STATISTICAL INSTITUTE FOR ASIA AND THE PACIFIC
(SIAP)

OCCASIONAL PAPER
No. 24

United Nations
E S C A P

FOREWORD

SIAP Occasional Paper No. 24 continues the revived tradition of the Institute to publish noteworthy papers of participants and staff members that were produced in the pursuit of its mandate to strengthen the capability of national statistical systems in the region through practically oriented training of official statisticians.

This series regularly features selected research papers that are outputs of the Research-based Training Programme (RbTP) of the Institute. Likewise it may include researches and papers that the SIAP faculty members occasionally conduct and write on topics related to their training specializations, and present in international meetings and seminars. The research outputs from the Second Research-based Regional Course held in Daejeon, Republic of Korea from 16 August to 24 September 2004 are presented in this issue.

The RbTP was launched in April 2001. The programme provides an additional training modality for middle and senior government statisticians with the objective of raising their capability in undertaking independent research in official statistics and preparing quality statistical reports. Traditional training courses of official statisticians have been focused on data collection, data processing and basic analysis of data. Trainings in data analysis are still mainly in the production of basic descriptive statistics from tabulations for standard statistical reports. Official statisticians especially in national statistical offices are less involved in in-depth analysis of survey and census results and administrative-based data for objectives such as improving data quality and guiding policy. The statistician's role in analysis for guiding policy is typically one of the passive data provider rather than one actively involved in an interdisciplinary approach to analysis.

While this situation may have been acceptable through the years, data analyses for the purpose of improving data quality and statistical processes still clearly have to be done by NSOs. Statistical offices in this regard need capability in doing research on methodologies to improve statistical processes—addressing problems in survey design, studying index computations, developing measurement frameworks for new areas in statistics, handling confidentiality issues, etc.

The concept of the RbTP responds to these training gaps by guiding participants in carrying out analytical or methodological research and preparing a technical report as the final output. The research papers produced under the programme are made available as training resources for the training programmes of SIAP as well as through the *SIAP Occasional Paper Series*, for selected ones.

The SIAP Governing Board approved the reformatting of the RbTP from a Tokyo Metropolitan Area (TMA)-based course to an Outreach Programme course, starting in academic year 2003, in order to expand the number of participants while maintaining cost effectiveness. It was revised to a two-phased training activity in contrast to the TMA-based programme which was single-phased and wherein five participated every year and carried out

their research within eight weeks in the TMA. Under the revised format, participants numbering at least ten will undergo basic training on research principles and methods for two weeks and work on a draft research paper for four weeks at a country partner institution. Upon return to their offices, participants will finalize their research papers within an additional four weeks. This new format has increased the cost effectiveness, geographical representation and research supervision, and has benefited the participants, the country partner institution and SIAP.

Sixteen fellows completed the programme conducted jointly with the Korea National Statistical Office in Daejeon, Republic of Korea. The Institute contracted Dr. Yeanok N. Yoon and Dr. Jung Su Choi to draft executive summaries for each of the final research papers. These were referred back to the authors for comments before finalization of the drafts. The executive summaries of the sixteen research papers are featured herein. A copy of any of the completed papers can be provided by SIAP upon request.

I hope that this publication will inspire and motivate the official statisticians in the region to undertake relevant analysis on the primary data that they have collected to support evidence-based development planning and policy formulation and decision-making.

I acknowledge with deep appreciation those national statistical offices that nominated and supported the participants from the preparation of the research proposals up to the revision of their papers. I also sincerely thank the distinguished experts who selflessly accepted the invitation of the Institute to supervise the conduct of the research and to critique the submitted outputs.

I likewise wish to acknowledge with deep appreciation the continuing and generous contributions of the host Government of Japan, both in cash and in kind, as well as those of the contributing members and associate members in the region, through which they have demonstrated their sustained interest in the training programmes of the Institute such as this.

Tomas P. Africa
Director
United Nations Statistical Institute for Asia and the Pacific

December 2005

CONTENTS

Second Research-based Regional Course
Daejeon, Republic of Korea, 16 August – 24 September 2004

<u>Executive Summaries of the Final Research Papers</u>[*]

---

[*] The views expressed in these papers are those of the authors and do not imply the expression of any opinion on the part of the Institute.

Construction of Trade Statistics Classification System in Afghanistan[*]

Executive Summary

During the Taliban period in Afghanistan, the budget management of the country was worsened by the introduction of large amounts of counterfeit currency. In 2002, after the fall of the Taliban, the government's total revenue was estimated at 21,533 million of new Afghanis (11.9 percent of GDP), while total expenditure was 20,653 million (11.4 percent of GDP).

The government revenues in Afghanistan were derived from four sources: donor assistance, custom duties, income transfers by state-owned enterprises such as cement, fabric, fertilizer, and agricultural products, and non-customs provincials.

After the wars, agricultural production had collapsed, livestock herds had been depleted, and industries had ceased functioning. The human capital was highly depleted due to the mass exodus of people with technical and professional skills. Today, with one of the highest child and maternal mortality rates in the world, one of the lowest literacy and life expectancy rates, and one of the highest proportions of disabled people in the world, Afghanistan is one of the poorest nations on earth.

Three years after the fall of the Taliban, the statistical services in Afghanistan are just barely reorganizing, and there are no effective statistical offices in the line ministries. The wars not only destroyed the physical infrastructure, but also severely disrupted the social and economic infrastructure and collapsed the public administrative capacity (with a complete loss of the statistical base, institution memories, and files in key economic ministries).

The capacity of the present government is therefore very weak. The civil service

is inadequately staffed, with most of the staff lacking the necessary qualifications, experience and equipment. Also the civil service salary is very low and in most cases below subsistence level.

The statistical system in Afghanistan and its capacity to respond adequately to the new demands of policy makers have been severely limited, particularly, in the process of transformation, as the policy focus has shifted from emergency to development and sustained growth.

The trade data collected and published by the Central Statistics Office (CSO) every quarter since 1978 was collected according to the Russian trade statistics classification system. In the year 2004, the value of foreign trade turnover exceeded $2552.1 million US, which, compared to 1978, had decreased by 3.4 times. The total imports in cash accounted for $2452.1 million US, a decrease of 5.8 times as compared to 1978.

Total commodities exports to Asian countries amounted to $73.9 million US, to European countries $22.2 million US and to other countries, $4.0 million US. The exports to Pakistan in 2002 were 26.3 percent of total exports.

Exports and imports are both valued at free on board (f.o.b.) and comprise all transactions between residents of Afghanistan and the rest of the world when involving a change of ownership of general merchandise and non-monetary gold.

Export data are valued on the basis of customs documents, including customs declarations of exports and certificates of cash receipts from exports (certificates of receipt). Estimates of merchandise imports also are prepared on the basis of customs documents and import payment authorizations. Balance of payment (BOP) and external trade estimation is extremely difficult due to a severe lack of data.

The scope of this study is to align the Afghan Classification System with the Standard International Classification System. However, this study has the following limitations:

(a)   As the size of trade grows, trade classification system (SITC) codes cannot represent country-specific items.

(b)   Even at present, there are some items which are not expressed in codes in the SITC system.

Although there are limits to this study, as mentioned above, this study is still very significant and constitutes a first step toward the development of a Standard Afghanistan Classification System. The following are the objectives, concepts, methodology and results of this study:

Objectives. The trade statistics of Afghanistan are not constructed based on the new trade statistics classification system and still use the old trade statistics system of Russia. Therefore, the purpose of this study is the construction of a standard trade statistics classification system for Afghanistan, similar to that of Korea and Japan.

Conceptual definitions and characteristics. Trade statistics are primarily a by-product of customs administration; they are not especially intended as a source of balance of payments statistics. Nonetheless, they are usually considered to approximate the timing of ownership changes, because - in the absence of other evidence - physical possession may be the best available indication of actual ownership.

Trade statistics may need timing adjustments as they fail to reflect physical movements correctly in all cases, though this type of systematic defect would be negligible in its effect unless the value of trade changed sharply from period to period. Such a defect, for example, arises when compilers of trade accounts cut off each month's statistics before all customs declarations have been tabulated, leaving a residue to fall into the next month. When practices of this sort lead to distortions, the amounts should be estimated and timing adjustments applied.

The change of ownership of goods can occur at a time that widely differs from the time of recording of those goods in trade statistics, such as when a lengthy voyage is

part of the process of importing or exporting. If the volume or unit value of trade changes substantially from the beginning to the end of the reporting period, the possible difference of one or two months between the shipment or receipt of goods, on the one hand, and the change of ownership, on the other hand, can be a source of error in the statement for a given country and the source of large asymmetries between partner countries.

No empirical basis has been established for presuming that ownership normally changes either at the beginning or the end of a voyage; inquiries, perhaps on a sample basis, are required to ascertain specific practice.

Aggregation and comparison of world exports and imports on the basis of balance of payments data lose much of their meaning at times of rapid change in prices or volume when changes of ownership are not recorded at approximately the same time by each country.

Methodology. As a first step of research methodology, we translated the classification of Afghanistan imports trade items, and then compared it to the Standard International Trade Classification (SITC) items and also to the classification of Afghanistan imports trade items classified as a level such as division group, subgroup and items.

This study tried to construct a model first-stage Standard Afghanistan Trade Classification System by aligning the existing Afghanistan trade classification codes into the SITC codes.

Results/findings. Imports trade by Afghanistan Classification under the machinery equipment code 1-21 includes generators, motor engines, batteries for motors, motor spare parts, typing machines, lorries, buses, passenger cars, bicycles, water pumps and tractors classified.

And according to the classification scheme of Standard International Classification, machinery and transport equipment are classified as a section including

power-generating machinery and equipment, machinery specialized for particular industries, general industrial machinery, and equipment and machine parts.

Afghan Standard Classification "petroleum oil" is the section in which benzene, kerosene, anti-freeze, mobile oil, grease and other oils for motor are classified by the classification scheme of SITC Revision 3 Section 3 Division code 33 petroleum, petroleum products and related material. Construction materials, according to the classification of the Afghanistan code 40, include cement, glass for buildings, tar back paper, fiber board, formica board and hard wood. It comes under the SITC 66-2 division.

Finally, according to the Afghan Classification, metals are classified as iron steel, plates and sheets, other iron steel wire, tin roof steel for building and other building equipment. This corresponds to SITC section 7 division code 73 (metal working machinery).

Implications/recommendations. One aim of this study is to prepare the External Trade Statistics of Afghanistan using the Standard International Trade Classification and to compile the trade statistics by the Standard International Trade System.

Afghanistan statistics need a new trade data system because the current classification system is an old system. For this, the Afghanistan specific code systems have to be constructed to prepare for the growth of trade in quantity and quality. We also have to construct an Afghanistan tariff schedule-based HS system as well as construct a correspondence scheme between the Standard Afghanistan Trade Classification System and Afghanistan's own HS System.

Poverty Reduction Plan of Cambodia[*]

Executive Summary

The purpose of this research is to review Cambodia's poverty situation and then to identify the poverty problems and suggest some indicators for monitoring poverty reduction that would improve the government policy and activities in the future. Three major objectives are:

- Review the poverty situation in its various dimensions and manifestations and the Royal Government policy and strategies and its development partner's support in addressing them.

- Assess the targets and indicators in Cambodia and their implications for policy, strategies, and public investment and support to the agricultural and rural development sectors.

- Identify intermediate targets and indicators for poverty reduction that would be feasible and realistic to assess progress towards better society and the mechanisms for monitoring of such progress.

To review the Cambodian poverty situation, the 1999 Socio-Economic Survey is analysed. The results are as follows:

1) For the overall poverty line, the rural area shows the greatest poverty incidence and is more than four times higher than that in Phnom Penh and 1.6 times that of urban areas in 1999. On the other hand, in relation to the food poverty line, poverty incidence in rural areas is slightly lower than in urban areas at 12.1 and 13.7, respectively.

2) The monetary values of the food poverty line and the overall poverty line for rural areas are $0.35 US and $0.46 US, respectively, and are lower than urban and city values.

---

3) Employment information from the labour force survey of Cambodia in 2001 shows the rural area has little diversity compared with national data. Rural areas have higher employment in agriculture, fishery, and forestry, because the job opportunities in these areas are limited.

4) The utilization of health care facilities shows those using non-sick treatment in the rural area are 93%. This implies that government should provide health care services focused on the underprivileged in the rural areas.

5) Education enrolment shows only 67% of children aged 6-11 are enrolled in primary schools at the national level. And there are also large differences between the city and rural areas in enrolment at the four levels of education -- primary, lower secondary, upper secondary and post secondary. So immediate assistance should be invested on the infrastructure for education to increase and to sustain higher levels enrolments in schools.

Simple Linear Regression Analysis. Based on the above information, simple linear regression analysis is performed relating poverty level to 6 variables: total population, mean year of schooling of males, volume of paddy production, money spent for health care, household size and unemployment. Applied linear regression model is

$$\hat{Y}_i = a + b\,X_i$$

Where: Y_i = Poverty Level by Province

X_i = Independent variable

i   = Province.

Linear regression with each variable shows total population has the strongest relationship and household size has the weakest relationship with poverty level (see Table 1).

<Table 1.> Linear regression model summary and ANOVA table

Independent Variable	r (correlation)	R-square	F	p-value
Total population	0.97	0.997	4217.162	0.000
Mean year of schooling male	0.464	0.215	6.038	0.022
Paddy production	0.79	0.624	36.561	0.000
Money spent for health care	0.483	0.233	6.694	0.017
Household size	0.26	0.001	0.015	0.904
Unemployment	0.66	0.436	17.02	0.000

Multiple Regression. Multiple regression analysis with all 6 independent variables shows that number of households, money spent for health, mean year of schooling of male, total population, and volume paddy production have very strong relationships with the poverty level. The F-test value of the multiple regression is around 1096.104 and p–value is 0.000. R^2 is around 99.7%. The equation of this multiple regression is

$$Y = -0.251 + 0.008\,Population - 0.005\,MYSchool + 0.001\,Padproduction + 0.000\,Health + 0.034\,Householdsize + 0.000\,Unemployment$$

However, this multiple regression does not seem to be the best fitting model for predicting the level of poverty of Cambodia. It is because the result of the t-test of this multiple regressions shows that not all independent variables have a significant relationship with dependent variable. It shows the mean year of schooling of males, money for health care and household size are not significant at $\alpha = 5$ %. This might be because of the multi-collinearity among independent variables. Therefore the stepwise method is proposed as the next step.

Stepwise Multiple Regression. There is strong correlation among total population, unemployment, and volume of paddy production. It means that there is multi collinearity among independent variables.

Multiple regression using the stepwise method will automatically choose independent variables which have significant relationships with the dependent variable,

while independent variables that have no significant relationship with the dependent variable will automatically be excluded from the equation. This method has considered multi-co linearity among independent variables.

With the stepwise criterion of (the probability of F to enter $<= 0.05$) and (probability of F to remove $>= 0.1$), the first selected variable is total population and the second selected variable is unemployment, and the other 4 variables are excluded. Since total population and unemployment have strong relationships with the poverty level, the final selected variable to predict the poverty level in Cambodia is total population.

A Proposed Framework for Poverty Reduction Plan. The proposed framework for the reduction of poverty should be focused on the steps as follow:

1) Maintaining Macroeconomic Stability: The central objective of the Royal Government's policy is to promote broad-based sustainable economic growth with equity, with the private sector playing the leading role. Economic growth is central to promote income opportunities for the poor. The Royal Government aims to achieve a sustainable real rate of inclusive broad-based measure with economic growth of 6 to 7 percent per year.

2) Improving Rural Livelihoods: Improvement in rural areas will help contribute to the reduction of poverty, through better access to basic services. There are also important links between actions in other areas, including decentralization and rural livelihoods.

3) Expanding Job Opportunities: The generation of jobs and improved conditions of work are keys to the reduction of poverty. The Royal Government of Cambodia's policies are intended to improve work opportunities especially through facilitating private sector development, expanding exports, and expanding tourism.

4) Improving Capabilities: This report will highlight the priorities that will particularly affect poor Cambodians in the areas of education, health, and income households. The education sector will address simultaneous supply, demand, and quality

and efficiency constraints focusing especially on the poorest and the groups at risk. The health policy statement for 2003- 2007 seeks to provide high quality health services with equity and no discrimination by gender, age, and place of residence or ability to pay and also based on trust between providers and users. To increase household income for the poor in remote areas, the focus will be on funding such as loans through Micro Finance Institution (MFI) with lowest interest rate and NGOs should provide some training courses to the poor on technical skills in agriculture production in order to promote higher levels of productivity.

5) Strengthening Institutions and Improving Governance: The Royal Government of Cambodia is committed to implementing the Governance Action Plan (GAP), a rolling strategic framework that provides a consistent and transparent approach to coordinate efforts in priority areas: legal and judicial reform, administrative reform and de-concentration, decentralization and local governance, anti-corruption, gender equity, demobilization and reform of the armed forces, reform of national resources management (land, forestry and fishery).

6) Reducing Vulnerability and Strengthening Social Inclusion: A sustainable and improved rural infrastructure is the main key to reduce the poverty in the areas such as land management, water management, and rural credit.

☞ The Land Management and Administration Project is assisting the Ministry to address such land issues. Land management should pay attention to the vulnerable people such as disabled people, persons affected by HIV/AIDS, homeless, etc.

☞ The Department of Water and Irrigation needs to be supported because sound water management has a huge role in increasing food availability as demonstrated by the green revolution in many Asian countries.

☞ Rural credit is also very important to sustain the poor in remote areas. The NGOs need to do research on which areas need loans to increase their productivity.

7) Promoting Gender Equality: To eradicate poverty there has to be greater emphasis on developing human resources with a focus on providing women with education, knowledge and skills for effective participation in all key sectors. Improving women's access to quality reproductive health services is also a prerequisite for greater

gender equality. Strengthening the enforcement of laws and policies that determine women's rights and welfare will contribute to women's empowerment and curb the rapid growth of the sex industry.

8) Priority Focus on Population: The population is also the main key role player in poverty reduction and it is reflected in primary programmes such as: (1) special target on reproductive health and family planning services for the poor by the Ministry of Health; (2) increasing primary education enrolment for the poor by the Ministry of Education; and (3) creating opportunities for the poor, especially those who live in the rural area, by the Rural Development Sector Ministry.

Concluding and Recommendation Statement. Public reform and economic development programme is the key to accelerate the Cambodian society to move forward faster. To achieve its development goals the Government has fully and firmly committed to the principles of good governance and to maintain sound macroeconomic policies, fiscal and policy discipline.

Area Selection for the International Comparison Programme (ICP) in China[*]

Executive Summary

The International Comparison Programme (ICP) was established in 1968 as a joint venture of the United Nations, the University of Pennsylvania and the World Bank, and by 1993, had expanded to a global programme. ICP calculates Purchasing Power Parities (PPPs) in order to make comparisons of the volumes of Gross Domestic Product (GDP) among different countries. The Purchasing Power Parity is the rate of currency conversion at which a given amount of currency will purchase the same volume of goods and services in two countries.

The task of the ICP is to measure differences in price levels by comparing the prices of the same products in different countries, with the objective of constructing price indices using the same approach as is used to measure price inflation within a country. As part of the global ICP exercise, the International Comparison Programme for Asia and the Pacific (ICP Asia-Pacific) is being implemented. The ICP Asia-Pacific will be carried out between 2003 and 2006, with 2004 as the reference year.

Objectives. China wants to actively take part in the ICP, but it has trouble collecting prices nationwide, for practical reasons, namely, limited funds and human resources. Therefore, China needs to participate in the 2004 ICP in a special way; that is, by choosing some areas to represent the whole of the nation. Although China has chosen 11 cities to represent it in the 2004 ICP, in the light of the practical conditions in the nation, China faces the question of which areas will better represent it in the 2004 ICP, from the theoretical or scientific view. The main objective of this study is to determine which areas would be better to participate in the 2004 ICP from the theoretical or scientific view.

Data. Data used in this study come from the National Bureau of Statistics (NBS) of China. First, data of the GDP and components of its expenditures at both the national

and provincial levels come from the Department of National Accounts of NBS. Second, data of consumption expenditure and components of urban and rural households, involving the whole nation and 31 provinces, are obtained from the Urban Social-Economical Survey Organization and Rural Social-Economical Survey Organization of NBS. Third, data of the level of CPI and its components at the national and provincial levels are from the Organization of Urban Social and Economic Survey of NBS. After getting the raw data needed, it is necessary to process these data, including ratio computing, standardizing, and averaging.

Computing ratios: In order to compare consistency between components of GDP's expenditures, it is necessary to compute the ratios of components of GDP expenditures to GDP or the ratios of components of urban/rural household expenditures to the total of urban/rural household expenditures.

Standardizing: Because distance is used to classify variables in a cluster analysis, or, in other words, variables with large values make a much greater contribution to the calculations of distance than those with small values, it is necessary to standardize these data to be measured on the same scale. For example, when using data of GDP, value of GDP or growth rate of GDP is chosen for all cases. Considering that both ratios of the components of GDP and rising rates of CPI all have the same scale, it is natural for these data not to be standardized.

Averaging: As emphasized above, it is important to average these data for several years to ensure stability and robustness of the data so that the results analyzed are closer to reality. Considering that economic structure is changing greatly, it is best to take the arithmetic average of these data for the most recent three years, that is, 2001, 2002 and 2003.

Methodology. This study explored the following statistical analysis methods: method of area selection in sampling, correlation analysis, regression analysis and cluster analysis.

Method of area selection in sampling: For the selection of representative areas,

one may consider stratified random sampling. This method involves several steps: determining sample classification variables, constructing sampling units, classifying sampling units by population size and allocating sample, determining stratification variables within each region's size class and stratifying non-self-representative sampling units, selecting sampling units for the CPI geographic sample. This method is widely used by many countries in the price sampling design, and it focuses on selecting a representative sample. However the stratified random sampling needs to have enough funds, human resources and time. Therefore given China's current condition mentioned above, this method is not practically feasible.

Correlation analysis method: The correlation analysis method is used to analyze the relationship between two variables by calculating the correlation coefficient, which generally has two types, bivariate correlation and partial correlation. The bivariate (Pearson) correlation coefficient measures the strength of a linear relationship between two quantitative variables. Partial correlation reveals variables that enhance or suppress the relation between two particular variables. It is necessary to note whether bivariate correlation or partial correlation analyzes the relationship between two variables, by computing the correlation coefficient of the two variables from data observed at a different time point or under different conditions. However, what is analyzed here is the relationship between two cases by estimating the distance from the data observed of the different indicators that reflect its features. Thus, it is not suitable to use the correlation analysis method for this research.

Regression analysis method: The goal of the regression analysis method is to establish a relationship, expressed via an equation, for predicting the typical values of one variable, given the value of another variable. This method requires that the dependent variable follows a normal distribution. However, the variables considered in this study are not normally distributed. Thus this method cannot be applied.

Cluster analysis method: The cluster analysis method is a multivariate procedure for detecting groupings in the data. Cluster analysis has mainly two methods: hierarchical cluster analysis and *K*-means cluster analysis. In the hierarchical method, clustering begins by finding the closest pair of objects (cases or variables) according to a

distance measure and combines them to form a cluster. The algorithm continues one step at a time, joining pairs of objects, pairs of clusters, or an object with a cluster, until all the data are in one cluster. This method was selected to be used in the study.

Results/findings: The study shows that among three possible scenarios, the shortest distance criterion selects Jiangxi, Jilin, Hubei, Henan, Gansu, Sichuan, Hunan, Liaoning, Anhui, and Fujian provinces. The study recommends that these 10 provinces represent China in the ICP for the following reasons:

(a) This is a relative economic choice. For a country that has 31 provinces, it should be an economic choice to select 10 provinces, that is, about only one-third of the country's provinces, to take part in the 2004 ICP on behalf of China.

(b) This is a scenario that can ensure that the 10 provinces selected represent China, because their GDP is 33 percent of the nation, and their population is 43 percent of the entire nation. An important point is that these 10 provinces mainly are located in the center of China so that they seem to represent obvious consumption patterns in China.

(c) This is a feasible plan for China. All the provinces in China have their own statistical bureaus which are led by the NBS in statistical work so it is not difficult to organize them to fulfil the ICP successfully.

The Re-basing and Re-weighting of Fiji's Consumer Price Index and the Spending Patterns of Low- and High-class Urban Households[*]

Executive Summary

Summary 1: The Re-basing and Re-weighting of Fiji's Consumer Price Index

The Consumer Price Index (CPI) is an important key indicator of economic performance in the Fiji context, as it measures price changes in goods and services consumed by the urban households of Fiji. Concurrently, prices of goods change with time, but usually not at the same rate; hence, the price index provides a clear indication of the direction of price movements of goods and services consumed by households. Measuring changes of household expenditures is not informative enough, as it does not give a clear indication of how these changes occur, unless we know the changes in prices of goods and services contributing to these expenditure changes.

Fiji Island's Bureau of Statistics (FIBOS) has been re-basing the CPI about every 5 years; in 1993, after a lapse of 8 years, it then decided to revise and modify the weights and re-base to the current base of 1993, using the expenditure data from the 1990/91 Household Income and Expenditure Survey (HIES).

Throughout these revision processes, there has not been any methodology documentation whatsoever made available on how the CPI was derived. The latest re-base, which was done in 1993, was based on the 1990/91 HIES. FIBOS had just completed the 2002/2003 Urban HIES in which some information had been officially released, and this had generated great enthusiasm and keenness for the CPI Unit to embark on the opportunity to use this data to review its CPI. Results from this study will provide FIBOS with the opportunity to produce and conduct a re-base and calculation of weights without external assistance.

---

[*] Based on the paper written by Asikinasa Toga Raikoti, Acting Principal Statistician, Coordination and Research Development Unit, Fiji Islands Bureau of Statistics, with his Research Advisor, Sun-Hyun Eun, Section Chief, Price Statistics Division, Korea National Statistical Office, Republic of Korea.

In this study, the terms "re-weight" and "re-base" mean the following:

- Re-weight is the process of selecting items from the HIES consumption expenditure into the CPI 'basket' and the calculation and assigning of weights to each of these items.

- Re-base is the process of re-basing the index to a reference period where the indexes are usually reset to 100.

It is expected that this study will provide the necessary information, produce documentation on these aspects, and hopefully provide the benchmark for CPI compilers to have a standard methodology and manual, which they can use as a guideline for future CPI revisions. The following are the objectives, concepts, data, methodology and findings for this study:

Objectives. The main objectives of this study are the re-basing and re-weighting of the CPI at a national and divisional level and also providing a standard methodology document that clearly states the procedures of how to re-base the CPI with all the relevant calculations of expenditure weights.

Concepts and characteristics. Weights are values calculated and attached to goods and services consumed by selected households, and they tend to reflect the relative effect of these goods and services consumed in relation to the total consumption of households. The weights determine the impact that a change in the price of an item will have on the overall index. The weights depend on the scope of the index, which, in turn, depends on the main uses of the index. The scope of the index needs to be defined so as to clearly show the categories of consumer goods and services acquired, used or paid for by the reference population, in terms of the type of household and its geographical location. The weights also often show the shares that goods and services in each division, group and class contribute to the total consumption expenditures of the reference population, in this case, the selected households from the HIES survey.

Before deriving the weights of the items, the expenditure figures from the HIES

should be compared with sales, production and trade data for the reference period. Any suspicious differences should be removed (e.g. if household expenditure on alcoholic beverages are deemed under-reported by 10 percent, the amount recorded in the HIES should be increased by 10 percent). Weights are usually calculated for a group of elementary aggregates, which are usually the smallest groups of goods and services for which expenditure data are available. These could be aggregates of a particular group within a country or by division, but generally, these elementary groups consist of goods and services that are as similar as possible in nature and characteristics.

In the structure of the current 1993-based CPI, there are 332 items in the basket, which was generated from the 1990/91 HIES and is based on the expenditure patterns of the 3,000 urban households surveyed. All consumption goods and services were classified into major divisions:

Division	Weights
1. Food	353.6
2. Alcohol, Drinks and Tobacco	61.3
3. Housing	164.9
4. Heating	49.0
5. Durable Household Goods	65.2
6. Clothing and Footwear	53.9
7. Transport	128.5
8. Services	75.8
9. Miscellaneous	47.8
All Items	1000

Under each major division are groups of goods and services classified according to their similarities in price, nature and characteristics. For example, under the division 'Food' are the groups, 'Bakery products', Wheat products,' etc. These groups are then classified into homogeneous classes for CPI purposes. Within each of these elementary aggregates, one or more products are then selected as representative of price movements

of all goods and services within the aggregate. Selection of these goods and services is fully described in 'Selection of Items from the HIES.'

Data and methodology. For the purpose of re-basing, including divisional information on the consumption expenditure of all households on each item, data come from the HIES was utilized. A total of 3,015 urban households were surveyed for the 2002/03 HIES. Each selected household was asked specific questions on the nature and characteristics of its income and expenditures.

The methodology for calculation of weights and re-based index is described below:

Phase 1: Selection of Items from the HIES Survey

The classification of items in the current CPI and the data collected from the 2002/03 HIES on expenditure items are different. The former did not meet the requirements of the CPI Unit where they had required the items captured in the survey to be consistent or be similar with the COICOP classification.

In deriving the weights, usually the detailed items captured in the HIES should be more or less similar to the classification of the CPI expenditure classification. If this is not the case, then the HIES classifications should be transformed or re-coded to match the CPI categories. Aggregating and/or disaggregating the relevant HIES headings over the relevant CPI expenditure classes can achieve the deserved matching. Such a transformation is achieved much more easily and more reliably if the coding list for expenditure items in the HIES is coordinated with the corresponding list of items used for collecting price observations for the CPI. Under the COICOP classification, resolutions by ILO have finalized the major sections and subsections, which should be used as a guideline for future use. The classification now has 12 sections and the 2002/03 HIES data had to be recoded and reassigned so as to match this classification.

Phase 2: Identification of Items for Selection

Once we have the required list from the HIES, the selection of items for the CPI is calculated. The selection is done on the basis of the value of the factor:

$$\text{Item} = \frac{\text{Expenditure on individual item}}{\text{Total expenditure}} \times 10,000$$

Phase 3: Redistribution of Excluded Items

After the calculations of the above factor, all items less than 1/10000 will be "excluded" from the list, but since they contributed to the total expenditure, these excluded items will have to be proportionately distributed to the selected items (items with factors equal to or above 0.5) in the same or similar sub-group.

Phase 4: Calculation of Weights

After 'excluded' expenditure items are distributed proportionately within each respective group, the weights are then determined by calculating the proportion of the contribution of the selected items to the total consumption expenditures.

For national weights, expenditures of each selected item will be calculated in proportion to the total consumption expenditure, whereas the divisional weights will be calculated in proportion to the divisional total consumption expenditures. The sum of these weights is 1000, whereas weights for each group or division will be the sum of all weights within each group and division, respectively. There are two steps in the calculation of weights:

(a) Step 1: After phase 3, where the distribution of excluded items has been completed, the 'first weight' is calculated. This is done by calculating the weight for expenditure to the total consumption expenditure; in other words, dividing the expenditure for each selected item by the total consumption expenditure and multiplying by 1000.

This calculation is done for each of the divisions and the national total, and the total weights for each of these strata should be equal to 1000.

(b) Step 2: This step involves the re-calculation of the weights after using the national total expenditure as the criterion or determinant of final selection of items for the new CPI basket.

Results/findings. The main result of this study is the calculation and generation of the weights of the Fiji Islands Bureau of Statistics' CPI from the 2002/03 Household Income and Expenditure Survey. The study produced the weights for each of the 3 divisions and the national weights and determined how to compile an underlying inflation rate series.

This study also presents, as simply as possible, the methodology for doing a re-base and calculation of the weights, which should enable the CPI compilers to use the paper as a guideline and benchmark for future re-basing exercises. With this methodology document, CPI officers would also be able to determine the item components that are to be included and excluded from the CPI scope, the special treatment of various transactions of households and the re-distribution of expenditures of non-selected items to other items of the same group or with similar characteristics.

The new basket contains 581 items, as compared to the 332 items in the 1993 basket. These are all reclassified and grouped into 12 major divisions. The major grouping from this study follows the same grouping under the COICOP classification but there is still a need to develop and improve further detailed classifications in some of the groupings. Due to incompatibility of items in the HIES data and the CPI classifications, some items in the HIES data had to be re-classified and re-assigned to other groupings so as to achieve at least some compatibility between the two classifications.

Summary 2: The Spending Patterns of Low- and High-class Urban
Households

The comparison of expenditures and income between income quintile groups, the statistical analysis to be done and the relationships between these two groups in terms of expenditure and expenditure items will be the main focus of this section. From this analysis, we would be able to compare and determine how these two income deciles groups spend their income, what items they spend most on, how much they spend on such items, their sources of income, among others. Poverty is a very sensitive and prominent issue in most countries, so information generated from this analysis will reveal some facts on the spending patterns of these households.

Objectives. The objective of this study is to analyze the spending patterns of households in the lower- and higher-income quintile groups, using the 2002/03 HIES data, and to determine how households in these groups spend their income in terms of major and individual consumption items. In addition, the study analyses the spending patterns of households in the two-quintile groups in terms of income source, area class, ethnicity and division.

Data and methodology. Data for this analysis will be taken from the Urban Household Income and Expenditure Survey 2002/2003. Data is captured using the CS Pro software while editing and generation of reports are done using the SAS software.

The Household Survey Division of the Fiji Islands Bureau of Statistics conducted the 2002/03 Urban HIES and a sample of 3015 households was selected throughout the country for this purpose. Questions on source of income, in terms of wages and salaries, personal account activities, source of financing like borrowing, and what they spent this income on were captured through the questionnaires. A diary booklet was also provided for each household to record all their daily expenditures on food and groceries items, gifts they received from employers, friends, and relatives, and subsistence (home-grown items). This study will be based on households in the first two lower and the two higher income

quintiles. Major classifications will be according to the ethnicity of households and population, class and division.

Results/findings. For the lower group, out of the average expenditure of $3,527 annually, they spent 45.12 percent on food, beverages and tobacco. The highest expenditures were on food, housing, transport and miscellaneous goods, whereas expenditures on health and education were very low.

Low spending patterns on education and health for low-income households are expected, as these households' main priority is to spend their income first on food (survival) rather than on education and health.

The higher income group follows the same spending patterns as the lower group, which indicates that the nature of spending in households in Fiji maybe due to the traditional and cultural obligations.

Comparing these spending patterns in the lower income group by ethnicity, Fijians spend more on food than Indians, but both tend to spend less on important items like health and education, which are of great importance in terms of healthy living.

The households in the higher income group have similar spending characteristics to the lower group, but they tend to be involved more in investment expenditure where they invest their income for gain. Most of the social and economic policies of governments provide financial assistance to lower income households, but there is also a need for these households to change their spending patterns for the benefit of health and wealth.

Poverty and Inequality in Georgia:
Main Trends and Some Key Factors[*]

Executive Summary

During the last ten years or so, differentiation of the population of Georgia by welfare has taken place at an extremely large scale, which causes a serious aggravation of poverty in the society. Absolute and relative impoverishment of a considerable part of the population has been a serious threat to democracy and the cause of building a civil society.

In 2003, Georgia's GDP grew by 11 percent over the previous year, but the poverty rate also increased from 15 percent to 17 percent. This means that the economic growth has not made a significant and immediate influence on poverty reduction in Georgia. There is some research focused on illuminating the dynamics of economic growth, employment and poverty. They found that economic growth did not automatically result in the reduction of poverty and the development of the labour market was a key tool for poverty reduction.

Objectives. Employment plays an important role in poverty alleviation and economic growth does not seem to affect all employment branches equally. This paper intends to elaborate on the dynamics of economic growth, employment and poverty reduction by examining the influence of employment in different branches on poverty and forecast poverty distribution for different scenarios of changes in employment.

Key variables and measurement. The following describes key variables for this research and how they are measured.

- **Poverty** (household level variable) is measured by consumption per equivalent adult, estimated in national currency at current prices for the estimation period. Both cash and in-kind consumption are included.

- **GDP** (national level variable) is used as an indicator of economic growth. **GDP per capita** indicator also will be used.
- **Value-added per employee** (national level variable) is based on GDP and employment and is defined as the average value added created by one employee per year.
- **Employment** (individual level variable) is measured by the employment status for the last three months prior to the survey period.

Methodology to estimate influence of employment on poverty. To examine the influence of employment on poverty, poverty levels of households with employed members by various branches were estimated and poverty risk levels between poor sectors of society were calculated. The structure of employment was then analyzed by branches and by sectors and poverty risk level was analyzed for each branch and sector. The poverty risk level is the difference between two characterized groups of society expressed as a percentage. These indicators were then analyzed together with data on GDP and value added per employee by sectors and branches.

Data sources. GDP and value-added data are obtained from the national accounts statistics produced by the Georgian State Department of Statistics in accordance with international guidelines. Georgian Household Survey (SHGG) data is used as the main tool for current research. It was developed and implemented in 1995-1997 in collaboration with Statistics Canada on the basis of the World Bank's institutional building credit. In July 1996, within the framework of the project, regular observation of households of Georgia began on the whole country except for the regions of Abkhazia and Tskhinvali. The present report uses the household data collected from 1997-2003.

From the Georgian Household Survey, estimates can be obtained for the following groups of data:
- Demographic data;
- Data about dwelling;
- Agricultural activity of households;
- Population's economic status;
- Employment structure, wages, pure income from employment;
- Incomes;
- Expenditures;

- Distributions of incomes and expenditures;
- Poverty indicators.

Reliable estimates can be obtained with quarterly periodicity. The data on economic status, demography, and dwelling can be obtained at the end of the third month after the reference period, while the data on incomes, expenditures, employment structure, and agricultural activity can be obtained at the end of the sixth month after the reference period.

Results of the analyses are summarized below.

Economic development and poverty incidence. In the nineties, after the collapse of the Soviet Union, the social environment in Georgia collapsed, which was directly linked to the destruction of the old economic links between Soviet territories. Early in the nineties, due to a significant economic recession, civil war and destruction of all economic links, there was a significant increase in the poverty level and a significant decrease in GDP. In the second half of the nineties the situation stabilized, causing decrease in poverty levels in 1996-97; but since 1998 the poverty level has displayed a slightly increasing trend, and it is correlated to the increasing trend of GDP.

Extreme poverty level data has been calculated since 1996. The data show an increasing trend in the extreme poverty rate. In 1997-99 poverty rate rose, while in 1999-2001 the poverty rate decreased. But in 2000-2003 the indicator shows deterioration of living conditions, which is reflected in increasing poverty levels.

When the GDP, poverty, and consumption growth rates are plotted on the same graph, it shows that the GDP growth rate is usually higher than the poverty line growth rate and consumption growth rate. And the consumption growth rate is lower than the GDP and poverty line growth rates. This is because GDP covers all goods and services, whereas the poverty line is based on the minimum subsistence basket, which covers only essential commodities and goods of first priority. However, the consumption level covers all goods and services which are included in GDP and the fact that consumption growth rate is below the GDP growth rate means that the GDP growth does not cover all society equally and the welfare of the main part of society does not benefit from GDP.

The main reason that GDP growth cannot cover the whole society is employment. SGHH data shows that the poverty level is twice as high among the households with no employed member than among the households with at least one employed member.

The criteria for employment used in the present research are based on employment during the last three months. This means that employment generally influencing poverty is not very significant. Main reason for this fact is the structure of employment. For example, the share of employment in agriculture is usually very large. The bulk, more than 95 percent, of this employment is self-employment via farming the land or looking after one or two cows and some productive animals.

The employment structure in Georgia is distributed very asymmetrically. It is natural that the branch with the biggest share in employment has the biggest share in GDP, but the employment structure in Georgia is not that way. For example, restaurant and hotel services, has a very small share of total employed, but its share in GDP is large. On the other hand, while employment in agriculture, which is mostly self-employment on own land or farms, has the highest share of total employed, it does not contribute much to GDP.

Employment has a great influence on poverty reduction but the level of influence varies according to the branch in which an individual is employed because of different weights in the generation of household income and in providing a respectable way of life and welfare.

Employment and poverty by branches. Out of 14 branches, 9 branches were selected to study the influence of employment on poverty levels by branches. The selected branches have a small share in employment but have a great influence on poverty reduction and have the resources for future development. These branches are:
- Mining and quarrying
- Manufacturing
- Electricity, gas and water supply
- Construction
- Restaurant and Hotel services
- Transport and Communications
- Financial intermediation
- Real estate, renting and business activities
- Other services

All the selected branches have some similar characteristics:

- They have low share in employment structure and have resources for future development.

- They are based on private initiative and do not need government to create anything special for them; that is government needs only to create a favourable environment for entrepreneurs such as by creating a favourable tax codex, instituting programs on occupational safety, and guaranteeing effective implementation of labour laws.

- They are powerful in creating real goods and services and in accumulating resources for state budgets. This method guarantees a transfer of wealth to the poor sectors of society -- those who will not be able to get out of poverty independently since they have no human and material resources. These are mostly single pensioners and households consisting of members of non-working age.

Agriculture, forestry, fishing and processing products by household for sale or for self-consumption, Trade services, and Repair services were not selected. These branches are over-employed and have no resources for increasing the share of employment. It is very important to optimise these branches, that is, to decrease the share of their employment so as to increase the effectiveness of employment.

Public administration and defence, education, and health care and social services were also not selected. These branches do not quantitatively influence poverty. That is, their influences are more qualitative and an increased number of employers in these branches does not lead to a positive impact on poverty reduction.

Results/findings. One of the main findings is that GDP growth does not automatically provide a reduction in poverty. GDP grew by 11 percent in 2003 as compared with 2002, but at the same time the poverty level also increased. It means that improved well-being from GDP growth was not accessible for all the society equally. Increased employment allows GDP growth to translate to improved welfare for a large part of society.

However, the increase in employment must be focused on productive employment and take into account the structure of employment. If the focus is on increasing employment – increasing only the number of employees and not paying attention to the effectiveness of employment– it will result in a reduction of effectiveness in over-employed branches like agriculture in Georgia. And the government should develop several policies focused on a favorable tax codex, safety, and infrastructure.

Application of X-12-ARIMA Seasonal Adjustment Programme on Some Economic Series of Hong Kong[*]

Executive Summary

To better assess the social and economic situation of Hong Kong, the Census and Statistics Department currently publishes seasonally adjusted data for most of the economic indicator series, including the gross domestic product, merchandise trade, retail sales, consumer price index and unemployment rate.

The seasonal adjustment programme used is X-11-ARIMA (Auto Regressive Integrated Moving Average). It was developed by Statistics Canada in 1988. Seasonal adjustment by the X-11-ARIMA programme is performed based on univariate time series models. In contrast to causal models, the method of univariate models works under the assumption that the time series is composed of a systematic part that is a well-determined function of time and a random part that obeys a probability law.

X-12-ARIMA, released in the second half of the 1990s, is the latest programme in the X-11 line of seasonal adjustment programmes. It was developed by the U.S. Bureau of Census mainly through enhancements made to X-11-ARIMA. A number of statistical agencies, including the U.S. Bureau of Census, Korea National Statistical Office, Federal Statistical Office of Germany and Statistics Netherlands, perform seasonal adjustments using the X-12-ARIMA programme.

Objectives. This study aims to evaluate the performance of the X-12-ARIMA seasonal adjustment programme on some of the economic time series of Hong Kong, and in particular, to compare it with that of X-11-ARIMA. It will shed light on the scope for introducing seasonal adjustments based on X-12-ARIMA to the official economic time series of Hong Kong and will encourage further exploration of the issue in the future.

Concepts and definitions. A *time series* is a data series obtained through repeated measurement of the same variable over time. It allows comparison of the variable across different periods. A time series can be decomposed into three main components according to the nature of the effect on the data series. The three components are the (a) trend-cycle component, (b) seasonal component and (c) irregular component.

The *trend-cycle component* is the combined long-term trend and business-cycle movements in the data. A trend corresponds to the underlying path or general direction of the data over a long period of time. The business cycle refers to an alternating sequence of economic contractions and expansions recurring within an interval of time.

The *seasonal component* taken in a wide sense includes (a) the repetitive within-year movements which are systematic and relatively stable over years in terms of annual timing, direction and magnitude and (b) the calendar-related systematic effects that are not stable in annual timing. Regarding the former, the Christmas effect is an example that is commonly referred to. On the other hand, the latter include trading day effects, effects of events that occur at regular intervals but not at exactly the same time in each year as well as the leap-year effect.

The *irregular component* captures effects that are unpredictable. It includes (a) outlier effects, the presence of which are characterized by unusually large or small observations and (b) stochastic irregularity that is symmetrically and randomly distributed around its expected value. The outlier effects are usually associated with exceptional economic or climatic events such as strikes and unusual weather conditions. In some literature, the term "irregular component" is restricted to the stochastic irregularity only.

Seasonal adjustment is a process of breaking down a time series into its components using analytical techniques and removing the effects of seasonal variations from the time series. The purpose is to identify the different components of the time series and thus to provide a better understanding of the behaviour of the series. In seasonally adjusted data, the impact of the seasonal pattern is removed. By removing the seasonal variations, a seasonally adjusted series highlights the trend-cycle and the irregular

components. However, seasonal adjustment will not smooth a time series if the irregular component is strong.

X-11-ARIMA used by the Census and Statistics Department of Hong Kong is a member of the X-11 family. The X-12-ARIMA contains essentially all the capabilities of X-11-ARIMA, including pre-adjustment to the original time series using data provided by users, and removal of trading day and Easter effects, if present, before modelling the time series and extending the time series with forecasts and backcasts from the model chosen prior to seasonal adjustment.

The flow diagram for seasonal adjustment with X-12-ARIMA is given below.

```
┌─────────────────────────────────────────────────────┐
│              RegARIMA Models                          │
│     (Forecasts, Backcasts, Pre-adjustments)           │
└─────────────────────────────────────────────────────┘

            ┌─────────────────────────────────────────┐
            │          Modelling and                  │
            │    Model Comparison Diagnostics         │
            └─────────────────────────────────────────┘

┌─────────────────────────────────────────────────────┐
│        Seasonal Adjustment (Enhanced X-11)           │
└─────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────┐
│                 Diagnostics                          │
│  (Including revision histories, sliding spans, spectra, etc) │
└─────────────────────────────────────────────────────┘
```

Data and methodology. Data used in this study include the following economic indicator series of Hong Kong:

Statistical series	Frequency
Gross domestic product volume index (2000=100)	Quarterly
Retail sales volume index (Oct 1999 – Sep 2000 = 100)	Monthly
Import value (HK$ million)	Monthly
Domestic export value (HK$ million)	Monthly
Re-export value (HK$ million)	Monthly

In designing the research method for this study, reference has been made to other researches. In the study on the application of X-12-ARIMA to some Italian indicator series, Findley and Hood performed default runs of X-12-ARIMA and TRAMO/SEATS. During the process, tests for trading-day and Easter effects and search for additive outliers, level shifts and temporary change outliers were undertaken. In another research to compare the quality of seasonal adjustment between X-12-ARIMA and TRAMO/SEATS, Hood also used results from default adjustments on some U.S. import/export series.

This research process has been designed following the method of the studies mentioned above. The procedures for X-12-ARIMA and X-11-ARIMA runs on each selected economic time series of Hong Kong are detailed below:

Step 1. Graph the time series to look for visible changes in seasonal pattern and obvious outliers. Changes in seasonal pattern that occur far back in the past are avoided by advancing the starting date of the data used for adjustment and modelling.

Step 2. Run the seasonal adjustment programme in default mode on the time

series.

Step 3. Assess the seasonal adjustment.   The basic diagnostics to be examined include the following:

Diagnostics	Criteria for satisfactory adjustment
M and Q statistics for quality of the final irregular component and stable seasonality	Value <1
F-test for presence of stable seasonality	Stable seasonality present
F-test for presence of residual seasonality	Residual seasonality not present

Step 4. If the adjustment is found unsatisfactory in step 3, correct problems using available options, when possible, with a view to removing unfavourable diagnostics.

Results/findings. Analyses on the performance of X-12-ARIMA and X-11-ARIMA are summarized below:

(a) Out of the five series studied, users' modifications to X-12-ARIMA default runs are required for two series only whereas X-11-ARIMA requires them for all the five series. The provision of outlier detection capability in X-12-ARIMA allows automatic identification and removal of outliers and level shifts in data series. This reduces the need for users' input in refining seasonal adjustments and thus X-12-ARIMA requires less users' intervention and is more effective in handling badly behaved time series.

(b) Differences in test results on the presence of Easter effects is noted for three series. X-12-ARIMA and X-11-ARIMA runs in this study use different methods to estimate the Easter effects. The X-11-ARIMA estimates Easter and other regression effects from a preliminary irregular component based on ordinary least-squares regression models,

whereas X-12-ARIMA uses regARIMA models. Earlier research results do not indicate which method is superior.

(c) All the five series have better quality assessment statistics from X-12-ARIMA. This illustrates that the X-12-ARIMA seasonal adjustment is superior to X-11-ARIMA. The fact that the standard deviation of period-to-period percent change in seasonally adjusted series from X-11-ARIMA is smaller than that from X-12-ARIMA for all the five series, appears, at first glance, contradictory to the results presented by M and Q statistics. In fact, the outlier detection capability of X-12-ARIMA is an influential factor.

Implications and recommendations. Based on the analyses, X-12-ARIMA is a superior seasonal adjustment programme to X-11-ARIMA. However, we cannot disregard the fact that this study is a preliminary one and many seasonal adjustment issues have not been touched on in the study yet. More research and analytical work will still be required before a decision to shift from X-11-ARIMA to X-12-ARIMA can be made.

The beauty of X-11-ARIMA is that it is simple. It only has two sets of commands (input and seasonal adjustment) accompanied by eight sets of options. Users can easily grasp the knowledge for running X-11-ARIMA. On the other hand, users faced with badly-behaved series may require the comprehensive set of diagnostics and options in X-12-ARIMA for fine-tuning the seasonal adjustment.

Further study on modelling the Lunar New Year holiday effects and choices between direct and indirect seasonal adjustments is recommended. Like Easter, the Lunar New Year is a fluctuating holiday associated with the western calendar. Modelling the Lunar New Year holiday will improve the estimates of seasonal factors for the Hong Kong statistical series.

At present, the statistical series of merchandise trade in Hong Kong is seasonally adjusted, using the indirect seasonal adjustment method, whereas the series of gross domestic product uses the direct seasonal adjustment method. With a wider range of diagnostics and options in X-12-ARIMA, an in-depth study of the issue is possible.

Factors Related to the Risk of Unwanted Pregnancy in Java, Indonesia[*]

Executive Summary

In Indonesia, maternal mortality rate is relatively high at 373 per 100,000 live births (SKRT, 1995). This figure is 50 times worse than that of Singapore (Lestari, 1997). Abortion is one of the reasons for increasing maternal deaths in developing countries. Moreover, the main cause of abortion is unwanted pregnancy.

Objectives. Major objective of the research is to analyze factors related to the risk of unwanted pregnancy in Java, Indonesia. More specifically, the aims of this research are:

(1) to know the ratio of unwanted pregnancy to wanted pregnancy;

(2) to know the socio-demographic and economic factors related to the risk of unwanted pregnancy; and

(3) to know the factor which has the most influence on the incidence of unwanted pregnancy.

Sources of Data. Data used for this research is from the 2002 – 2003 Indonesia Demographic and Health Survey (IDHS). The 2002 – 2003 IDHS was implemented by BPS-Statistics Indonesia (*BPS* or *Badan Pusat Statistik*) from 21 October 2002 to 9 April 2003. The study population is married women aged 15 – 49 years old. The ten independent variables from IDHS used in this study of unwanted pregnancy are: age of mother, highest education level, age at first married, history of pregnancy, number of children (parity), working status, participation in family planning, ideal number of children, partner's preference number of children, and type of residence (urban and rural).

For the analysis, the values of all variables are transformed to binary values, as follows:

---

[*] Based on the paper written by Gantjang Amannullah, MA, Middle-level Statistician, BPS-Statistics Indonesia, with his Research Advisor, Kwang-Hee Jun, Professor, Department of Sociology, Chungnam National University, Republic of Korea.

<Table 1.> Category of ordinal scale variable.

Variable	Category
Unwanted pregnancy	1 = Unwanted pregnancy (at the time became pregnant: <u>did not want</u> to become pregnant; did want to become pregnant but wanted to <u>wait until later</u>, or did not want to have any more children at all) 0 = Wanted pregnancy (at the time became pregnant: did want to become pregnant)
Type of Residence (Urban and Rural)	1 = Urban Area 0 = Rural Area
Age of Mother	1 = Risking age become pregnant (age group of 15 – 19 years and 35 – 49 years) 0 = Safety age become pregnant (age group of 20 – 34 years)
Age at First Marriage	1 = Less than 20 years old 0 = 20 years old and older
Parity	0 = Less than 3 Children 1 = 3 Children or Higher
History of Pregnancy	1 = Have ever had a pregnancy that miscarried, was aborted, or ended in a stillbirth 0 = Have never had a pregnancy that miscarried, was aborted, or ended in a stillbirth
Participation in Family Planning	1 = Have ever used family planning method 0 = Have never used family planning method
Ideal Number of Children	0 = Less than 3 Children 1 = 3 Children or Higher
Partner's Preferred Number of Children	1 = Different Number 0 = Same Number
Working status	1 = Working 0 = Not working
Educational Attainment	0 = Junior high school or lower level 1 = Senior high school or higher level

Analytical methods. Analytical methods used in this research are descriptive analysis, chi-square and logistic regression analysis. Chi-square analysis is used to know which independent variable has a significant relationship with the pregnancy variable. Logistic regression analysis is useful for finding the best fitting model to describe the relationship between the risk of pregnancy and a set of independent variables.

Descriptive analysis. Results of the 2002-3 IDHS show that one in ten pregnancies was mistimed and one in fourteen was not wanted at all. If unwanted births could be prevented, the total fertility rate in Indonesia would be 2.2 births per women instead of the actual level of 2.6. This gap remains the same as that recorded in 1997 (2.4 and 2.8 births per women, respectively).

This research shows that from the sample of 458 married women aged 15 – 49 years old who are currently pregnant, 80.3 per cent were wanted pregnancies, and 19.7 percent were unwanted pregnancies.

Chi-square Test. The results of the chi-square tests (see Table 2) show that 4 variables (parity, family planning participation, ideal number of children, and partner's preferred number of children) have a significant relationship to the risk of unwanted pregnancy, while 2 variables (education attainment and type of residences) have almost significant influence on the incidence of unwanted pregnancy at a 5% significant level. However, the other 4 variables (age of mother, age at first marriage, abortion experience, and working status) have no significant relationship to the risk of unwanted pregnancy.

<Table 2.> Cross Tabulation and Chi-square Test between Unwanted Pregnancy and Selected Factors, Java Islands, 2002 – 2003 (in percentage)

Selected Factors Affecting Unwanted Pregnancy	Pregnancy		Total	Chi-square (2-sided Sig.) (df)
	Wanted	Unwanted		
Age Category (years)				0.001
• 15 – 19 and 35 – 49	80.5	19.5	100.0 (87)	(0.977)
• 20 – 34	80.3	19.7	100.0 (371)	(1)
Educational Level				3.087
• Junior HS and Lower Level	77.9	22.1	100.0 (289)	(0.079)
• Senior HS and Higher Level	84.6	15.4	100.0 (169)	(1)
Age at First Marriage				1.239
• Less than 20 Years	77.9	22.1	100.0 (195)	(0.266)
• 20 Years and Older	82.1	17.9	100.0 (263)	(1)
History of Pregnancy				0.390
• Never abortion	80.8	19.2	100.0 (396)	(0.532)
• Abortion	77.4	22.6	100.0 (62)	(1)
Participation in Family Planning				10.812
• No Participation in FP	88.5	11.5	100.0 (165)	(0.001)*
• Yes, Participation in FP	75.8	24.2	100.0 (293)	(1)
Parity				42.180
• Less than 3 Children	85.4	14.6	100.0 (390)	(0.000)*
• 3 Children and Higher	51.5	48.5	100.0 (68)	(1)
Ideal Number of Children				8.198
• Less than 3 Children	74.6	25.4	100.0 (213)	(0.004)*
• 3 Children and Higher	85.3	14.7	100.0 (245)	(1)
Partner's Preference Number of Children				10.163
• Different Number	71.4	28.6	100.0 (140)	(0.001)*
• Same Number	84.3	15.7	100.0 (318)	(1)

Selected Factors Affecting Unwanted Pregnancy	Pregnancy		Total	Chi-square (2-sided Sig.) (df)
	Wanted	Unwanted		
Working Status of Mother				1.240
• Not Working	82.1	17.9	100.0 (273)	(0.265)
• Working	77.8	22.2	100.0 (185)	(1)
Type of Residence				3.761
• Rural	39.9	28.9	100.0 (173)	(0.052)
• Urban	60.1	71.1	100.0 (285)	(1)

Logistic Regression. Six independent variables which showed significant or almost significant effect with the dependent variable, unwanted pregnancy, in the chi-square tests, were used in the logistic regression analysis to find the best fitting model in predicting factors which affect the risk of unwanted pregnancy.

The value of the likelihood ratio test statistic in logistic regression is 51.816 with the p-value equal to 0.000. Therefore, it can be said that at least one of the six independent variables (parity, participation in family planning, ideal number of children, partner's preference number of children, educational level, and type of residence) has a significant relationship with the dependent variable (unwanted pregnancy).

As the next step, the Wald statistical test is used to determine independent variables which have a significant relationship to the dependent variable (see Table 3). Parity, participation in family planning, and type of residence have a positive relationship to the risk of unwanted pregnancy, while partner's preferred number of children has a negative relationship to the risk of unwanted pregnancy

<Table 3.> Summary of logistic regression analysis of unwanted pregnancy

Variable	B	S.E	Wald	df	Sig. (p-value)	Exp (B)
Parity	1.597	0.301	28.107	1	0.000	4.936
Participation in Family Planning	0.595	0.296	4.033	1	0.045	1.812
Partner's Preference in Number of Children	- 0.598	0.258	5.386	1	0.020	0.550
Type of residence	0.708	0.279	6.414	1	0.011	2.029
Constant	- 2.242	0.366	37.602	1	0.000	0.106

※ Exp: odds ratio, B: coefficient of each variable, df: degrees of freedom

The logistic model can be expressed as follows:

$$g(x) = \ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = -2.242 + 1.597D1 + 0.595D2 - 0.598D3 + 0.708D4$$

Where: D1 = Parity, D2 = Participation in Family Planning
D3 = Partner's Preference Number of Children, D4 = Type of Residence

Odds ratio of each variable, assuming that other factors are constant, can be interpreted as follows:

① The odds of women having 3 children and higher to the risk of unwanted pregnancy increases by 4.94 compared to those having less than 3 children.

② The odds of women participating in the family planning to the risk of unwanted pregnancy increases by 1.81 compared to those not participating in the family planning.

③ The odds of women having different preferred number of children with their spouse to the risk of unwanted pregnancy decreases by 0.55 compared to those having same preference for number of children with their spouse.

④ The odds of women living in urban areas to the risk of unwanted pregnancy increases by 2.03 compared to those living in rural areas.

Conclusion. The result of analysis shows that four variables: parity, participation in family planning, partner's preference in number of children, and type of residence, have significant relationship with the risk of unwanted pregnancy. Among them, parity has the most significant influence on the risk of unwanted pregnancy.

Measuring of Development Level and its Relationship with Fertility Rate in 252 Sub-provinces of the Islamic Republic of Iran[*]

Executive Summary

The fertility indicators in Iran show a remarkable decline in the level of fertility at a uniform pace during the period 1986-1996. The General Fertility Rate (GFR) dropped 58.8 percent from 204 to 84 per 1,000 and the Total Fertility Rate (TFR) declined by 58.3 percent from 7.1 to 2.96 children per woman. The decline in GFR was 56.2 and 54.5 percent for urban and rural areas, respectively. These figures show that the trend of fertility reduction in urban areas was slightly faster than in rural areas.

Socio-economic and cultural development planning in Iran has included population policies for controlling fertility levels and development of health standards in order to decrease infant mortality. There are questions about whether the fertility patterns of the sub-provinces of Iran are similar throughout the country and if there are differences, what factors cause these differences.

Objectives. The main objectives of this paper are determining the development level and its relationship to the fertility rate in 252 sub-provinces of Iran. It means to find whether there is any relationship between fertility index and development index and social variables such as literacy, employment and so on and what is the quality and rate of this relationship.

Operational definitions of variables in this analysis. The development index is for measuring development level of the sub-provinces of Iran considering socio-economic variables and population. This index was constructed using regression modelling and factor analysis.

For measuring the fertility level of the sub-provinces under consideration, the child-woman ratio (CWR) is used. CWR can be defined two different ways, say CWR_1 and CWR_2. The CWR_1 index is calculated by dividing the number of children 0-4 years of age by the woman population of 15-49 years of age and multiplied by 1000. The CWR_2 index is computed by dividing the number of children 5-9 years of age by the number of women 20-54 years of age and multiplied by 1000. The second index is used more in developing countries because of underestimated children of 0-4 years of age. Therefore, CWR_2 index is used for this study.

Data and Methodology. The data for this research has been obtained from the National Population and Housing Census, 1996 and other statistics. In this paper, there are two main variables - CWR for each sub-province as the dependent variable and the development index of each sub-province as independent variable.

The correlation between 11 independent variables, which are hypothesized to be factors affecting fertility and fertility rate was reviewed and then the significance of the relationship was tested. For each of the eleven independent variables, 252 provinces were divided into three sub-provinces, and the analysis of variance test was performed to determine whether there are any differences among the mean fertility rate of three sub-provinces. To measure the development level and to determine the status of sub-provinces in the viewpoint of development, two development indexes, statistical and theoretical development index, were studied. For the analysis, CWR and development index were used as dependent and independent variables, respectively.

Multiple Regression. Multiple regression can establish that a set of independent variables explains a proportion of the variation in a dependent variable at a significant level (significance test of R^2) and can establish the relative predictive importance of the independent variables (comparing beta weights). For the selection of independent variables, forward and stepwise regression methods are used.

Results and Findings. The eleven independent variables and F-value of one-way analysis of variance are as follows:

(1) Percentage of university education coverage of women (F=53.49)

(2) Male employment (F = 15.00)

(3) Women educational coverage (Elementary Level) (F = 108.88)

(4) Percentage of women employment (F=5.54)

(5) Urbanization rate (F = 36.8)

(6) Percentage of litcratc women, 15-34 years of age (F=45.16)

(7) Population Youth (F = 169.17)

(8) Percentage of units accessed piped water... (F=17.72)

(9) Percentage of services sector employment (F=14.55)

(10) Percentage of industrial sector employment (F=6.74)

(11) Percentage of agricultural sector employment (F=12.48)

The analysis of variance tests show significant differences in mean fertility rate among the three groups of sub-provinces by each independent variable except for the percentage of industrial employment variable (10). With increasing levels of independent variables, (1), (2), (4), (5), (6), (7), and (8), the mean fertility rate decreases among the sub-provinces. Also the test shows that there is not a very strong relationship between the mean fertility rate and each of independent variables (9), (10) and (11).

For the statistical development index, 14 variables related to development level were selected. From a factor analysis, 5 variables with most weight were selected, namely: percentage of educational level of women in university, fertility rate, urbanization rate, population youth, and units accessed to piped waters.

By using statistical development index, the sub-provinces were grouped into five development levels. The analysis of variance test for the fertility mean in the five groups of sub-provinces based on development ratc has a high significant level with F=91.47. It means there are significant differences in fertility rates among the 5 groups. The Sheffe test was also performed to check which groups were different from each other. It can be concluded that with an increasing development rate in sub-provinces, fertility mean decreases.

Another method to make a development index is the Theoretical Development Index. For this index, the variables were classified from the lowest level up to the highest level and then after recoding, the grade of each sub-province, based on each variable, was determined.

Sub-provinces were classified into five groups of development levels based on the theoretical development index. The result of the analysis of variance test shows that there is a significant difference in fertility rate among these five groups of sub-provinces by development level, which is the same result as the statistical index analysis.

Another grouping of sub-provinces into five based on fertility levels was made using the child-woman ratio variable. From the review of the list of sub- provinces in the groups of fertility and development level, sub-provinces which are in the fifth group of development level (high development) were the same sub-provinces which were in the first group of fertility (very low fertility).

The forward regression method selected six variables and yielded an $R^2 = 0.7081$ and multiple correlation coefficient of 0.84. The entered variables are: social inequality index (women literacy index), cultural inequality index (percentage of married 15-34 years of age), demographic index (sex ratio) and economic index (male employment and units accessed piped water and etc.) The resulting equation is:

$$Y = 131.60 + 1.20(C) - 0.94(D) - 1.60(I) - 0.18(M) - 0.04(X1) + 0.35(X5)$$

where:

(C) Percentage of married women 15-34 years of age

(D) Male employment

(I)Percentage of literate women 15-34 years of age

(M) Percentage of units accessed with piped water, electricity and telephone line

(X1) Urbanization rate

(X5) sex ratio

Of these variables, fertility rate is most strongly influenced by percentage of literate women of 15-34 years of age.

The stepwise regression method yielded results similar to the forward regression method. The urbanization rate was first entered into the equation and other variables eliminated. With a correlation coefficient R=0.4501 and F=63.5, it may be concluded that there is a strong relationship between CWR and urbanization rate. The final equation obtained is as follows:

$$Y = 133.4262 + 1.1992(C) - 0.9248(D) - 1.6562(I) - 0.2216(M) + 0.3630(X5)$$

Independent variables:

C=Percentage of married women 15-34 years of age

D=Male employment

I=Percentage of literate women 15-34 years of age

M=Units accessed with piped water, electricity and etc.

X5=Sex ratio

Overall, results of the analysis indicate that the percentage of literate women 15-34 years of age has a major role in determining CWR.

Conclusion. Different and non-harmonized development levels in sub- provinces resulted in various and unequal fertility patterns. It is recommended that to control and harmonize fertility patterns, the same development pattern should be taken for all of the sub-sectors of the population. From this research, it was found that sub-provinces in the fifth group of development, that is in the very high level of development, are the same sub-provinces in the first group of fertility, that is in low level of fertility. It also found that the findings based on the theoretical index and statistical index were the same.

Development of Labour Statistics in Kiribati[*]

Executive Summary

The information on employment and unemployment statistics has never been produced on a regular basis in Kiribati because of the lack of staff and financial resources. So far, the Population Census is the only source of employment statistics in Kiribati, which are produced every five years. Up to now, the National Statistical Office (NSO) still has no unit responsible for undertaking household surveys and this is why household statistics like household income, number of people unemployed, household assets, etc. are not readily available to the public.

Assessing the performance of the labour market in Kiribati is a difficult task. Not only is there a lack of reliable data from which informed analysis of the employment situation could be made, but also there are structural characteristics of the Kiribati economy that hinder a meaningful collation of these data. As with most of the Pacific islands, failure to find a job in the cash economy does not normally result in open unemployment but rather a return to some kind of work in the subsistence sector. This makes the conventional definition of unemployment inappropriate in the Kiribati context.

Objectives. This paper aims to develop a Labour Force Survey (LFS) in Kiribati. The LFS is based on the recommendations of the international statistical agencies such as ILO, UN etc. In the context of developing the survey, Korea's LFS is referred to. This paper will also help to improve the information available about the employment from the 2005 Population Census. The Kiribati Government can adopt many survey items to get labour force information in the coming Census questionnaire.

The study will provide information on the performance of the labour force (employment), focusing on the following aspects:

---

a) Employment statistics from available data especially from the Census records;

b) Description and analysis of available information on employment in the informal sector and of any legislation or regulations affecting employment in the informal sector;

c) Distribution of formal employment between the public and private sectors and the distribution of employment within the public and private sectors according to the major activities in these sectors;

d) Description and analysis of any legislation and regulations relating to formal and informal employment conditions;

e) Trends in employment regarding major activities;

f) Policy responses that governments can consider in their search for more and better jobs.

The study will develop further the statistical definitions and methods necessary to describe employment situations.

Concepts and Definitions related to LFS. The definition and concept of LFS for Kiribati is based on the recommendations of ILO and adjusted a little bit. Economically active population is all persons aged 15 years and over who furnish the supply of labour for the production of economic goods and services during the reference period. They can be classified as employed persons and unemployed persons. Not economically active population refers to persons who do not participate in economic activities. This applies only to those who did nothing to provide for themselves or their families or households during the reference period.

Persons of 15 years of age and over are considered as having employment if they did any type of work for pay or profit at least one hour during the reference week. Persons are counted as workers (in paid or self employment) if they receive payments or wages and are engaged in the production of goods and services. Unpaid family workers who worked 18 hours or more and persons who had a job but were temporarily absent from work during the reference period are also regarded as employed persons

Employment can be categorized into the formal sector and informal sector. The public sector comprising the general government and state-owned enterprises dominates
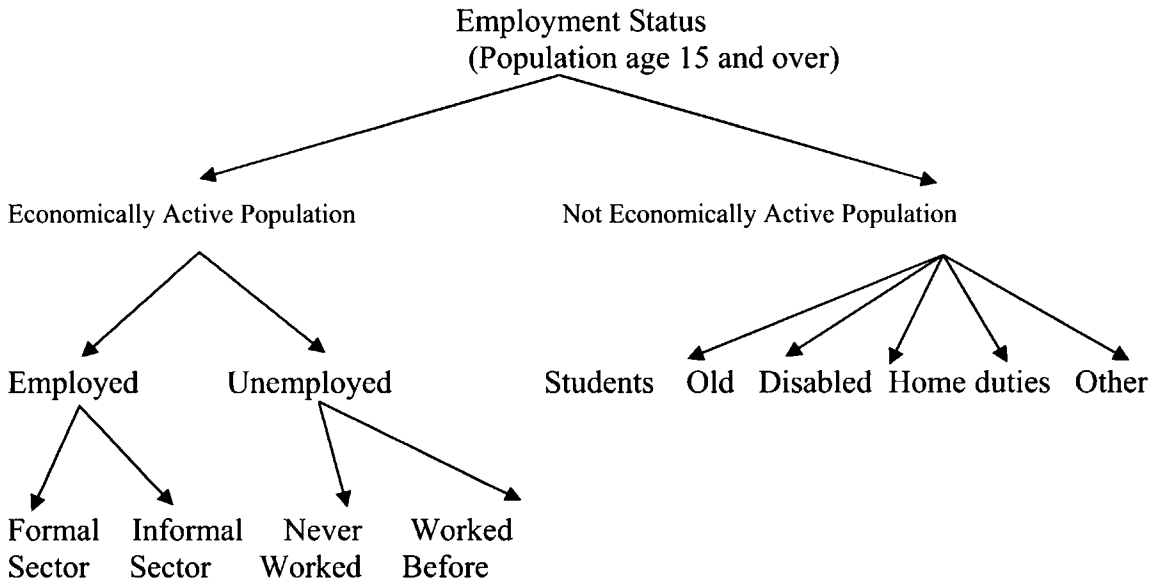
formal employment. A major component of the informal sector is the subsistence economies such as cultivating of coconuts, fishing and more recently, seaweed farming. In other words, informal activities comprise people or families engaged in subsistence and semi-subsistence activities mostly in the rural area and those working in urban areas without formal employment arrangements.

Underemployment exists when a person's employment is inadequate in relation to specified norms or alternative employment, account being taken of his or her occupational skill (training and working experience). In other words, people who are employed only part time or at work that is inefficient or unproductive, with a correspondingly low income that is insufficient to meet their needs are considered to be underemployed.

Unemployment refers to people who are classified as (1) neither "at work" nor "with a job but not at work" during the reference week, and (2) were looking for work during the last 4 weeks, and (3) were available to start a job. Also included as unemployed are people who did not work at all during the reference week, were waiting to be called back to a job from which they had been laid off, and were available for work except for temporary illness. Unemployment is classified into two types. One is an unemployed person who has never worked, and the other is an unemployed person who has worked before.

Figure 1 summarizes the concepts on employment status as described above.

Figure 1: Labour Force Framework:

Kiribati applies the ISIC (International Standard Industrial Classification) for the industrial classification. For the occupational classification, Kiribati applies ISCO-88 system with only 4-digits of coding following each of the 9 categories. Unfortunately, some of the jobs cannot be classified according to the ISCO-88. The NSO staff is intent to create a specific code with information that will be in line with the ISCO-88 system internationally.

Plan of the Labour Force Survey in Kiribati. To design Kiribati's labour force survey, the Korean labour force survey was taken into consideration. The overall plan for labour force survey of Kiribati is as follows.

A. Survey Scope: The scope of this survey will be all persons aged 15 years old and over except prisoners and foreigners.

B. Survey Cycle: This survey will be conducted every 3 months or every 6 months depending on the budget of the Government or foreign assistance.

C. Survey Methods: The survey will be done by the methods of face-to-face interview, telephone, fax, mail or internet. Normally the enumerators will visit each household and conduct an interview using the questionnaire.

D. Questionnaire Design: The survey will be based on a short questionnaire of 31 questions covering aspects of employment statistics such as personal items involving age, sex, educational attainment, number of household members, employed and unemployed, industry, occupation and employment status, etc.

E. Sampling Design: To minimize the budget and personnel necessary for the survey, a minimum sample size is indispensable. 2000 Population and Housing Census results were used as a sample frame. First, the characteristics of enumeration districts by region and industry were analyzed and then household data was sorted by island, village, land owner, repair and administrative code. With the sorted data, households were selected by the systematic sampling method. As a result, 1,817 households were selected from a total of 12,623 households with 95% confidence and 1% allowance for error.

F. Data Dissemination: Results are to be made available to the public three days after completion of the analysis. Staff has to distribute domestically to the public users, ministries, non-government and to members of Parliament. It should also be mailed to several high schools and colleges in the outer islands, regional and international organizations, and also neighbour countries in the Pacific. The media, such as radio and newspapers, are the most convenient way to announce the release of reports, which will also be put up in the Pacific Regional Information System (PRISM) website.

Conclusion. To recognize the broader concepts of the utilization of the labour force and to assist in understanding the structure and dynamics of the labour market, it is recommended that the Kiribati government develop the Labour Force Survey as a regular base. To develop LFS, the Government should include the annual budget funds for financing the LFS and also seek assistance from advanced countries or international agencies for further funding. In addition, the Government should give the authority to allow the expertise from other statistical agencies or ILO to help implement the Labour Force Survey because Kiribati is a small country with a lack of resource persons.

Inequality and Economic Growth in Malaysia[*]

Executive Summary

Malaysia's rapid economic growth, associated with very low unemployment, moderate inflation and poverty alleviation, is a key ingredient to the development and prosperity of the people and a paramount factor for the political and social stability of the ethnically heterogeneous country. Along with its economic development, Malaysia's poverty rate has decreased from 50 percent in 1970 to 5.1 percent in 2002. The implementation of the New Economic Policy (NEP) in 1971-1990, two years after the race riots, was widely recognized as a dominant contribution for the tremendous progress in poverty eradication and as a turning point for social and political stability in the country that created a conducive environment for economic growth.

Even though Malaysia continues to achieve a high level of income, still the distribution of income in society has only improved slightly. Over the years, the indicators of income inequality level measured by the Gini coefficient show an inconsistent direction. The presence of this inequality affects the performance of aggregate economic growth. Some economists, such as Oshima, and Kuznets, have theorized that *inequality has a built-in tendency to beget inefficiency, because it does not permit people at the lower end of the wealth or income scale to fully exploit their capabilities.*

Thus, this study aims to examine how economic inequality influences the Malaysian economic performance as measured by the gross domestic product (GDP), with the following objectives, concepts, methodology and findings:

Objectives. In the light of the growing importance of the above issues, this study analyses the trends and patterns of inequality by gender, regional and ethnic groups in Malaysia. Secondly, this study attempts to estimate models of the relationship between Malaysian economic growth and inequality.

Conceptual definitions. Income inequality can be measured as monetary or non-monetary. Monetary inequality can be measured on the basis of annual income or wealth or lifetime income or consumption. Non-monetary inequality can be based on access to health and education services, basic amenities, public services, etc. Generally, inequality is measured through simple statistical calculations, namely: range, Kuznets ratios, mean absolute deviation, coefficient of variation, Gini coefficient, Lorenz curve, among others. In inequality measurement, the following four ethical principles are used:

- anonymity principle
- population principle
- relative income principle
- Dalton principle

There are several models to examine the effect of inequality on GDP per capita, including

- Varying Saving Rates Model
- Distortionary Taxation
- Occupational Choice Model

Varying Savings Rates Model: What matters in this model for measuring the effect of inequality on GDP per capita is the effect of inequality on economy-wide average savings rate. This, in turn, depends on whether the savings function is concave or convex; i.e., whether the savings curve get flatter or steeper as income increases. If it is concave, then rising inequality will lower the average savings rate, while if it is convex, the opposite occurs. If the real savings curve has both concave and convex parts, then depending on where in the distribution the inequality increases, the effect on the average savings rate could be positive or negative.

Distortionary Taxation: This model also looks at what happens to savings rates in the economy if inequality increases. The assumption here is that higher inequality leads to higher tax rates on savings, thus lowering the after-tax real interest rate. The ambiguity in

this model is due to the income and substitution effects, which, for rich people, work in opposite directions. The income effect is positive, leading them to consume less tomorrow since the after-tax interest rate is lower. If the income effect overwhelms the substitution effect, and if it is enough so that rich people increase their savings by more than poor people reduce theirs, then the increasing inequality could actually increase the savings rates. Otherwise, if the substitution effect for the rich outweighs the income effect, inequality will lower the savings rates.

Occupational Choice Model: In this model, what matters is not inequality *per se*, but the number of people who are credit-constrained. The fewer people who are credit-constrained, i.e., the lower the Head Count Ratio (poor), the higher is the GDP per capita.

Data and methodology. This study is based on primary and secondary data, including Household Income Survey, Labour Force Survey and National Accounts Statistics. In terms of methodology, empirical findings originating in the work of Kuznets shows the correlation between economic inequality and per capita income. The resulting inverted-U curve implies that economic development is a sequential and uneven process in the initial phase of development, inequality widens, and later, as countries progress further, inequality falls. Thus, economic progress measured by per capita income is initially accompanied by rising inequality, but the disparities ultimately go away as the benefits of development spread more widely. Two ways of testing the Kuznets hypothesis empirically are a cross-section study and a time-series study.

The earlier focus of studies of inequality and economic growth was on factors that determine income inequality. However the recent studies give more attention to how income distribution affects economic growth. Galor and Zeira tried to explain how inequality affects growth, based on the interaction among imperfect credit markets, asset inequality and human capital accumulation.

A recent study by Barro (2000) finds that there is a negative relationship between inequality and growth for poor countries, but a positive relationship for rich countries. Barro notes that "inequality of wealth and income motivates the poor to engage in crime, riots, and other disruptive activities."

Knowles (2001) stated that inequality would do harm to economic growth in four ways: " (a) an inequality distribution of income will lead to pressure for redistribution through distorting taxes, thus reducing growth; (b) inequality may lead to socio-political instability, which will in turn reduce investment and growth; (c) the presence of imperfect capital markets inequality will reduce investment in human capital, hence reduce growth; and (d) as inequality increases, fertility is likely to rise and human capital investment fall, thus reducing growth."

Results/findings. Income inequality and poverty has been a main concern in Malaysia after the race riots in 1969. Even though there has been significant/tremendous progress in poverty eradication, income inequality rose between 1957 and 1976. The Gini coefficient rose from 0.412 to 0.529. However, between 1976 to 1990, the coefficient continuously fell, to 0.446 in 1990. Thereafter it has risen again.

In the early stage of development, the scenario of income inequality and poverty was a complex problem because there was an association between poverty and inequality with ethnic groups. Furthermore, there was also an ethnic identification to economic activities, largely due to history. The Malay and other indigenous ethnics were engaged mainly in agriculture production and fishing activities (which were low-productivity rural activities); the Chinese mostly controlled the trade and small-scale processing industries (e.g mining); whereas the Indians largely worked on estates owned by British companies. In 1957, the Gini coefficient was 0.412 and more than 50 percent of the population was in poverty. It was recorded that Malay households earned less than half as much on average as non-Malay households at the time.

Implications. Economic growth *per se* does not guarantee reductions in inequality and poverty. The issue here is, is inequality harmful to the economic development of the country? This is being discussed and theorized by many economists throughout the world. We have to be realistic about the issue. It depends on from what point of view we look and the state of development of the country.

If we look back at the classical economist Adam Smith, we find that he said that

inequality is a phenomenon that will continue to exist in this world. According to Smith, economic inequality is unavoidable. Higher social division leads to higher productivity and the income gap between classes with higher productivity and those with lower productivity has widened naturally. Hence, an adequate inequality is the more important issue here.

A long-term strategy for alleviating poverty and inequality almost certainly must revolve around increasing the GDP per capita. While increasing the GDP per capita can theoretically not result in any poverty reduction, (since all the increases in the GDP could be going to the rich and leaving poverty and inequality unaffected), the world experience of the past decades has shown that, on average, growth in average incomes has translated into an increase in the incomes of the poorest quintile.

Determinants of Contraceptive Use
among Eligible Women in the Maldives[*]

Executive Summary

The Maldives has one of the highest total fertility rates among the South Asian countries, although the annual population growth rate has started to decline rapidly, from 5.4 to 2.8 percent in period of 1985-2000. This may be due to the fact that the government had launched a family planning program in 1984 to control the high population growth rate. The family planning policy has improved the quality of Maldivian life by reducing infant, child and maternal mortality through reproductive health care and birth spacing

In 1971 the contraceptive prevalence rate (CPR) in the Maldives was only 5 percent. This was before the introduction of a family planning programme in the country. Over the past 30 years this rate rose to 18.9 percent in 2000 (The Health Report of the Maldives, 2001). According to the Reproductive Health Survey 2004 (unpublished), the CPR among married eligible women aged 15-49 years was 39 percent.

Objectives. The objectives of this study are to identify socioeconomic and demographic differences between contraceptive users and non-users among eligible women and to explore the determinants of contraceptive usage among the eligible women in the Maldives.

Data. The source of data in this study is the 1995 Population and Housing Census. Fertility measures are based primarily on married women since there are very few possibilities of having a baby out of wedlock in the Maldives. Therefore the study is strictly focused on the eligible women in the population age 15-49, who are married at the time of 1995 Population Census. According to the 1995 Census, total population in 1995 was 244,814 and females were 120,192. The number of eligible women aged 15-49 was 53,651.

Hypothesis. The hypotheses tested in this study are based on the relationship between contraceptive usage and demographic and socio-economic variables. Different demographic and socio-economic situations of women would influence differently their decision-making on contraceptive usage. Four hypotheses are established as follows:

1) The higher the education level, the more the contraceptive users;

2) The more the number of children, the more the contraceptive users;

3) The contraceptive usages among the working female population is higher than the not-working female population; and

4) The younger the female, the higher the contraceptive usage.

Five variables were selected for this research. For the dependent variable, contraceptive use was used. For the independent variables, four variables were used: number of children ever born and age at first marriage as demographic variables; education level as a social variable; and, employment as an economic variable.

The analytical tool for this study will be mainly a logistic regression analysis and chi-square test, since the dependent variable is dichotomous. Chi–square test is used to test the hypotheses on whether there are any differences in socioeconomic and demographic characteristics of eligible women 15-49 depending on the contraceptive use.

In order to apply statistical methods, two dummy variables, 0 and 1, are created for each of the independent variables by collapsing some of the values, as shown in Table 1.

<Table 1.> Creation of Dummy variables

Original Variables	Dummy Variables	Frequency
Contraceptive Use	1= Using Contraceptive 0= Not Using Contraceptive	1=67.3 % 0=32.7 %
Attended any Educational Institution	1= Having Education 0= Not having Education	1=90.2 % 0=9.8 %
Employment Status	1= Currently Working 0= Not Working	1=28.8 % 0=71.2 %
Children Ever Bone	1= less than 4 children 0= 4 children and higher	1=47.9 % 0=52.1%
Age at first Marriage	1= Less than 20 years 0= 20 years and over	1=84.7 % 0=15.3 %

Chi-Square Test. The Chi-square test for the four independent variables with the dependent variable showed that three independent variables were significant and one variable, Employment Status, was insignificant with p-value 0.499. Three significant variables were "Educational Status", "Children Ever Born" and "Age at First Marriage". The Chi-square test results (refer to Table 2) show that educational status, number of children ever born and age at first marriage are significantly associated with contraceptive use while employment status is not.

<Table 2.> Cross Tabulation of Dependent Variable, with Independent Variable

	Distribution			Chi-square Test	
	Contraceptive Users (cu)	Contraceptive Non Users (cu)	Total	Pearson Chi-square	P Value
Educational Status (p-edu1)					
• No education	29.6%	70.4%	100.0		
• Having Education	33.0%	67.0%	100.0	12.834	0.000
Employment Status (empstat1)					
• Not Working	32.7%	67.3%	100.0	.020	0.499
• Working	32.6%	67.4%	100.0		
Children Ever Born					
• Less than 4 children	28.3%	71.7%	100.0		
• 4 children and higher	36.7%	63.3%	100.0	224.643	0.000
Age at First Marriage					
• Less than 20 years	33.1%	66.9%	100.0		
• 20 years and over	30.4%	69.6%	100.0	12.192	0.000

Logistic Regression. From the fitted logistic regression model, coefficients of age at first marriage and employment tested as non-significant based on Wald test statistics value. Thus, the recommended final model for predicting the contraceptive usage (cu) among eligible women in the Maldives involved only education (p_edu 1) and children ever born (ceb 1). The fitted logistic regression model is:

$$\text{Logit(cu)} = -0.757 + 0.246 \times \text{p\_edu1} - 0.405 \times \text{ceb1}$$

Table 3 shows the results of the Wald tests.

<Table 3> The logistic regression analysis

	B	S.E.	Wald	df	Sig.	Exp(B)
p_edu1	.246	.046	28.825	1	.000	1.279
ceb1	-.405	.026	239.708	1	.000	.667
Constant	-.757	.044	298.104	1	.000	.469

If education is 1 (p_edu1=1) and other things are constant, Logit(cu) = -0.511. The probability p can be obtained as follows:

Since $\text{Logit(cu)} = \text{Ln}(p/(1-p))$, $\quad p/(1-p) = \varepsilon^{-0.511} = 0.599891$

$$p = 0.59981 - 0.59981p$$
$$1.59981p = 0.59981$$
$$p = 0.3749$$

Those women with education are more likely to use contraceptive methods than those without education by 37.5%.

Likewise, if children ever born is 1 (ceb1=1) and other things are constant, Logit(cu) = -1.162. The probability p is calculated as follows:

$$\text{Logit(cu)} = \text{Ln}(p/(1-p)), \; p/(1-p) = \varepsilon^{-1.162} = 0.31286$$
$$p = 0.31286 - 0.31286p$$
$$1.31286p = 0.31286$$
$$p = 0.2383$$

Those women who gave birth to four children and more are more likely to use contraceptive methods than those who gave birth to less than four by 23.8%.

Findings/Results. This research has attempted to examine the determinants of the contraceptive usage among eligible women age 15-49, who are currently married and to examine the socioeconomic factors related to the use of contraception.

Major findings of this research are: women with education and those who are having more than 4 children are more likely to use contraceptive practices than those who have no education and less than 4 children. Other findings are that there are significant relationships between contraceptive use and education status, children ever born and age at first marriage. Employment status on the other hand, has an insignificant effect on contraceptive usage.

Natural Resource Accounting in Mongolia[*]

Executive Summary

Mongolia is experiencing a transition from a centrally-planned to a market economy. Currently, 49.6 percent of the population is male and 50.4 percent is female. Agriculture and mining is the key sector of Mongolia's economy. It produced 35.6 percent (in average) of the national income in 2000-2004 and accounted for about 55.2 percent of total exports.

Objectives. The objectives of this study are developing a methodology of natural resource accounting and creating a system of natural resource accounting. Traditional calculation of gross domestic product (GDP) in the national accounting system underestimates the true value of natural resources, and essentially ignores the value of natural resources while neglecting environmental costs of development. Therefore, this study also will make adjustments to the value added of the mining sector for 1976 - 2002.

Concepts. The valuation of natural resources and pricing consists of the following parts: a cadastre of natural resources, ecological and economic valuation of natural resources, and natural resources pricing or determination of basic costs of natural resources.

A methodology of ecological and economic valuation of natural resources based on their ecological and economic direct benefits has been developed for these main types of natural resources: land, forest, wildlife and vegetation resources. For all types of natural resources, this methodology of valuation is based on the cost and price of the resources' exploitation and restoration. Economic incentives for land management are important in the case of Mongolia, due to its orientation toward pastoral agriculture, which occupies about 80 percent of its territory. For land valuation, the recommended main criteria are domestic market prices for the value of internal land use, the market price relative to

---

neighbouring countries, land use in the border area, and international market prices if the land is used for foreign investment projects. In addition, mineral resources are also of great importance for the economic development of the country. The purpose of economic valuation of resources is to set the rate for fees for the exploitation of mineral resources by citizens, economic entities and organizations and determine how income from such fees is to be distributed between the local and state budgets. For the economic valuation of mineral resources, the main criterion is the domestic and international market price for the minerals.

Data and methodology. This study makes use of data for mining and data on pasture land use and pasture degradation from the Ministry of Food and Agriculture. Economic data can be obtained from the national accounts of the National Statistical Office and Ministry of Finance, while physical data on forestry is provided by the Ministry for Nature and Environment and includes data in the Statistical Year Book 1989 - 2002 and Environment Statistical Yearbook 1996 - 2000.

The various accounts of the UN system of environmental and economic accounting (SEEA) may be expressed either physically or in monetary units, or both. An appropriate starting point is a description of the accounting system, beginning with the physical and hybrid flow accounts. The framework for both the physical and monetary asset accounting generally follows the (SEEA) framework for non-renewable assets:

Illustrative physical asset accounting

	Resources
Opening stock	*Increases during the year:*
	New discoveries
	Natural growth
	Land reclamation
	Decreases during the year
Volume changes	Extraction of minerals
	Soil erosion
	Loss of capacity
	Harvesting of plants
	Natural death of plants
Closing stock	Loss of animals

The monetary accounts are derived from the physical accounts by applying monetary unit values, that is to say, market prices or estimated (imputed) market values, to the physical stocks and stock changes of assets. Three leading natural resources accounting methodologies exist in most countries. They are:

(a)   Net present value method

(b)   Net price method

(c)   User cost method

(a) *Net present value method*: the present value Vo of a natural resource is the sum of the expected net revenue flows NtQt, discounted at the nominal or real interest rate r:

$$V_0 = \sum_{t=0}^{T-1} \frac{N_t Q_t}{(1+r)^t}$$

r is assumed to be constant for the life T of the asset. N_t is defined as the total unit (sales) value of the resource less the production cost, i.e. the cost of extraction, development and exploration, including a normal return to capital. Q_t is the quantity exploited during the period t.

(b) *Net price method*: the second approach applied in this paper is the net price method. The equation of the net price calculation is:

$$V_t = (P_t - C_t) * Q = N_t Q$$

The value of a resource at the beginning of period t, V_t, is the volume of the resource Q (quantity extracted or mined over the lifetime of the resource) multiplied by the difference between the average market value per unit of the resource P_t and the per unit production cost C_t. Most of the literature suggests that it is the total rent that should be used to measure depletion of a resource, because it precisely measures depreciation of non-renewable natural resources and it can be used to measure the real income level in deriving such depreciation.

(c) *User cost approach*: the third approach is to compute the user cost as a measure of resources depreciation. The user cost method divides the net revenues from the sale of an exhaustible resource into a capital element, or user cost, and a value-added element, which represents true income. In theory, user cost (UC) is:

$$UC = \sum_{t=1}^{n} \frac{R_t Q_t}{(1+r)^t}$$

where R is the expected unit rent at time t; Q is the expected amount of resource to be extracted at time t; n is the expected period of extraction at the time t; and r is the discount rate.

The system of national accounts (SNA) recommends using a rate of discount based on transactions in the particular type of asset being valued, rather than a general rate of interest such as yield on government bonds. The discount rate is different in many countries; for example, Australia used 8.6 percent and Canada uses 4 percent. The results with different discount rates demonstrate that when the reserve is very large and the depletion period is very long, the minimum rate is the most appropriate. There are also annual inflation and bank deposit rates, which should be taken into account. Therefore this study used a 5 percent discount rate for all natural resources.

The aim of national income accounting is to provide information for analyzing the performance of the economic system. Man-made assets such as buildings and equipment are valued as productive assets. However, natural resource assets are not so valued, particularly in Mongolia, and their loss entails no charge against current income that would reflect a decrease in future production. If current development trends continue, then Mongolia could exhaust its mineral resources, cut down its forests, erode its soils, pollute its aquifers, and hunt its wildlife and fisheries to extinction, but measured income would still rise steadily as these assets disappeared.

This anomaly can lead to serious mis-estimating of the economic effect of resource depletion. From an economic accounting perspective, the depletion of resources through use (exploitation) or misuse (degradation) represents a real economic cost and diminution in national wealth, which is equivalent to the wearing out (depreciation) of physical structures and equipment. Currently, the environmental concerns generally fall into three categories:

(a) depletion of natural resources

(b) conservation of the natural state of the environment

(c) pollution and its control

One of the most important objectives of environmental accounting is to provide a basis for adjusting conventional macroeconomic measures such as GDP that take into account cost of resource use.   There are two methodological versions that have so far been explored. The first version is to have a totally integrated system, with a complete inventory of environmental assets, with a balance sheet of all assets at the end of accounting period, and to make an adjusted recalculation of the GDP. The second version is a conventionally calculated GDP which reflects environmental degradation only in net income.

Results/findings.   The results of this study show that degradation and depletion of natural resources have increased over the study period. This is due to expansion of gold and copper mining activities and the rapid growth in number of livestock.

This study also shows that the level of environmentally-adjusted value added in the mining sector is similar to the green net national product (gNNP) at the national level. The main idea of the gNNP calculation is to assess the sustainability of national development.

This study shows that cost of degradation comes from copper extraction and pastureland use in agriculture. The depletion of these natural resources has increased in the

last decade, which can be explained by the growth in number of livestock and expansion of gold and copper mining.

There has been a comparatively high amount of copper resources depletion after 1991, due to an increasing amount of copper extraction and decreasing unit cost. In contrast, the amount of depletion of coal resources is comparatively low due to the vast resources and lower level of exploitation as it is mainly used for domestic consumption only. The depletion value of gold resources has risen during the period 1993 - 2002, due to the increased amount of its mining by Mongolian private interests. The pastureland degradation is comparatively high, and can be explained by the extensive agricultural development practice. The increased amount of pastureland degradation value in recent years is connected to the increased number of livestock, mostly after the privatization of state cooperatives and farms starting in 1992.

Implications and recommendations. The proposed methodology of natural resources accounting is suitable for the specific case of Mongolia. Most resources depletion comes from copper and pastureland, about 37.4 percent - 60.9 percent of the total monetary value of resources' depletion. High inflation rates and the devaluation are due to national currency movements in 1991 - 1998. That means some economic indicators need to be adjusted, including natural resources exploitation cost benefit analysis with the adequate prices, using special deflators.

This study is the first effort to apply natural resources environmental accounting in Mongolia. Therefore future actions need to be the development of water, biodiversity resources, and an environmental pollution accounting procedure for the country. Future studies also need to focus on expanding of natural resources and environmental accounting and its macro economic analysis, including biodiversity losses and environmental pollution.

Factors of Methodology Influencing Value-added (GDP) of Large- scale Manufacturing Establishments in Pakistan[*]

Executive Summary

In Pakistan, the survey conducted for the Large-scale Manufacturing Industries (LSMI) sub-sector, which is used to derive the aggregated value added for the manufacturing sector, was designed to provide accurate estimates at the national level. Activity-wise estimates are less accurate than establishment-wide estimates, but still are of acceptable quality. However, it should be noted that the amount of errors is generally higher for establishment-wise estimates, as compared to those of the aggregated ones. While constructing these partial estimates, which lead us to the aggregated ones, statisticians face some problems in data reliability.

The most widespread of these problems stem from two common causes: non-response and under-reporting. During the past few years, there has been a great deal of discussion in survey research concerning the problem of under-reporting in Pakistan in general, as well as discussion of the problem of non-response in particular cases. While these problems have always been a concern, there has been a general concern among statisticians in Pakistan about the increasing rates of non-response and under-reporting.

This study will be carried out within the guidelines of the *UN Manual of 1993 SNA*, with the aim of evaluating the present profile of the large-scale manufacturing sub-sector in Pakistan to find effective means to address the problems of non-response and under-reporting.

Objectives. The main objectives of this study are:

(a) to analyze the influence of non-response on the value-added in the large-scale manufacturing sub-sector;

(b) to analyze the influence of under-reporting on the value-added in the large-scale manufacturing sub-sector; and

(c) to improve the methodology of compiling the macro-economic indicators.

Conceptual definitions. The key concepts used in this study are defined below.

Output: the value of the goods and services that are produced by resident units. This covers market production, production for own final use, and non-market production in general government and in Non-Profit Institutions Serving Households (NPISHs). The correction items such as taxes on products and subsidies on products are not included with output when recordings are made at basic prices but are considered as an additional item to the total value added of the industries in order to arrive at the GDP (at market prices) when recordings are made at the producer's price. Such additional items are confined to taxes on imports, custom duties and the VAT and investment levy.

Intermediate consumption: consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed assets. The goods or services may be either transformed or used up by the production process.

Value added: is identical to the concept of the domestic product of the country. The value added is computed by deducting the value of inputs from the value of output.

Non-response: For this study, the non-response rate is defined as $100*(P-C)/P$ where "P" is the estimated overall population and "C" is the published census count.

Data and methodology. The data for this study is taken from the *Census of Manufacturing Industries (CMI's) 1990-91* and *1995-96.* For analysis of non-response and under-reporting, this study used the data for CMI 1995-96.

The *Census of Manufacturing Industries (CMI) 1995-96* provides data on census value added at producer's price which is further adjusted for the net indirect taxes and other overhead costs to obtain gross national product (GNP) value added at factor cost.

However, presently the CMI is not being used for the compilation of annual gross value added estimates in respect of the large scale manufacturing sub-sector, but only for the benchmark estimates.

The methodology applied in the benchmark estimates of national accounts implicitly assumes that the cost structure has not changed over a period of time, which is not the case in the real world. On-ground reality is different from what is being applied in compiling the estimates for the large-scale manufacturing sub-sector. On the other side, the system of national accounts (SNA) 1993 has laid down its guidelines differently, which are not compatible with the existing practices for the compilation of estimates in this sub-sector. Changes in gross value added from one year to the next may differ from the changes in the gross value of production because of inappropriate changes in the input cost. It is observed that some establishments report their value of production on the lower side and over-report their input costs to evade taxes.

Keeping in view the deficiencies in the existing methodology for the compilation of the value-added indicator, a new approach is proposed for this purpose. The methodology in the study is based on a comprehensive approach and it focuses explicitly on the improvement of the existing methodology by decreasing the influence of non-response and under-reporting.

To estimate the error of under-reporting in the CMI data, data reported in the balance sheets of the establishments / enterprises registered at the stock exchanges of Pakistan in respect of the establishments who under-report their output and over-report their input cost was used. The proposed methodology has some limitations, such as implicitly assuming that the cost structure will not change over a period of time while using the CMI results to compile macro-economic indicators on an annual basis. To overcome the problem of year-to-year changes in the input and output structure, a small survey for selected establishments can be conducted with a specific questionnaire to observe the changes in the cost structure. In this way, not only can non-response and under-reporting be controlled in an efficient manner, but also this methodology will help in saving a considerable amount of money by avoiding conducting the annual surveys. The estimates so compiled, after removing the influence of non-response and under-reporting,

will provide a basis for historical comparisons in conformity with the international recommendations for industrial statistics.

Results and findings. This study that gross-value added is under-estimated by 29 percent and improves the same by applying survey results for the non-responding establishments. It is observed that the response rate can be improved by adopting some administrative as well as policy measures. It is also observed that most of the respondents think that such establishment surveys are no more than a futile exercise by the government agency, as they don't see any positive output from such survey results.

GVA is under-estimated by 10.27 percent due to under-reporting. It is observed that establishments report their value of output on the lower side and over-report their input cost. The main cause of this behaviour is the implied fear of taxation by the establishment owner.

It is also observed that most of the establishments that do not keep their accounts updated are not paying any taxes to the government exchequer. On the other hand, those establishments that maintained well-documented accounts are overburdened by many types of taxes. This irregularity is the bitter fruit of an undocumented economy. It is suggested that the tax authorities should adopt such measures that keep the number of taxes limited (only one type of tax) and broaden the tax base.

We find that the proposed approach is cost-effective. Without additional expense, reliable results can be achieved. Moreover, the huge costs involved in conducting annual surveys of establishments can be saved, and can be used more effectively for conducting CMI every five years. In this way, the excuse of fund shortage can be overcome and timeliness in data availability can also be ensured.

Implications/recommendations. A good monitoring system is necessary to inform policymakers of the effectiveness of policy interventions. Such a monitoring system is possible through modifications in the basic data collection procedures. To minimize the effect of non-response, some moral and social measures can be taken. For this purpose, respondents can be given incentives in terms of honorary certificates or shields/trophies in

public gatherings as a token of respect, declaring them as model citizens for contributing towards the national economy. Ambiguities and incompatibilities in definition lead to confusion and sometimes double-counting occurs in the sample surveys. To cope with the problem of definition, it is proposed that the following definition be used for the large-scale manufacturing establishments:

The large-scale manufacturing sub-sector covers all those establishments engaged in manufacturing activities and registered under the factories act, having 10 or more employees on any working day during the year.

For this purpose, it is suggested that proper measures should be adopted to make amendments to the Factories Act of 1934.We observe that while using the proposed approach, data on 'consumption of fixed assets' can be available in original format instead of using imputations at a flat rate of 10 percent. As far as the construction of an indicator regarding changes in the input-output structure is concerned, considerable work is still to be done in this area. In fact, manufacturing is a transaction-intensive process. A higher transaction rate is linked with the export and import of the manufactured goods and raw materials, which is further linked with the cost structure of the different industrial activities. In Pakistan, large-scale manufacturing establishments are at a comparative disadvantage due to a poor policy environment that increases transaction costs. This increase is due to a number of factors, including poor infrastructure, inefficient public utilities and also an improper regulatory and legal environment.

Factors of the Statistical Response Burden: A Step toward the Reduction of the Response Burden Imposed on Establishments in Korea[*]

Executive Summary

Many national statistical agencies in OECD member countries and elsewhere are faced with the imperative of reducing the cost of collecting data, both to meet declining budgets and to reduce enterprise reporting. To do this, agencies now make greater use of a variety of techniques and practices to bring about the required reductions and efficiencies. The development and implementation of these improvements in reducing the cost of collecting data is primarily a matter of action by national agencies.

In identifying possible areas of improvement, a considerable number of studies have been made on the sampling error but little attention has been given to non-sampling error. Even though the Korea National Statistical Office (KNSO) realizes that non-sampling error may occur throughout all survey processes, it has never been measured. Non-sampling error, in fact, can be even more serious than sampling error.

While surveys conducted on households provide some leeway in the response levels, establishment surveys are compulsory because the data are necessary for government policy-making. For these surveys, there has been an almost perfect response rate by establishments because of the fact that "no response" is not permitted. However, responding to these surveys places a considerable burden on the responder.

Objectives. The KNSO has been concerned with reducing the response burden of these surveys by investigating the factors influencing response. The purpose of this study is to understand the response burden, based on the "Statistical Response Survey" conducted by the KNSO in 2003, and to propose possible solutions for a reduction of that burden.

Data. The 600 samples of the Statistical Response Survey come from among the

---

current establishment sample. The reference period of the survey is from 1 January to 31 December 2002, and the survey was conducted in April 2003 by direct interview. It covers 2 items. One area of study is the degree and cause of the burden that respondents feel themselves; the other is to describe the kinds of burdens in surveys during the year 2002 to which they responded to.

According to the survey 15,050 questionnaires were filled-in by establishments for an annual average response frequency of 25.1 per establishment. 13.9 of these were conducted by the KNSO which accounts for 55.5 percent of all questionnaires issued by statistical agencies. Mining, Manufacturing and Construction establishments with more than 300 workers answered surveys on average 42.5 times and 42.3 times, respectively. In addition, the heavily surveyed establishments have an annual response rate of 123 times. Among total establishments, 51 percent have a degree of "response burden." Considering the degree by industry, the survey indicates that construction has the highest burden at 60.3 percent. Here "burden" combines the two items in the questionnaire, "burdened slightly" and "burdened quietly.

The response burden imposed on establishments results from having to respond to many surveys. The "Statistical Response Survey" results show that there are many other factors contributing to response burden besides the number of surveys. It also indicates that the respondents are burdened to disclose confidential information, or have a concern that the survey information may be used for other purposes, which leads to response reluctance. Also there is some doubt about whether the statistical agencies are aware of the contents and rules of the Statistics Act. The following are the main factors of the burden to be examined:

1) There are too many surveys to respond to.

From the present survey, the proportion of the surveys conducted by other agencies besides approved statistical agencies amounted to 40 percent, which is a very big burden for respondents. To minimize this burden, the KNSO, as a central statistical agency, has to play a leading role in coordinating the statistical activities. Related to this problem, a few suggestions follow:

If non-approved agencies have plans to conduct a survey, they should have a prior consultation with the KNSO and submit an application to the KNSO. After permission is given from the KNSO, they can conduct the survey. Currently, establishments are inundated by non-approved surveys from various agencies. The KNSO only becomes aware of this fact after the event when it attempts to conduct official surveys. So the KNSO must educate establishments with regard to approved official surveys. In addition, usage of administrative data and reduction of sample sizes are also alternatives to solve this problem

2) The items are too many and too specific.

Also an alignment between the enumerator and respondent would be beneficial for the following reasons:

(a) It would help in developing a bond of familiarity and trust between interviewers and respondents, which will reduce the respondent's resistance to the questionnaires.

(b) It would help in educating the respondent with regard to statistical terms, classifications and definitions

3) There is no correspondence to format and purpose.

It seems rare to have the same format data between establishments and statistical agencies' need. This can cause greater burdens to respondents. To avoid this problem, they can create harmony through cooperative works and can share information and knowledge. In addition, they can develop well-designed questionnaires where the respondents have input into the survey structure. By empowering the respondents in a collaborative process, the NSO will gain greater results due to transparency of the whole process of statistical data collection. This transparency will be due to the willingness of respondents to be part of the survey, aside from just answering questions, as they will view the survey as theirs.

Results/findings. Several ways have been suggested to reduce the respondent burden with regard to statistical surveys in Korea:

1) Coordination of statistical activities and avoiding overlaps in data collection. As it turned out from the "Statistical Response Survey," the top factor in the response burden was too many surveys. Redundancy and duplication of statistics and inconsistency between statistics compiled by various agencies may occur under a decentralized system.

To preclude the problems of a decentralized statistical system and to minimize the response burden related to these problems, the National Statistical Office, as a central statistical agency, plays a leading role in integrating and coordinating the statistical activities of about 62 governmental and 73 non-governmental agencies as authorized by the Statistics Act, and other agencies as well.

2) Greater use of administrative data. Use of administrative data reduces on-going collection costs to the NSO and the burden on respondents. Administrative sources of these data are not yet accessible by the NSO for statistical purposes except for register maintenance.

At present, the KNSO only uses two kinds of reporting data-Corporation Tax and VAT (Value-added Tax)- from the National Tax Office, which can be offered without any information regarding the respondents. How to share the data cooperatively between offices needs more exploration. Related to that, it will be necessary to explore connections between data in order to prevent duplication of surveys and items conducted by different statistical agencies. The use of administrative data is facilitated by the use of a common identifying code for establishments in different administrative agencies. New techniques in hardware are especially needed.

3) Reduction in sample size. Most countries report the traditional use of cut-offs of various sizes (based on employment or turnover) to reduce the reporting burden on small businesses. The size of the cut-off varies between countries. It is more important to decide the cut-off by considering the characteristics of the establishment, such as amount of sales and employees.

4) Improvement of the data collection. The use of the Internet is expanding globally and also in Korea. The rate of Internet usage in Korea now is 60 percent and the KNSO expects to expand the use of the Web-based method. The KNSO has used the Web-based method in collecting data, the so-called CASI (Computer Assisted Self Interviewing). Since January of 2002, the Mining and Manufacturing Industry Survey and the Cyber Shopping Mall Survey use both the direct interview and Internet CASI method.

5) Developing and applying the response burden index. Compliance costs are also measured and analyzed in hours for the agency's burden and for each division conducting business surveys, but it is unreasonable to apply equally to all surveys the same method of measuring response time because of the differences between surveys, such as survey subject, survey method, etc. It is needed to calculate the burden along with considering each survey's characteristics. Nevertheless, it is a very good exercise to calculate the annual response burden. It enhances the consciousness of being careful with new or added questionnaires.

Recommendations. From the results of this study, we determined that coordination activities have to be strengthened in order to minimize survey frequency. Furthermore, the information technology (IT) system should be utilized more and sharing of databases and data should be encouraged. The government should give more attention to the use of administrative data rather than depending on surveys, so as to reduce the response burden.

Analysis of Disability Statistics in Sri Lanka-2001[*]

Executive Summary

There was no formal information system on disabled persons in the country until the year 2001. Therefore, the disability census was designed together with the 2001 Census of Population and Housing. This is the first disability census with detailed information on both physical and mental disabilities.

The percentage of disabled persons to the total population is 1.6 percent according to the disability census. Life expectancy and literacy are very low for disabled persons in the country. Furthermore labour force participation for them is negligible and they depend on their family/relatives or government/organizations. Disabled persons are deserted by the society and they are not satisfied with their facilities as well as physical environment.

Objectives. The objectives of this research are to identify the types of disabilities of persons, to identify the factors which cause the disability, and to determine the relationship between the factors and disabilities.

Data and limitations. Data of the disability census is used for the analysis. There are some limitations in coverage of disabilities. The disability census could not be done in certain areas (Northern province and certain areas of the Eastern province) due to peace and order conditions. Therefore, this research is not representative of the whole country. Moreover, de-jure method is used for data collection in this special census. Thus disabled persons who lived in non-housing units and homeless persons could not be enumerated.

Concepts and definitions. Disabled person is identified as a person who is unable or limited in carrying out activities due to congenital or long term physical/mental

disabilities. Short term difficulties due to temporary conditions were excluded. This study analysed six types of disabilities, i.e. disability in seeing, disability in hearing /speaking, disability in hands, disability in legs, other physical disabilities, and mental disabilities.

Some disabled persons have more than one disability but there are no filtering questions to identify the most harmful disability. In this study, the total number of disabilities is more than the total number of disabled persons as multiple disabilities are included in the total count.

Analysis. The total number of disabled population in the country (excluding Northern province, Batticaloa and Trincomalee districts) is 274,711. The majority (57.7 percent) of them are males. These persons have one or more disabilities, i.e. 77 percent have only one disability, 16.3 percent have two disabilities, and 6.6 percent have more than two disabilities.

The chi-square test is used to figure out the relationship between two variables. The chi-square test showed that type of disability is related to the age at which the disability occurred, the cause of disability, and the level of education.

Logistic regression analysis is used to study the pattern of the labour force participation for the disabled population and to identify crucial factors that directly affect employment. The disabled population aged 10 years and over who revealed their employment status is divided into two groups: as employed ('Yes'=1) and not employed ('No'=0). This is the dependent variable. The independent variables are educational attainment, vocational training, age and sex.

Results and Findings. The logistic regression analysis showed that age is inversely related to employment that occupational engagement of younger ages is higher than the elder ages. Educational attainment is directly related to the occupation and the educated persons have more chance to obtain employment than others. Vocational training is also important to obtain employment. Sex is also an important factor for

employment. Men have more chances to obtain employment than women, because of lower demand in the labour market for women.

Educational attainment of the disabled population is very low and some of them have never gone to school because it is not easy to enter the common school system and there are no facilities for them to continue their education. The majority of disabled persons are dependent on their family or relatives. But they can not provide necessary arrangements for education due to poverty and lack of facilities. The educational attainment of disabled persons who live in institutions are better than other disabled persons.

Some important characteristics for each type of disabilities are as follows:

Disabilities in vision. There are 69,096 visually disabled persons in the country. Most (37.8 percent) persons with disability in vision became disabled when they were below age 15. More than half (51.9 percent) of the population with disabilities in vision have become disabled due to illnesses. Around the age of five is the age with the highest risk for the visual disability and around the age of 34 has comparatively lowest risk.

Disabilities in hearing/speaking. There are 73,343 persons with hearing/ speaking disabilities in the country. The vast majority (67.6 percent) of persons with disability in hearing/speaking were disabled at birth. The main reason for the speaking difficulties is also congenital abnormalities (65.5 percent). But the main reason for the deafness is illness (48.9 percent).

Disabilities in hands. There are 48,131 persons (64.6 percent of them are men) with a disability of the hands. One hand not working is the prominent disability (46.3 percent). The majority of persons with a disability in one hand were disabled when they were 0-14 years of age. The age bracket of 2-3 years is the period of highest risk for this disability and thereafter the number decreases with age, but a little increment can be seen around age 20. Majority (40.3 percent) of the population with disabilities in hands became disabled due to illnesses.

Disabilities in legs. There are 90,576 persons (62.4 percent of them are men) with leg disabilities. The majority of persons with a disability in one leg were disabled when they were 0-14 years of age. The age bracket of 2-3 years is the period of highest risk for this disability and thereafter the number decreases with age, but again a little increment can be seen around age 20. The pattern is similar with that of hand disability. Majority (40.7 percent) of the population with leg disabilities became disabled due to illnesses.

Other physical disabilities. There are 13,275 persons (55.3 percent of them are men) with other physical disabilities. The majority (39.8 percent) were born with these disabilities. For another 26.5 percent, this disability occurred when they were less than 15 years old. The age bracket of 0-5 years is the period of highest risk for this disability and thereafter the number decreases with age, but a little increment can be seen around age 30. 36.4 percent of the population with other physical disabilities became disabled due to illness. Another 34.9 percent became disabled as a result of congenital abnormalities.

Mental disability. There are 69,026 persons (53.7 percent of them are men) with mental disabilities. Mental disability covers mental retardation and psychosis. Mentally retardation is the prominent disability (61.0 percent) of the total mental disabilities. Vast majority (87.7 percent) of them were born with the disability. Majority (50.9 percent) of the population with mental disabilities became disabled due to congenital abnormalities. But the reason for the vast majority (60.2 percent) of persons with psychoses is illness, with age around 20 years as the most vulnerable age.

Multiple disabilities. The highest percentages of the disabled persons are those with leg disability and nearly 2/3 of them are males. Second place are the persons with only mental disability (17.4 percent) and the majority of them are also males. The highest percentage (5.6 percent) of persons with two disabilities are those with disability in hands and legs. The second group is the hearing/speaking and mental disability group (3.2 percent). 1.1 percent of persons have three disabilities -- disability in hearing/speaking, hands and legs. The main cause for disability in hands and legs is illness, and hearing /speaking and mental disability is caused by congenital abnormalities.

Conclusions. The number of persons with disability increased until the year 1995. This is true for all types of disabilities. The main causes for the increase were disabilities at birth and various types of illnesses which cause disabilities.

The majority of persons with disability in hearing/speaking and mental retardation became disabled when they were born. Further, disabilities in hearing/speaking and mental retardation have rapidly decreased after year 1995. Congenital rubella syndrome is the most harmful illness for blindness, deafness, dumbness and mental retardation. A pregnant woman infected with this syndrome has a high risk of giving birth to a child with above types of disability. A health program was launched to immunize congenital rubella syndrome in the mid 1990s all over the country. Moreover, recognition of the problem and other health programs for pregnant women by the Ministry of Health in Sri Lanka also explains the decline. Mental retardation has also decreased due to the above reasons.

Educational attainment of disabled persons is low. The vast majority of persons who are disabled at birth have never gone to school. Therefore, the illiteracy rate is very high among them. Levels of educations of disabled people who live in institutions are substantially higher than others. Institutions which are maintained by the government have formal administration systems and disabled people are motivated to learn. Therefore the government and other social services organizations must have some plans to increase the number of institutions.

Most disabled persons are unemployed. But persons who have some vocational training have a higher probability to obtain employment. A substantial proportion of disabled persons is in the position to train for some vocation. Therefore, the responsible authorities must take necessary action to train them for suitable vocations according to their capacity.

The information on developmental disability such as Down syndrome, dyslexia, etc., and more detailed information such as the cause of the disability or the most harmful disability was not collected in the 2001 disability census. In the future, it is necessary to do a special disability survey to collect detailed information on disability.

Population Projections for Vanuatu Citizen Population for the Period 1999-2029[*]

Executive Summary

Population projections form the basis for planning and policy decision-making at national and sub-national levels regarding not only demographic phenomenon such as fertility, mortality and migration but also other sectoral issues including health, education, environment, land, and housing. In more specific terms, population projections play a key role in planning processes.

Past projections have been done at national level. However, no provincial population projections have been done to date. As such, the purpose of this study is to project the Vanuatu citizen population for the first time at the provincial level and in so doing, the national level. This will assist the national and provincial planners and decision makers to make appropriate decisions in their social and economic development planning. The projections for this study are for every year for a total of a 30 year-period starting from 1999 to 2029 for the Vanuatu citizen population.

Objectives. This study aims to provide not only insights into the future likelihood of changes in terms of size, structure and composition of the Vanuatu citizens population, and their socio-economic and cultural implications in the Vanuatu society to formulate appropriate sound policy. The immediate objectives are:

➢ To develop sets of national level population projections by age and sex for 30 year period, 1999 to 2029; and

➢ To develop appropriate methods for projections for the six rural provinces and urban areas in Vanuatu.

Data Set. The 1999 National Population and Housing Census dataset is used for the analysis of this study. According to the 1999 Census, total population of Vanuatu is about 186,678. Out of this total, males accounted for 95,682 while females were 90,996. The reason for using the 1999 Census data-set is because the only reliable source of statistical information in Vanuatu is the national population census. So far, Vanuatu has conducted 4 decennial censuses – 1967, 1979, 1989 and 1999.

Computer Package Program. This study adopts the Rural/Urban Projection (RUP) because of its great utility. The RUP is a computer program developed by the US Bureau of Census, which is designed to project the whole population or any area's population of the country. It is also able to perform cohort component projections. The cohort component method projects each age and sex cohort over time based on the components of growth.

Population age and sex structure. The 1999 Population and Housing Census shows that population structure is pyramid shaped and relatively young. The median age is 18.8 and there is a broad base of young population and a small elderly population.

Fertility. The 1999 Population Census has indicated that all fertility figures have declined during the past decade. The total fertility rate (TFR) fell from 6.5 to 4.8 at the national level. There are fertility differentials by geographical regions. Rural areas generally have higher birth rates than urban area. The TFR for urban areas, Port Vila and Luganville are 3.8, while that of Torba is 5.9. The current declining fertility indicates that there have been some changes due to economic, social, and cultural factors.

Mortality. The average life expectancy at birth is used in a mortality projection assumption. The 1999 Population Census has estimated the average life expectancies at birth for the national, urban/rural and the provincial levels. It reveals that there is difference in mortality by geographical regions. For instance, women's life expectancy in the urban sector is 74.2, while that in Torba is 51.9. This may have resulted from a decreased death rate and improved health situation, which are typically more advanced in urban areas than rural areas.

The average life expectancy at birth for both males and females has shown significant increase in the last decade. The 1989 census indicated the average life expectancy at birth for males to be 61.5 and females 64.2. These have increased to 65.6 and 69.0 for males and females, respectively, in 1999.

Migration Assumptions. The rate of international migration during 1979-89 was very low; therefore in the past projections (1979 and 1989), international migration in Vanuatu has been regarded as "closed." This study assumes also the international migration to be zero in all the variants of the projections.

Though the international migration from Vanuatu is very low compared with Polynesian countries, the internal migration has been and is one of the very important factors in the overall social and economic development in Vanuatu. Citizens tend to migrate a lot within the country, mainly from rural provinces to urban areas of Port Vila and Luganville. Consequently, the rates of internal migration are very high with schooling and search for financial security as prime factors.

This study uses age-specific net migration rates for the internal migration assumptions. Furthermore, the study assumes the 1999 level of migration will be constant until 2029 at the national level and in each of the 6 provinces.

Projections are based on the assumptions summarized in Table 1.

<Table 1.> Assumptions for the projections, 1999-2029

	Projection variants							
	Vanuatu	Urban	Malampa	Penama	Sanma	Shefa	Tafea	Torba
Total fertility rates								
1999	4.8	3.8	5.0	5.2	5.1	4.0	5.1	5.9
2029	3.0	2.0	3.8	3.5	3.5	3.0	3.5	3.8
Life expectancy at birth								
1999 Male	65.6	69.5	62.2	65.2	64.8	68.9	64.4	66.6
1999 Female	69.0	74.2	69.4	68.8	69.3	70.2	72.4	51.9
2029 Male	70.6	74.5	67.0	70.2	70.3	72.3	67.9	70.6
2029 Female	74.0	79.2	72.0	73.8	74.0	74.2	73.6	55.9
Net number of migrant								
1999	0	2,092	408	563	-1025	-684	391	347
2029	0	2,092	408	563	-1025	-684	391	347

Note: 1999 = Base year population for the projections

Methodologies. The method used to project Vanuatu citizen population using the 1999 Population and Housing Census as the base population reflects three fundamental principles:

(1) The projections are demographic. Future populations are derived from a base population through the projections of population change by its major demographic components: births, deaths and migration.

(2) The projection of the demographic components of change is driven by the composition of the population by age and sex for the Vanuatu citizen population and these variables determine the propensity to bear children, die and migrate to other islands and provinces within Vanuatu.

(3) The definition of the population in regards to who is included. The target population for this study is the citizens of Vanuatu who were enumerated during the time of census taking in November 16th 1999. Thus, the primary data used for the projection is the 1999 Census database.

The first two principles allow the use of "cohort component" methodology in projecting the population. Under the cohort component method the projected projection is available not only by total population but also by age and sex distribution. The cohort-component method can be expressed by the following equation:

$Pt = Pt\text{-}1 + Bt\text{-}1,t + Mt\text{-}1,t$

Where Pt = population at time *t;*
Pt-1 = population at time *t-1;*
Bt-1,t = births in the interval from time *t-1* to time *t;*
Dt-1,t = deaths in the interval from time *t-1* to time *t;* and
Mt-1,t = net migration, in the interval from time *t-1* to time *t*

In this case, components of population change are estimated or projected separately, and then applied to the above equation recursively to produce a series of populations. In this case, the measurement unit of time is every 1-year interval for a 30-year period.

Projection Scenarios. The current population projections started from the 1999 Census population by age and sex. This base population is adjusted by applying the Feeney Correction Procedure on both males and females for the adjustment of age. And the sex ratio at birth in projections is set to 112 in 1999 and remains constant until 2029.

The medium growth scenario is assumed for Vanuatu, Urban, Rural, and the six provinces. It is assumed that there is change in mortality assuming that average life expectancy at birth for both males and females is increasing from the current levels to higher levels during the projection period.

Results. According to the projection, the Vanuatu citizen population is estimated to be about 250,886 by 2010 with the growth rate of 2.5 percent per annum. Further decline will be shown in 2020 of about 313,678 with a growth rate of 2.0 percent per annum. By the end of the projection period, the citizen population will be about 366,177 with the growth rate assumed to decline to 1.5 percent per annum.

The rates of population changes among provinces will vary during the next 30 years. Over the next three decades, the size of population at the provincial level are expected to increase and for some are projected to grow nearly three times, while others are projected to grow only at one and half times.

The projected age and sex distribution of the citizen population of Vanuatu between 1999 and 2029 indicates an imbalance in the sex ratios at younger age groups, 0-4 to 10-14. The gap in the sex ratio tends to get narrower as the population grows older. The wider imbalance in the sex ratio is more evident in the 2029 projected population. The imbalance in the sex ratio in urban areas will be less severe than for Vanuatu as a whole. One of the reasons is that urban places may attract an enormous number of young males.

The population projections for national, urban and the six provinces provide clear indications that the citizen population of Vanuatu is growing rapidly and is likely to double towards the end of the projection period. Furthermore, the population will continue to grow from the year 2029 at an annual rate of growth of 1.5 percent. Under the

assumptions of declining fertility, the Vanuatu citizen population in ages below 15 is expected to decline from 43 percent in 1999 to 31 percent in 2029. The working age population would have increased (by 2 times) and the school age population is expected to increase also depending on the declining rate of fertility. These observations have clear policy implications and these are challenges for planners and policy decision-makers at national as well as provincial levels.