CHAPTER V

EMPIRICAL RESULTS

This chapter presents the result of regression analysis using data of 24 countries for the period from 1997-2004. In fact all the classical assumptions must be met for OLS estimates to be BLUE, when assumption is violated, we must determine which of the properties no longer holds. It turns out that applying OLS directly to the structural equations of simultaneous system produces biased estimates of the coefficients. Such bias is called simultaneous equations bias or simultaneity bias. Although there are number of econometric estimation techniques available that help mitigate the bias inherent in the application of OLS to simultaneous equations systems, the most frequently used alternative to OLS is called two-stage least squares (2SLS) and because the equations of this study is simultaneous equations we used 2SLS.The result presented separately in according to the model of the study.

5.1Under 5 mortality rate as health indicators.

Equation 1.1. Dependent variable under 5 mortality rate.

This equation shows the effect of economic and socioeconomic factors at health. Theory proved that economic factors effect directly on health status. Improved economy produces more 'life sustaining' necessities such as food, shelter, health care and broadening their distribution.At this equation the variable that represent economy is the real GDP per capita (ppp). The correlation coefficient associated with per capita GDP has negative sign as expected but statistically not significant that means the sign go with theory but it is not significant. Second variable is dependency ratio which is percentage of population aged less than 15 and 60+years (age) that mean they are risky group of population and that effect negatively on health status .In this equation it has negative sign as expected but statistically not significant. The third variable is the percentage of governmental health expenditure from the total health expenditure. It is agreed that increasing governmental expenditure lead to improve health status .In this equation the correlation coefficient associated with it has positive sign , not expected and statistically significant. The equation shows that increasing governmental health expenditure one percent lead to the increasing of the under 5 mortality rates 0.4percent. That is because the governmental spending is inefficient and that had been proved in many studies in these countries because they depend mainly on a low quality inefficient governmental expenditure, another reason is that

the total governmental expenditure on health does not reflect the expenditures that have direct impact on health services such as recurrent expenditure. Fourth variable total health expenditure it is agreed that increase health expenditure lead to improve health status .in this equation the correlation coefficient associated with it has negative sign as expected but not significant .Fifth variable is EDU (gross enrollment ratio).when education improve in society lead to improve life style and improve health status. In this equation the relation with education is negative as expected and statistically significant. Increase gross enrollment one percent lead to decrease under 5 mortality 0.9 percent. Last variable is geographical factor theory prove that geographical factors affect health. In this equation used dummy variable the correlation coefficient associated with it has negative sign change the place from Africa to Asia associated with decrease under 5 mortality rate 17.5 percent.

Table 5.1 Result of equation 1.1

Variable	Note	Coefficient	Std. Error	t-Statistic	Prob.
constant	C	214.9234	102.0625	2.105803	0.0366
Per capita GDP (PPP)	LOG(GDP)	-20.81439	15.53828	-1.339555	0.1821
Dependency ratio	DR	-0.331354	0.734430	-0.451171	0.6524
Percentage of governmental expenditure from total health expenditure	GHE	0.490589	0.237777	2.063232	0.0405
Total health expenditure	LOG(THE)	-16.49006	9.321693	-1.768999	0.0786
Gross enrolment ratio	EDU	-0.952941	0.295429	-3.225617	0.0015
Dummy ,Asia and not Asia	DM	-17.59759	6.397716	-2.750605	0.0065
R-squared	0.856923				
Adjusted R-squared	0.851450				
S.E. of regression	18.79080				
F-statistic	157.8627				
Prob(F-statistic)	0.000000				

Equation 1.2. Dependent variable GDP

This equation shows the factor that affect economy. Using GDP represent economic status. The alternative factors that represents health status is under 5 mortality rate. The effects of health on development are clear. Countries with weak health conditions find it harder to achieve sustained growth. in this equation correlation coefficient associated with it has negative sign as expected and statistically significant increase under 5 mortality rates one percent with decrease in per capita GDP 0.008 $.Second variable is demographic factor (dependency ratio).its agreed that dependency ratio represent those who are not in productive age so it is burden on economy and have negative impact . In this equation Correlation coefficient associated with it has negative sign as expected but statistically not significant. The third variable is geographical (dummy variable) it is approved that geographical factors effect economy. In this equation change from Africa to Asia decreasing GDP per capita 0.23$.Fourth one is gross fixed capital formation to each labor force. Increasing investment lead to improve economy and increasing labor force lead to increase productivity which leads to improve economy. In this equation correlation coefficient associated with capital / labor has positive sign as expected and statistically significant increase capital/labor one $ associated with increase in GDP 0.32 $.

Table 5.2 Result of equation 1.2

Variable	Note	Coefficient	Std. Error	t-Statistic	Prob.
Constant	C(1)	-15.07259	10.35038	-1.456235	0.1470
Under 5 mortality rate per 1000 life birth	C(2)	-0.064347	0.033850	-1.900940	0.0588
Dependency ratio	C(3)	0.190113	0.121223	-1.568299	0.1185
Dummy ,Asia and not Asia	C(4)	-1.704262	0.940356	-1.812359	0.0715
k/l gross fixed capital formation /number of pop.(proxy of labor)	C(5)	0.838122	0.366865	2.284553	0.0235
R-squared	-3.922653	f statistic	2.100396		
Adjusted R-squared	-4.027950	prob (f statistic)	0.000000		
S.E. of regression	2.155396	Number of observation	192		

Equation 1.3 Dependent variable dependency ratio

This equation shows the effect of the health and economy at demographic factors. It is agreed that demographical factors effected both health status and economy and vies viscera. The first variable is under 5 mortality rate it is agreed that bad health status have positive relation with dependency ratio. In this equation under 5 mortality represent bad health. Correlation coefficient associated with it has positive sign as expected and statistically significant. Increase under 5 mortality rates one percent associated with increase dependency ratio 0.1. It is agreed that economy have affect on dependency ratio. In this equation GDP per capita is has negative sign as expected and statistically significant. Increase GDP per capita one $ associated with decrease in dependency ratio 6.33. For geographical factors it is approved that it has effect on demographical factors. In this equation geographical factors has positive sign but statistically not significant.

Table 5.3 Result of equation 1.3

variable	Note	Coefficient	Std. Error	t-Statistic	Prob.
constant	C(1)	78.90992	6.200699	12.72597	0.0000
Under 5 mortality rate per 1000 life birth	C(2)	0.183161	0.025579	7.160536	0.0000
Per capita GDP (PPP)	C(3)	-6.337087	1.173754	-5.398993	0.0000
Dummy ,Asia and not Asia	C(4)	3.459395	1.887760	1.832539	0.0685

R-squared 0.615000

Adjusted R-squared 0.608856
S.E. of regression 10.69260
Number of observation 192
F-statistic 10.532
prob (f statistic) 0.000000

5.2 Life expectancy as health indicators.

Equation 2.1 Dependent variable LOG (LE)

This equation shows the effect of economic and socioeconomic factor at health. As mentioned in previous section. Theory proved that economic factors effect directly on health status. Improve economy Producing more 'life sustaining' necessities such as food, shelter, and health care and broadening their distribution. The first variable represent economy is the real GDP per capita (ppp). The correlation coefficient associated with per capita GDP has positive sign as expected and statistically significant the result implies that an one $ increase in per capita GDP is associated with a increase in life expectancy 0.22 year. Second variable is dependency ratio which is percentage of population aged less than 15 and 60+years (age) that mean they are risky group of population and that effect negatively on health. The correlation coefficient associated with it has negative sign as expected but statistically not significant. Third variable is governmental health expenditure as percentage of total health expenditure. It is agreed that increasing governmental expenditure lead to improve health status .In this equation the correlation coefficient associated with it has negative sign and it is not expected and statistically significant. The equation shows that increasing governmental health expenditure one percent lead to decrease life expectancy 0.06percent. That is because the governmental spending is inefficient and that had been proved in many studies in these countries because they depend mainly on a low quality inefficient governmental expenditure , another reason is that the total governmental expenditure on health does not reflect the expenditures that have direct impact on health services such as recurrent expenditure. Fourth variable is total health expenditure. It is agreed that increasing health expenditure lead to improve health status. In this equation the correlation coefficient associated with it has positive sign as expected but statistically not significant. Fifth variable is EDU (gross enrollment ratio). When education improved in society lead to improve life style and improve health status in this equation the correlation coefficient associated with it has positive sign as expected and statistically significant the result implies that increase gross enrollment ratio one percent associated with increase in life expectancy about 0.004 year. For geographical variable. The correlation coefficient associated with dummy has positive sign as expected and statistically significant the result implies that Asian people have life expectancy longer than African about 0.06year.

Table 5.4 Result o f Equation 2.1

variable	Note	Coefficient	Std. Error	t-Statistic	EXP	Prob.
constant	C(1)	2.758773	0.818351	3.371138		0.0009
Log GDP per capita (ppp)	LOG(GDP)	0.225909	0.111703	2.022416	EXP	0.0446
Dependency ratio	DR	-0.007080	0.006064	-1.167500	EXP	0.2445
General governmental expenditure	GHE	-0.003978	0.001799	-2.211443	NOT EXP	0.0282
Log (total health expenditure)	THE	-0.029730	0.036999	0.803552	EXP	0.4227
Edu(gross enrollment ratio)	EDU	0.004658	0.001785	2.609167	EXP	0.0098
Dummy ,Asia and not Asia	DM	0.069378	0.020784	3.338003	EXP	0.0010
R-squared	0.241473	Prob(F-statistic) 0.000000				
Adjusted R-squared	0.216872					
S.E. of regression	0.111608					
Number of observation	192					

Equation 2.2 Dependent variable LOG (GDP).

This equation shows the factors that effect economy. The effects of health on development are clear. Countries with weak health conditions find it harder to achieve sustained growth. The health indicator in this equation is life expectancy. The correlation coefficient associated with it has positive sign as expected but it is not significant. The second variable is dependency ratio it's agreed that dependency ratio represent those who are not in productive age so it is burden on economy and have negative impact. In this equation correlation coefficient associated with it has negative sign as expected but statistically not significant. For geographical factor it is agreed there is relation between geographical factor and economic status .in this equation the correlation coefficient associated with dummy has negative sign as expected but statistically not significant. The last factor is gross fixed capital formation to each labor force. When increased investment lead to improve economy and increase labor force increase productivity which leads to improve economy. In this equation correlation coefficient associated with it has positive sign as expected and statistically significant increase .capital/labor one $ associated with increase in GDP 0.23 $.

Table 5.5. Result of equation 2.2

variable	Note	Coefficient	Std. Error	t-Statistic	Prob.
constant	C(1)	-0.341353	13.02771	-0.026202	0.9791
Log(life expectancy)	LOG(LE)	0.775997	2.615833	0.296654	0.7671
Dependency ratio	DR	-0.030715	0.022889	-1.341916	0.1813
dummy	DM	-0.102696	0.233222	-0.440335	0.6602
Log(k/l)	LOG(K/L)	0.234967	0.067236	3.494672	0.0006
R-squared	0.671101				
Adjusted R-squared	0.664066	Prob(F-statistic) 0.000000 F test 0.566123			
S.E. of regression	0.557133				
Number of observation	192				

Equation 2.3 Dependent variable dependency ratio.

It is agreed that demographical factors affect both health status and economy and vies viscera for health status .in this equation life expectancy is the health indicator the correlation coefficient associated with it has negative sign as expected and statistically significant increase life expectancy one year associated with decrease of dependency ratio 102.2 percent. Second variable is GDP per capita it is agreed that demographical factors affect economy and vies viscera Correlation coefficient associated with it has negative sign as expected and statistically significant increase GDP per capita one $ associated with decrease in dependency ratio 4.8 percent .geographical factors have effect on demographical factors . In this equation geographical factors (DM) have positive sign and statistically significant .change from Africa to Asia associated with increase 8.14 percent in dependency ratio.

Table 5.6 Result of equation 2.3

variable	Note	Coefficient	Std. Error	t-Statistic	Prob.
constant	C(1)	509.2333	58.68870	8.676855	0.0000
LOG (LE)	C(2)	-102.2047	15.48805	-6.598937	0.0000
LOG(GDP)	C(3)	-4.825526	1.683014	-2.867194	0.0046
DUMMY	C(4)	8.140772	2.375844	3.426475	0.0008
R-squared	0.570046	Prob(F-statistic) 0.000000			
Adjusted R-squared	0.563185	F test 10.3329			
S.E. of regression	11.29962				
Number of observation	192				

Summary

From above equations we can summarize the variables for each health indicators according to significant and expectancy.

First under 5 mortality as health indicators

Table 5.7, 5.8, 5.9 summarizes the significant and expectancy for each variable. Table 5.7

Table 5. Equ 1.1. Under 5 mortality is dependent variable

Variable	Significant	Expectancy
Per capita GDP (PPP)	Not significant	expected
DR	Not significant	expected
GHE	significant	Not expected
THE	Not significant	expected
EDU	significant	expected
DM	significant	expected

Table 5.8 equ 1.2 GDP per capita is dependent variable.

Variable	Significant	Expectancy
Under 5 mortality	significant	expected
DR	Not significant	expected
DM	Not significant	expected
Capital/labor	significant	expected

Table 5.9 equ 1.3 Dependency ratios is dependent variable

Variable	Significant	Expectancy
Under 5 mortality	significant	expected
Per capita GDP (PPP	significant	expected
DM	Not significant	expected

Second life expectancy as health indicators

Table 5.10, 5.11, 5.12 summarizes the significant and expectancy for each variable.

Table 5.10 equ 2.1 life expectancy is dependent variable

Variable	Significant	Expectancy
Per capita GDP (PPP)	Significant	expected
DR	not Significant	expected
GHE	Significant	Not expected
THE		expected
EDU	Significant	expected
DM	not Significant	expected

Table 5.11 equ 2.2 GDP per capita is dependent variable.

Variable	Significant	Expectancy
Under 5 mortality	Not significant	expected
DR	Not significant	expected
DM	Not significant	expected
Capital/labor	significant	expected

Table 5.12 equ 2.3 Dependency ratios is dependent variable

Variable	Significant	Expectancy
Under 5 mortality	significant	expected
Per capita GDP (PPP	significant	expected
DM	significant	expected

5.3 Comparison of results and Discussion.

Discussion has been developed regarding each health indicators used in this study. The first health indicator is under 5 mortality rates and the second is life expectancy.

First using under5mortality rate as health indicators.

First equation under 5 mortality as dependent variable. The relation with GDP, THE, DR has negative sign as expected but statistically not significant. The relation with EDU, DM has negative sign as expected and statistically significant. The GHE has positive sign, not expected. That is because the governmental spending is inefficient and that had been proved in many studies in these countries because they depend mainly on a low quality inefficient governmental expenditure , another reason is that the total governmental expenditure on health does not reflect the expenditures that have direct impact on health services such as recurrent expenditure. These countries need to finance their health system to improve quality of health care.

The second equation results shows the factor that affect economy (GDP). The first variable is under 5 mortality rate. Negative relation as expected. Second variable is demographic factor (dependency ratio) has negative relation as expected but statistically not significant. The third variable is geographical (dummy variable) relation negative but not expected .fourth one is gross fixed capital formation to each labor force positive relation as expected.

The third equation result shows the effect of the health and economy at demographic factors. The first variable is under 5 mortality rate the relation is positive as expected. Second variable is GDP per capita the relation is negative as expected .third one is geographical factors. The relation is positive as expected.

Second using life expectancy as health indicators

First equation under 5 mortality as dependent variable .The first variable GDP the relation is positive as expected. Second variable is dependency ratio the relation is negative expected but statistically not significant. Third variable is GHE the relation is negative but is not expected .the same reason mention previously .fourth variable is total health expenditure the relation is positive as expected but statistically not significant. Fifth variable is EDU (gross enrollment ratio). The relation is positive as expected. For geographical variable (DM). The relation is positive as expected.

Second equation GDP dependent variable. First independent variable is life expectancy. The relation positive sign as expected but it is not significant. The second variable is dependency ratio relation is negative as expected but statistically not significant. For geographical factor relation is sign as expected but statistically not significant. The last factor is gross fixed capital formation to each labor force relation is positive sign as expected.

Third equation shows the affect of the health and economy at demographic factors. The first variable is life expectancy the relation is negative as expected. .second variable is GDP per capita relation is negative as expected t. For dummy it has positive sign as expected.

From above discussion using two stages least squares .It shows that there is slight different between two health indicators.

The first equation using health indicator as dependent variable. For (under5 mortality rate) it is relation with GDP as independent variable was negative, statistically insignificant. For (life expectancy) as health indicator. The relation with GDP as independent variable statistically significant. That mean economic factor affect on life expectancy more than decreasing mortality.

But when used GDP as dependent variable .The relation with(under 5 mortality)as independent variable statistically significant While using (life expectancy) as health indicator the relation with GDP statistically insignificant. That mean the under 5 mortality more affective on economy GDP than life expectancy.