	-0.0433	0.0065
Urban	0.7447	-0.1024	0.0316	0.0234	-0.0076	-0.0183	0.2078	-0.3349	-0.1991	0.0246	0.0299
Rural	0.7488	-0.0573	0.0410	-0.0164	-0.1374	-0.0097	-0.0122	-0.2297	-0.1717	-0.0518	0.0137
<b>Carbohydrate</b>											
All	0.5901	-0.3098	-0.0059	-0.0534	-0.7861	-0.0411	-0.3248	0.1826	-0.3362	-0.1619	-0.0483
Urban	0.7961	-0.4454	0.0895	0.0784	-0.5171	-0.0433	0.1848	0.0702	-0.2645	-0.1210	0.0391
Rural	0.6251	-0.4167	0.0433	-0.1733	-0.8794	-0.0197	-0.3626	0.2861	-0.3004	-0.2093	-0.0965

Source: estimated using the 2011 SUSENAS household survey data

**Table IV-5. Nutrient Elasticity by Income Groups, Urban Areas, Indonesia, 2011**

	Nutrient Expenditure Elasticity	Nutrient Price Elasticity									
		Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
<b>Calorie</b>											
Stratum 1	0.9065	-0.3617	0.0863	0.0970	-0.4981	0.0513	0.2161	-0.0947	-0.3775	-0.1689	0.1154
Stratum 2	0.8664	-0.3196	0.1010	0.0541	-0.4679	0.0910	0.1483	-0.1271	-0.3124	-0.1403	0.0410
Stratum 3	0.7577	-0.2955	0.0402	0.0392	-0.3765	-0.0376	0.1140	-0.1001	-0.2748	-0.0930	0.0089
Stratum 4	0.6764	-0.2586	-0.0115	-0.0157	-0.3215	-0.0493	0.0259	-0.1289	-0.2354	-0.1404	0.0153
Stratum 5	0.4968	-0.2756	-0.0151	-0.0076	-0.3214	-0.0210	0.0370	-0.0578	-0.2677	-0.0544	0.0113
<b>Protein</b>											
Stratum 1	0.8653	-0.3069	-0.0097	0.0701	-0.4042	0.0295	0.2200	-0.0715	-0.3414	-0.1281	0.1039
Stratum 2	0.8293	-0.2601	-0.0294	0.0221	-0.3833	0.0706	0.1527	-0.0773	-0.2727	-0.1010	0.0332
Stratum 3	0.7471	-0.2311	-0.1001	-0.0023	-0.2968	-0.0412	0.1276	-0.0501	-0.2321	-0.0628	0.0067
Stratum 4	0.6756	-0.1959	-0.1471	-0.0563	-0.2396	-0.0468	0.0366	-0.0621	-0.1978	-0.0882	0.0140
Stratum 5	0.4942	-0.2095	-0.1451	-0.0616	-0.2364	-0.0225	0.0503	-0.0022	-0.2325	-0.0124	0.0094
<b>Fats</b>											
Stratum 1	0.9777	-0.0598	0.0399	0.0926	-0.0690	0.0260	0.1639	-0.3663	-0.3013	-0.0589	0.0744
Stratum 2	0.9255	-0.0507	0.0472	0.0521	-0.0539	0.0768	0.1165	-0.3308	-0.2655	-0.0258	0.0422
Stratum 3	0.7876	-0.0233	0.0186	0.0138	-0.0422	-0.0162	0.0934	-0.3478	-0.2430	0.0034	0.0138
Stratum 4	0.7301	-0.0090	-0.0115	-0.0331	-0.0171	-0.0192	0.0228	-0.3389	-0.2234	0.0412	0.0185
Stratum 5	0.4999	-0.0252	-0.0003	-0.0745	-0.0210	0.0196	0.0589	-0.2528	-0.2569	0.0474	0.0273
<b>Carbohydrate</b>											
Stratum 1	0.8837	-0.4928	0.1223	0.1008	-0.6788	0.0676	0.2354	0.0443	-0.4326	-0.2235	0.1358
Stratum 2	0.8482	-0.4432	0.1483	0.0558	-0.6559	0.1039	0.1604	-0.0123	-0.3589	-0.2034	0.0430
Stratum 3	0.7488	-0.4324	0.0781	0.0502	-0.5382	-0.0479	0.1220	0.0380	-0.3138	-0.1486	0.0082
Stratum 4	0.6518	-0.3909	0.0152	-0.0103	-0.4799	-0.0667	0.0250	0.0003	-0.2663	-0.2501	0.0150
Stratum 5	0.4978	-0.4282	0.0033	0.0245	-0.5007	-0.0493	0.0151	0.0794	-0.2981	-0.1322	0.0011

Source: estimated using the 2011 SUSENAS household survey data

**Table IV-6. Nutrient Elasticity by Income Groups, Rural Areas, Indonesia, 2011**

	Nutrient Expenditure Elasticity	Nutrient Price Elasticity									
		Cereals	Fish	Meat	Eggs and Milk	Vegetables	Fruits	Oils and Fats	Prepared Food and Drink	Other Foods	Tobacco
<b>Calorie</b>											
Stratum 1	0.9287	-0.4693	0.0039	0.2274	-0.7281	-0.1562	0.0467	-0.0990	-0.2174	-0.1909	0.1487
Stratum 2	0.8789	-0.4669	0.0223	0.0425	-0.6124	-0.2078	0.0040	-0.1164	-0.1751	-0.0032	0.1457
Stratum 3	0.8864	-0.4566	0.0097	0.1255	-0.5869	-0.2295	0.0008	-0.0793	-0.1395	0.1619	0.1443
Stratum 4	0.7818	-0.3935	0.0996	0.0336	-0.5385	0.0589	0.2241	0.6642	-0.3763	0.0598	0.1337
Stratum 5	0.5016	-0.3122	0.0290	0.0289	-0.5037	-0.0504	0.0688	0.0078	-0.3005	-0.1090	0.0277
<b>Protein</b>											
Stratum 1	0.9251	-0.4002	-0.1163	0.1901	-0.6101	-0.1737	0.0672	-0.0378	-0.1786	-0.1618	0.1391
Stratum 2	0.8809	-0.3975	-0.1079	0.0223	-0.5200	-0.2142	0.0213	-0.0484	-0.1340	0.0256	0.1392
Stratum 3	0.8860	-0.3905	-0.1192	0.1060	-0.4850	-0.2286	0.0250	-0.0113	-0.0981	0.1811	0.1307
Stratum 4	0.7661	-0.3230	-0.0605	-0.0024	-0.4467	0.0498	0.2383	0.7333	-0.3283	0.0873	0.1248
Stratum 5	0.5015	-0.2414	-0.1247	-0.0207	-0.4033	-0.0555	0.0973	0.0669	-0.2408	-0.0646	0.0255
<b>Fats</b>											
Stratum 1	0.8646	-0.1302	-0.0007	0.1409	-0.1238	-0.0910	0.0742	-0.4567	-0.2141	-0.0425	0.1280
Stratum 2	0.8825	-0.1131	-0.0068	0.0498	-0.1291	-0.0908	0.0298	-0.4570	-0.1773	0.1905	0.1325
Stratum 3	0.8274	-0.1331	-0.0161	0.0850	-0.0709	-0.1141	0.0478	-0.4146	-0.1244	0.2665	0.0958
Stratum 4	0.8111	-0.0794	0.0427	0.0231	-0.0877	0.1106	0.1625	0.3161	-0.2127	0.1235	0.0795
Stratum 5	0.4702	-0.0561	-0.0085	-0.0258	-0.0741	0.0044	0.0780	-0.2627	-0.2287	0.0339	0.0081
<b>Carbohydrate</b>											
Stratum 1	0.9593	-0.5914	0.0245	0.2617	-0.9452	-0.1811	0.0318	0.0436	-0.2386	-0.2495	0.1574
Stratum 2	0.8825	-0.5953	0.0536	0.0394	-0.7859	-0.2514	-0.0091	0.0155	-0.1933	-0.0788	0.1514
Stratum 3	0.9099	-0.5823	0.0412	0.1415	-0.7828	-0.2762	-0.0218	0.0576	-0.1635	0.1153	0.1637
Stratum 4	0.7800	-0.5195	0.1509	0.0391	-0.7195	0.0414	0.2477	0.8195	-0.4678	0.0326	0.1588
Stratum 5	0.5253	-0.4330	0.0749	0.0531	-0.6973	-0.0758	0.0570	0.1403	-0.3548	-0.1847	0.0366

Source: estimated using the 2011 SUSENAS household survey data

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