Chapter 4

Determinants of Food, Health Care and Transportation Consumption in Mawlamyine, Myanmar

This chapter focuses on identifying, prioritizing and testing the significance of the determinants of food, health care and transportation consumption expenditures in Mawlamyine, Myanmar based upon our primary household survey carried out in 2009. Three SUR (seemingly unrelated regression) equations were estimated and the Wald test applied to observe the possible determinants of each aggregate category of consumption expenditure and to detect any impact from the partial construction of the East-West Economic Corridor. Although income is an important determinant of food expenditures, our Wald Coefficient test shows that income is not significant in the health care and transportation expenditure equations. Nor is proximity to the Economic Corridor significant in any equation. The results from the SUR further confirm that rural people are distinctly different from urban and semi-urban people in our study. This chapter is a revised version from the original paper presented at the Fourth Conference of The Thailand Econometric Society, Chiang Mai, Thailand in January 14 , 2011 and the paper gets published at *IJITAS* Vol.4 No.2. The full text of the issue will be available on website Airiti Library http://www.airitilibrary.com/ soon.

4.1 Introduction

Historically, such classical economists as Adam Smith, Jean-Baptiste Say, David Ricardo, Thomas Malthus and John Stuart Mill, chose to emphasize the roles of capital, land and labour in creating national wealth. Neoclassical economists such as William Stanley Jevons, Carl Menger, Leon Walras, and Alfred Marshall added the marginal impacts of tastes and technology to these endowments of production factors. Monetarists, notably Nicholas Kaldor and Milton Friedman, focused instead on the size of the money mass as the key determinant of the health of the economy.

Whatever the merits of these respective views, the development and growth of economies at the macro level certainly varies from one to another as a result of population, physical and monetary capital, human and natural resources, R&D, access to sea lanes, climatic conditions, technology, energy use, institutions and markets. In order to set effective developmental policy, administrators need to understand behaviour at the level of microeconomic households in urban, semi-urban and rural areas; especially in regards to the three arguably most important determinants of physical and economic well-being: food, health care, and transportation to jobs and markets. If such determinants can be understood, effective policies can be targeted at specific items of expenditure for particular subclasses of the population.

4 .2 Model Structure Based on the Selected Literature

The present study emphasizes two types of demand: direct and derived. Generally, food expenditure is considered to be a direct demand while health care and transportation expenditures are derived demands. Both types of demand are important to households in this era. Household expenditure patterns may provide information about their ability to use income as well as their allocation of income based on their priorities and their level. Normally, people from the poor countries and poor classes within those countries spend a much higher proportion of their income on food than that of their wealthier counterparts. This pattern, known as *Engel's Law*, predicts that the proportion of income spent on food falls as income rises even if the amount of expenditure on food rises. This is because the share of non-essential (luxury) products like alcohol, tobacco, and social spending is expected to rise. The current thesis will test Engel's law for Mawlamyine households.

Development economics theory and empirical research stress the role of education and health, as these are basic objectives of development and components of growth and development as an input to the aggregate production function (Todaro 2003). Although the availability of production factors is of potentially greater importance to development, the poorer nations continue to face challenges in health and education. Therefore, what sustainable development economists emphasize is health care expenditures in developing countries. While high income countries spend an average of $2505 per capita per annum on health care, South Asia countries spend only $69. These figures represent 9.9% of GDP in high income countries and 4.5% of GDP in South Asia countries (Rogers et. al., 2008, p. 87). From the efficiency viewpoint, although transportation costs seem to bear no direct effects on the economic growth of a country, they do have substantial impacts on the organization of trade and markets. Increasing transportation costs also limit the profits and international competitiveness of firms and industries; and may, after a few years, cause them to disappear entirely (Victoria Transport Policy Institute, 2009). Since transport is a major component of economic activities, current scholars such as

Debbage (1999), Boopen (2006), Dalal *et al.* (2008), and Cohen(2010) pay attention to transportation-related issues that can affect overall costs, productivity and efficiency. At the microeconomic level, households have already accorded their greatest importance to the direct demand for such basic needs as food, shelter and clothing. Increasing transportation cost, however, as a derived demand in household expenditures, seems to be more burdensome to the household's economic condition. Other things being constant, increasing transportation costs could reduce the family's spending ratio on food and nonfood items; and notably discourage the family from seeking health care and higher quality education. High transportation costs might also discourage people's working motivation when transportation costs have already taken a large section of family income. "It is essential to make daily travel easier and cheaper for the poor. This would enhance access to jobs and productivity at work" (Diaz-Olvera et al., 2008, p.4).

Since current academic research in quantitative economics and econometric analysis for Mawlamyine is virtually non-existent, our literature review points to similar topics in other countries or regions. A series of papers explored food expenditure (Jacobson et al 20010, Garcia and Grande 20010) and heath care expenditures (Beraldo et al. 2009, Rout 2006, Huang 2004, Gustafsson and Li 2004, Rous and Hotchkiss 2003, Matteo 1998, Parker and Wong 1997, Hansen and King 1996) at either the macro or meso level. Meanwhile, most of research in transportation sought to discover either a) the relationship between transportation investment and economic development at the macro level or b) the micro level impacts of transportation expenditures of the household. The majority of past research was limited to a single item: food or health or transportation.

In early history and theories, the relationship between food expenditure and income by Engel (1895) found that food expenditures are an increasing function of income and family size, but that food budget shares decrease with rising household income (Engel's Law). Starting from Engel's Law, economists and researchers are paying continued attention to the relationship between food expenditures and the income of households. Recently, Jacobson *et al.* (2010) observed household sizes, income and expenditures on food in Cyprus. They employed OLS regression to on a primary survey data for 2003 and found that food expenditures at home were more sensitive to household size than to household earnings. Sabates *et al.* (2001) compared the impact of changes in household composition on food expenditures in three Latin American countries using household level data. They determined that male household members place greater demands on household food supplies than female members, *ceteris paribus*. They found that the incorporation of age and gender information significantly improves the explanatory power of econometric models of food expenditures. We therefore included those socio-demographic factors in the initial model specifications to be tested in the present paper.

For health care expenditure regressions, the literature contains studies on both advanced and poor economies. Huang (2004) applied an OLS regression model to 1960-2001 Singaporean data to determine factors influencing health care spending. Five key determinants were chosen for testing: gross domestic product, government health operating expenditures, supply of doctors, the aging of the population and the use of Medisave withdrawal for the payment of health care expenditures. Huang found that GDP and the percentage of government health care expenditure to GDP were highly significant determinants of the growth of health care expenditure, while the aging of the population and the number of doctors per thousand people were not significant. Applying a similar OLS model to cross sectional 1999 data from Tribal Orissa in India, Rout (2006) explored the influence of income and education on household health expenditures. He determined that an increase of one rupee of income brings about an average 0.43 rupee increase in health expenditures, but that an educated person will spend 0.06 rupee more of that rupee on health care than an uneducated person.

As for transportation, Boopen (2006) searched for the relationship between transport infrastructure and economic growth for Africa using a dynamic panel estimation method. His sample comprised of 38 Sub-Saharan countries and 13 small island developing countries over the years 1980-2000. Boopen concluded that transport capital has been a contributor to the economic progress of these countries.

Dalal *et al.* (2008) employed Tobit models to determine household expenditures for transportation by income segment in Bangladesh. Ferdous *et al.* (2010) adopted the so-called multiple discrete continuous nested extreme value (MDCNEV) model formulated by Pinjari and Bhat (2010). With the MDCEV and by use of 2002 consumer expenditure survey for the United States, the researchers analyzed household expenditures for transportation–related items in relation to a host of other consumption categories. Their sensitivity analysis reported that households adjust their food consumption, vehicle purchases, and savings rates in the short run.

Diaz-Olvera (2008) investigated household transportation expenditure among income groups in three Sub-Saharan African cities. His results showed that transport is a major component of household expenditure, that there has been a considerable inequality between households, and that poor households cannot afford daily motorized transport services.

4.3 Hypotheses

Based upon the above theoretical background, empirical literature, and real-world challenges, the present research will test five hypotheses:

Hypothesis 1: Increases in household income result in a non-linear decrease in the Engel share of food expenditures, especially in rural, agricultural households.

Hypothesis 2: Other things equal, households with younger household heads, greater education, lower dependency ratios, more employment in transportation, and less distance from EWEC have lower Engel coefficients for food.

Hypothesis 3: The Engel coefficient for health expenditures is a negative function of income, total years of education, and space per capita; and a positive function of age of the household head and distance from the EWEC.

Hypothesis 4: The Engel coefficient for transportation expenditures is a positive function of income and distance from the EWEC.

Hypothesis 5: The Engel coefficient for transportation expenditures is a positive function of total years of education and employment in the transportation sector; and a negative function of age of the household head and casual employment.

4.4 Choosing Variables for the Model

In order to validate our objective of determining the effects of household income on expenditure shares for food, health care and transportation by rurality category (rural, semi-urban and urban), seemingly unrelated regression (SUR) analysis was used.

The three dependent variables food consumption, health care consumption and transportation consumption shares are computed as percentages of total household expenditure. Regarding the explanatory variables, we do care about theories and muticolinearity tests although we do not show the results of mulitcolinarity test here. Per capita household income (INCO) is calculated by dividing total annual income of the household by the number of members in the household. Distance variable (DISTANCE) stands for distance in kilometers from the EWEC to the sample urban/rural. Dummy (1,0) variables were created for both the urban (URBAN) and rural (RURAL) subsamples, with semi-urban being the implicit standard of comparison.

In order to gauge the effects of the characteristics of the household head decision on household expenditure, the gender of household head (GENDER_HH) was assigned the value 1 for those whose head was female head and 0 for males. AGE_HH represents the variable describing the age of household head in years. Variable descriptions used in our 3-equation SUR model are shown in Table (4.1)

Table 4.1. Variable names and their descriptions

Dependent variable names	Descriptions
Engel_food_exp Engel_health_exp Engel_transp_exp	Share of food expenditure Share of healthcare expenditure Share of transportation expenditure
Explanatory Variables	Descriptions
Income_per_cap	Household income per capita (Kyats)
Distance	Distance from the EWEC in kilometers
Urban	Urban =1, other =0
Rural	Rural =1, other =0
Gender_hh	Gender of household head
Age_hh	Age of household head
Employment_transp	Working in transportation (1, 0)
Employment_casual	Odd jobs (1, 0)
Employment_barber	Other small services shop (barber shop and sewing) (1,0)
Total_educ	Total years of education of all family members
Total_workers	Total workers
Dependency ratio	Dependency ratio = number of dependent over the number of workers
Space_capita	Living space per capita (square feet)
Percent_income_agric	Percent income from agricultural output (share)
Percent_income_transp	Percent income from transportation output (share)
Percent_income_sales	Percent income from other small scale merchandising and sales (share)
Percent_income_remittan	Percent income from migration remittance (share)
Income_squared	Household income per capita square

4.5 Basic Structure of Seemingly Unrelated Regressions Model

Regarding SUR regression, some previous researchers have emphasized the methodology and efficiency of that method. Zellner (1962), Binkley and Nelson (1988), Fiebig (2001) and Alba *et al* (2010) have evaluated the efficiency of the SUR.

Other researchers have applied SUR in their problem statement and research. For example, Sriboonchitta (1983) applied the SUR regression as one of the estimation methods in his dissertation. As that study also estimated share equations, it was similar to our study. Furthermore, Delaney and O'Toole (2005) applied SUR regression analysis in their decomposition of demand for public expenditure in

Ireland. Fosu (2007) also used the technique in his share equation study of the external debt-servicing and public expenditure composition for African economies. The latter two researchers focused on the SUR methodology and its constraints. Our study accepted the SUR which have been proven to be efficient and working within its constraints. The normal form of SUR regression model which is accepted by Zellner (1962) and Sriboonchitta (1983) as follows;

$y_i = x_i\beta_i + \varepsilon_i$ i= 1, 2, 3,……… N

In which the errors are contemporaneously correlated where y_i and ε_i

are T*1dimensional vectors, X_i is $T * K_i$ and $\beta_i$is a K_{i*1} dimensional vector. Stacking all N equations yields: In Matrix form:

$$\begin{bmatrix} y_1 \\ y_2 \\ ; \\ y_N \end{bmatrix} = \begin{bmatrix} x_1 & 0 & 0 & 0 \\ 0 & x_2 & 0 & 0 \\ 0 & 0 & . & 0 \\ 0 & 0 & 0 & x_N \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ . \\ \beta_N \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ \varepsilon_N \end{bmatrix}$$

This can be written in vector form as:

$y = x\beta + \varepsilon$

Where β is a K*1 -dimensional vector of unknown parameters that needs to be estimated and $K = \Sigma^N_{i=1} K_i$. For the $NT * 1$ vector of stacked disturbances the assumptions are:

(i) Error terms ar*e independent between observations i.e.* $E(\varepsilon) = 0$, and may have cross-equations

(ii) The $NT * NT$ covariance matrix is comprised of N^2 blocks of the form $E(\varepsilon_i\varepsilon_j') = \sigma_{ij} I_T$ where I_T is a $T * T$ identity matrix. These assumptions mean that the T disturbances in each of the N equations have zero mean, equal variance, and are uncorrelated and that covariance between contemporaneous disturbances for a pair of equations are potentially nonzero but equal, while non-contemporaneous covariances are all zero. Thus the full covariance matrix of *the stacked error term u* is given by $\omega = \Sigma \otimes I_T$ where $\Sigma = [\sigma_{ij}]$ is the $N * N$ contemporaneous covariance matrix and $\otimes$ denotes the Kronecker product.

Since we have "N" equations, each equation can be estimated separately as an individual equation is assumed to satisfy the classical linear regression model's assumptions. If we do so, it ignores the correlation between the disturbances of different equations. One of the methods to satisfy this is joint estimation i.e. SUR (Zellner,1962; Sibonchitta, 1983; Binkley and Nelson, 1988; Fiebig, 2003; Alaba et. al, 2010). The individual equations are related, even though supposedly they may not seem to be; they are only seemingly unrelated. The estimator of SUR is readily defined as the following form where there is N equations.

$$\hat{\beta}_{seem} = (X'\Sigma^{-1}X)^{-1}X'\Sigma^{-1}Y \qquad (4.1)$$

With asymptotic covariance matrix given by

$$Var(\hat{\beta}_{seem}) = (X'\Sigma^{-1}X)^{-1} \qquad (4.2)$$

Where $\Sigma^{-1} = \Sigma_c^{-1}\Theta I$ (4.3)

$$\Sigma_c = \begin{bmatrix} \sigma_{11} & . & . & \sigma_{1N} \\ . & . & . & . \\ . & . & . & . \\ \sigma_{N1} & . & . & \sigma_{NN} \end{bmatrix} \text{ and } E(\varepsilon_i \varepsilon_j') = \sigma_{ij} I, \text{ I, j= 1, 2,3,..........N} \qquad (4.4)$$

"The most empirical applications Σ is unknown, and so the estimator $\hat{\beta}_{seem}$ cannot be applied. However, EGLS can be utilized by substituting $\hat{\Sigma}^{-1}$ for Σ^{-1} in equation (4.1) where $\hat{\Sigma} = \hat{\Sigma}_c \Theta I$

$$\text{and } \hat{\Sigma}_c = \begin{bmatrix} \hat{\sigma}_{11} & . & . & \hat{\sigma}_{1N} \\ . & . & . & . \\ . & . & . & . \\ \hat{\sigma}_{N1} & . & . & \hat{\sigma}_{NN} \end{bmatrix} \quad (4.5)$$

and $\hat{\sigma}_{ij} = \dfrac{\hat{e}_i \hat{e}_j}{T}$ where $\hat{e}_i = Y_i - X_i \hat{\beta}_i and \hat{e}_j = Y_j - X_i \hat{\beta}_j$, I, j= 1,………, N (4.6)

The estimator $\hat{\beta}_{seem}$ and $\hat{\sigma}_{ij}$ from equation 1 and 6 respectively are frequently referred to as Zellner's seemingly unrelated regression estimator. Since $\hat{\sigma}_{ij}$ from equation (6) is biased because of the presence of T in the divisor and, generally, "the number of explanatory variables in each equation can be different, one cannot carry out the usual single equation procedure of correcting for degree of freedom" (Sriboonchitta, 1983, p. 78-79).

It is well known that the GLS estimator reduces to OLS (ordinary least squares) when:

(i) there is an absence of contemporaneous correlations ($\sigma_{ij} = 0$, $i \neq j'$); or

(ii) The same sets of explanatory variables are included in each equation ($X_1 = X_2 = \ldots = X_N$). A more complete characterization of when OLS is equivalent to GLS is given in Baltagi (1989) and Bartels and Fiebig (1991).

Efficiency of seemingly unrelated regression estimator over the OLS which have been proved by Alba et. al (2010). [24]

Joint normality of error terms in 3 equations SUR which have been given as follows by Alaba et. al (2010);

$$\beta = \begin{bmatrix} \beta_1 & 0 & 0 \\ 0 & \beta_2 & 0 \\ 0 & 0 & \beta_3 \end{bmatrix} \qquad \varepsilon = \begin{bmatrix} \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \end{bmatrix}$$

Joint Normality of error terms $\varepsilon \sim$ N(0, $\sum \Theta I_3$), $\sum = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12}^2 & \sigma_{13}^2 \\ \sigma_{21}^2 & \sigma_{22}^2 & \sigma_{23}^2 \\ \sigma_{31}^2 & \sigma_{32}^2 & \sigma_{33}^2 \end{bmatrix}$

Where $Y_1 = N(X_1\beta_1, \sigma_{11}^2)$

$Y_2 = N(X_2\beta_2, \sigma_{22}^2)$

$Y_3 = N(X_3\beta_3, \sigma_{33}^2)$

4.6 Empirical Findings

In our three SUR regression equations, the dependent variables are normalized so as to clearly visualize the individual allocation of expenditure categories in the form of shares. Explanatory variables in our model include household socio-economic variables, demographic variable, and location variables. Dummy variables in household employment, job and rurality will capture the non linear effect in each regression equation.

[24] . More details in Zellner (1962) and Alaba et al. (2010).

(1) Food expenditure regression equation

We assume that fourteen variables might potentially determine the expenditure of the households on food: income per capita, income per capita squared, age of the household head, gender of the household head, total years of education of family members, living space per capita, the dependency ratio, working in transportation employment (1,0), distance from the East West Economic Corridor, share of agriculture income, share of remittance income, share of small-scale merchandising and sales income, and the degree of rurality (rural = 1, urban or semi-urban = 0). The choice of the above variables was motivated by both consumption theory and the specification of the hypotheses to be tested. We presumed that the distance variable and working in transportation might affect the household food expenditure as the road transportation system has been upgraded in recent years in Mawlamyine. Furthermore, the shares of agricultural income and remittance income are chosen for inclusion since some quantity of remittances from migrants was revealed through our survey. The reason for choosing the share of small-scale merchandising and sales income variable is in order to reflect any significant impact of roads on those professions that require traffic and shipments to flow smoothly.

(2) Health care expenditure regression equation

Ten variables were assumed to potentially determine the share of health care expenditures of households. First of all, since consumption theories have postulated and proved that household income has a positive influence on the household health condition, income per capita becomes our main explanatory variable. Additionally, the age of the household head and their education level might explain the households' health condition. Furthermore, greater living space per capita will improve the quality of the air and reduce the possibility of contagion transfer among household members. The location of the household in rural, semi-urban or urban areas is also thought to affect the accessibility to health care. Other small services job such as barbershop and sewing have some negative effects on family health status due to related occupational hazards. Since Myanmar people generally do not know to wear mask cover during their work jobs where they come into contact with dust, link, hair or other particles that could be breathed into the lungs, there is the potential for these worker to be more susceptible to health issues and disease. Regarding sewing or seamstress jobs, it is supposed that long hours of sitting in the same position frequently leads to muscular stiffness. Therefore, we expect that thse jobs will have a negative impact on family health status. In our regression, this situation is reflected in the assumption that the more time an individual spends in the barber profession then the more money they will spend on health care. On the other hand, we assume that households with remittance income from migration will have more liquid cash to spend on health care.

(3) **Transportation expenditure regression equation**

As our target is to test whether rurality affects transportation expenditure, rural, urban and distance variables have been taken into our model apart from income per capita which was presumed to be the most important determinant to decide transportation expenditure of the household. Odd job employment status and employment in such transportation sector services as trishaw, pony cart, bus driver and motor cycle rider (cycle taxi) might also have a non linear effect on households' transportation expenditures. Besides, some socio demographic factors such as total workers, the total years of family education, the age of the household head, living space per capita and the dependency ratio might have effects on family's transportation expenditure. Altogether, these eleven variables were included in the model to find out the determinants of household's transportation expenditure equation regression.

Table 4.2 Seemingly Unrelated Regression Results: Determinants of Food, Health, and Transportation Consumption in Mawlamyine, Myanmar, 2009

(1) Food Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.650426	0.04162	15.6280	0.0000
Income_per_cap	-7.76E-08	0.00000	-6.0832	0.0000
Income_squared	4.00E-15	0.00000	4.8526	0.0000
Age_hh	0.00205	0.00066	3.1054	0.0020
Total_educ	-0.001974	0.00040	-4.9098	0.0000
Space_capita	-0.001078	0.00045	-2.3736	0.0178
Depend_ratio	-0.020829	0.00702	-2.9654	0.0031
Employment_transp	-0.073603	0.01713	-4.2972	0.0000
Distance	0.029935	0.01470	2.0359	0.0420
Percent_income_agric	-0.074056	0.03461	-2.1397	0.0326
Percent_income_sales	-0.048376	0.02383	-2.0303	0.0426
Percent_income_remittan	-0.034972	0.02284	-1.5315	0.1259
Rural	-0.073168	0.02296	-3.1872	0.0015
Urban	-0.005001	0.01859	-0.2690	0.7880
Gender_hh	0.0072	0.01570	0.4585	0.6467

R – squared = 0.323
Adjusted R-squared = 0.295

(2) Health Care Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.01807	0.01780	-1.01479	0.3104
Income_per_cap	0.00000	0.00000	0.34302	0.7317
Age_hh	0.00065	0.00028	2.29106	0.0222
Total_educ	0.00025	0.00017	1.43643	0.1512
Space_capita	0.00042	0.00020	2.16140	0.0309
Depend_ratio	-0.00307	0.00302	-1.01684	0.3095
Rural	0.02675	0.00994	2.68981	0.0073
Urban	-0.00482	0.00811	-0.59431	0.5524
Employment_barber	-0.01677	0.00836	-2.00552	0.0452
Percent_income_remittan	0.02011	0.01031	1.95047	0.0514
Distance	-0.00715	0.00642	-1.11419	0.2655

R – squared = 0.097
Adjusted R-squared = 0.071

(3) Transportation Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.05650	0.03621	1.56056	0.1189
Income_per_cap	0.00000	0.00000	0.94724	0.3437
Age_hh	-0.00147	0.00049	-2.98513	0.0029
Total_educ	0.00141	0.00037	3.82023	0.0001
Space_capita	0.00065	0.00036	1.81310	0.0701
Depend_ratio	0.01454	0.00683	2.12846	0.0335
Employment_transp	0.05483	0.01308	4.19062	0.0000
Employment_casual	-0.02760	0.01213	-2.27510	0.0231
Rural	0.03801	0.01764	2.15524	0.0314
Urban	0.01356	0.01422	0.95343	0.3406
Total_workers	0.00333	0.00694	0.48020	0.6312
Distance	-0.00347	0.01113	-0.31192	0.7552
Determinant residual covariance		4.42E-07		

R – squared = 0.206
Adjusted R-squared = 0.181

Our first model's results (Table 4.2) follow Engel's law. For example, if household income increases then the relative share of food expenditures seems to go down. The results further demonstrate that the Engel share will increase if the household head is older. Total years of education, space per capita, working at a transportation job, income from agriculture and income from sales give us the expected, positive signs in terms of their significant effects on food consumption. However, the urban variable and the gender of the household head have no significant effect in the food consumption model for Mawlamyine, Myanmar. Gender is not a significant variable to explain the family food consumption expenditure in Garcia and Grande (2010) too. However, this result is distinctly different from Sabate et al. (2001) who found that gender description changed the family food demand function. For example, male household members place greater demand on food.

As for health care consumption expenditures in Mawlamyine, surprisingly, income, years of education, the dependency ratio, the urban area and distance from the East-West Economic Corridor do not seem to matter. In other words, households in the Mawlamyine area seem to undermine the importance of health care for their future. However, the age of the household head and living in rural areas positively affects the health care consumption of the family. As expected, households with more income from remittances have a greater chance to access health care services in Mawlamyine while small service jobs such as barbershop and sewing workers seem also to be stronger than we expected - maybe because of fewer injuries or accidents or high resistance. This is perhaps because of the steady nature of the work, meaning that there is always cash on hand to go to the doctor or pharmacy when needed.

With regards to transportation consumption, firstly we thought that transportation consumption would rise if the family had more workers. However, the total worker variable is not significant in our results. Nor is the distance from the EWEC significant, even though it has the expected sign.

Therefore, as a second step, we applied the Wald Coefficient test to decide whether those insignificant variables should be omitted from the model or not. The results are shown in Table (4.3).

Table 4.3 Wald Coefficient Test

Null Hypothesis: Percent_income_remittan= 0, urban=0, Gender_hh=0

Test Statistic	Value	df	Probability
Chi-square	2.667876	3	0.4457

Null Hypothesis: Income_per_cap=0, Total_educ=0, dependent=0, urban=0,distance =0

Test Statistic	Value	df	Probability
Chi-square	4.617193	5	0.4644

Null Hypothesis: Income_per_cap=0, urban=0, Total_workers=0,distance=0

Test Statistic	Value	df	Probability
Chi-square	2.526494	4	0.6399

The Wald coefficient test proves with a high level of probability that we cannot reject the null hypothesis of normalized variables which are "0" in our test; we may thus dispose of those variables which are not significant in the model. Table (4.4) presents the results after removal of those variables from the regression; the estimates and associated standard errors proved to be more efficient than before.

Table 4.4 Seemingly Unrelated Regression Results After Wald Test

(1) Food Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.660255	0.04058	16.27186	0.00000
Income_per_cap	-7.55E-08	0.00000	-5.97385	0.00000
Income_squared	4.02E-15	0.00000	4.81750	0.00000
Age_hh	0.001828	0.00064	2.87373	0.00410
Total_educ	-0.002038	0.00038	-5.37345	0.00000
Space_capita	-0.001123	0.00044	-2.53922	0.01130
Depend_ratio	-0.022307	0.00689	-3.23777	0.00120
Employment_transp	-0.068294	0.01693	-4.03377	0.00010
Distance	0.023725	0.01165	2.03634	0.04200
Percent_income_agric	-0.065568	0.03418	-1.91845	0.05530
Percent_income_sales	-0.035201	0.02309	-1.52468	0.12760
Rural	-0.068417	0.02190	-3.12374	0.00180

R – squared = 0.312
Adjusted R-squared = 0.296

(2) Health Care Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.03346	0.01689	-1.98098	0.04790
Age_hh	0.00090	0.00030	3.00908	0.00270
Space_capita	0.00052	0.00020	2.55248	0.01080
rural	0.01850	0.00852	2.16966	0.03030
Employment_barber	-0.00804	0.00898	-0.89576	0.37060
Percent_income_remittan	0.01400	0.01056	1.32613	0.18510

R – squared = 0.083
Adjusted R-squared = 0.071

(3) Transportation Expenditure Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.06552	0.03200	2.04767	0.04080
Age_hh	-0.00150	0.00049	-3.03833	0.00240
Total_educ	0.00168	0.00029	5.71828	0.00000
Space_capita	0.00066	0.00034	1.95281	0.05110
Depend_ratio	0.01248	0.00540	2.30908	0.02110
Employment_transp	0.05391	0.01313	4.10569	0.00000
Employment_casual	-0.02782	0.01203	-2.31285	0.02090
Rural	0.02970	0.01386	2.14239	0.03240
Determinant residual covariance		5.43E-07		

R – squared = 0.2
Adjusted R-squared = 0.184

After rerunning the SUR regression, the percent income from other small scale merchandising and sales does not seem to significantly affect the households' food consumption. Nonetheless, it may be noted that the sign of its coefficient is negative, which is what one would expect in that small scale merchandising could help to contribute to the food consumption of households. On the other hand, a family with more education can handle reductions in food consumption or, alternatively, they may have other expenditures which are more important than food consumption. However, living one more kilometer closer to the EWEC has a positive and significant effect of .0234 on the share spent on food consumption. This is can be possible because those who live close to the road and have greater access to transportation might have more chance to go the grocery store in general. Furthermore, people living in rural areas could save 0.068 food consumption share since rural people have a greater chance to access food such as vegetables. They also have a lower chance to buy snacks for children compared with those of urban and semi-urban households.

Since the age of the household head, living space per capita and living in a rural area all exert a positive impact on health care expenditures, rural families have more possibilities to use their 0.018 share on health care than do urban and semi-urban families. The dependency ratio in food consumption and transportation consumption are significant, but paradoxically, it is negative in the case of food consumption. This would imply that, if a family's dependency ratio increases, then the family is sure to increase transportation expenditure share by 0.012. Additionally, increasing the age of household head lessens the share of transportation by 0.0015. Furthermore, people employed in odd jobs seem not to need transportation services or they are not spending money on transportation. It may be inferred that they go by bicycle or on foot to a relatively nearby workplace.

These modest impacts of transportation on expenditure patterns come as no surprise, since only 18 km of the 200-km EWEC have been finished. Furthermore, the majority of the people in the study area know nothing about the EWEC. We predict, however, that the effects of improved transportation infrastructure will be visible some years in the future, after the road has been built completely.

4.7 Conclusion

Of the five hypotheses set out for testing at the beginning of this paper, only two were confirmed (could not be rejected) by the estimation results. These are;

Hypothesis 1: Increases in household income results in a non-linear decrease in the relative share of food expenditures, especially in rural, agricultural households.

Hypothesis 5: The Engel coefficient for transportation expenditures is a positive function of total years of education and employment in the transportation sector; and a negative function of age of the household head and casual employment.

However, the three other hypotheses were rejected for the following reasons:

Hypothesis 2: Other things equal, households with younger household heads, greater education, lower dependency ratios, more employment in transportation, and less distance from EWEC have lower Engel coefficients. (Rejected because of higher dependency ratio.)

Hypothesis 3: The Engel coefficient for health expenditures is a negative function of income, total years of education, and space per capita; and a positive function of age of the household head and distance from the EWEC (Rejected because only age was significant with the correct sign.)

Hypothesis 4: The Engel coefficient for transportation expenditures is a positive function of income and distance from the EWEC. (Rejected because neither variable was significant.)

Thus, even though income or income per capita is generally assumed to determine family socio-economic behaviour, the Mawlamyine case differs except for food consumption. Mawlamyine income per capita can neither determine the family's health care nor transportation consumption. This may be because both health care and transportation are derived demands.

Based on our findings from the SUR models, rural people have a chance to reduce their food consumption expenditure but spend more on health care expenditure and transportation. Since the current paper has left aside the issue of poverty, we cannot precisely discuss the impact of rurality conditions. It does, however, seem that rural people have a better chance to reduce their poverty in that they have more access to health care and less access food consumption.

On the other hand, people in the Mawlamyine area should be given more education and knowledge since the total years of education does not significantly determine health care or consumption patterns. Since income does not affect the use of health care, we may deduce that families in Mawlamyine lack the necessary knowledge to take care of their individual lives. We have also observed from the survey results that the majority of young people from especially the rural and semi-urban samples pay little attention to getting a quality education. What they prefer is to migrate to a border area or into Thailand, get a job, and send back remittances to their home town. Thus, in one village we found only elderly people and school age children. Households in that village are more likely to stay because of better shelter, but they lack knowledge and skills gained from a formal education.

For the SUR regression result, though Zellner (1962) and Alba et al. (2010)) had already proved it to be more efficient than OLS, we also used and checked the OLS regression for the sake of our results' efficiency. However, we haven't provided the results of OLS regression in this chapter.