# SOCIO-ECONOMIC ANALYSIS FOR HUMAN RESOURCE POLICY AND PROGRAM REFERENCE

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## ADDENDUM

## CONTINUATION OF PLANS FOR FUTURE ANALYSIS: INDONESIA

I. On October 15, 1974, the education and human resource development program responsibility for Indonesia was transferred to the East Asia Bureau. The Education Planning Office (EP) of the Technical Division (TECH) in the Near East South Asia Bureau (NESA) will continue project management of the Bureau of the Census, Participating Agency Service Agreement (PASA). Because of the shift in responsibility, PASA personnel will not continue socio-economic analyses of Indonesian data under this contract.

II. This report is directed to a number of users: policy decision-makers, those who formulate and allocate appropriations, and those who plan and implement programs responsive to policy determinations. These groups specifically include:

1. AID/Washington - NESA Bureau Staff,
2. USAID/Indonesia Personnel,
3. Indonesian Economic and Education -- Human Resource Planners.

A few of the useful functions served by this and future country reports are:

a. Supportive information in developing and continuing an input to DAPs, assessments, and project identification proposals.

b. A more comprehensive, multi-sectoral profile of probable financial and human resource requirements, in the near and medium term, in the social and economic sectors.

c. An analytical model from which micro studies can be conducted on the basis of significant constraints identified by the output of the model.

d. Easily understood graphs and data formats for practitioners in the field not familiar with more elaborate descriptions of mathematical computer models.

e. Applicability to sensitivity analysis. Where host governments plans are assessed, data from these reports will more precisely indicate priorities, feasibility, etc.

III. Had country responsibility remained in NESA/TECH/EP, the following micro and macro level analyses would have been produced over the two-year period of the PASA contract:

1. Cost effectiveness of alternative education programs — These would be supportive of current project development field activities in non-formal education.

a. Adult productivity in rural non-farm employment.
b. Costs and benefits of large investments to increase the quality of teachers in a skill shortage-labor surplus economy.
c. The size-distribution costs of major non-formal education activities.
d. Capital expenditures in multi-service community facilities.

2. Education-labor force-employment interrelations -- The next stage of this analysis, using an education-labor force model (ELF), was to include an in depth examination of the implications of alternative education programs upon the skill level and employment of the labor force and upon productivity and economic development. Further analysis was also anticipated which would examine various policy options relating to the Government of Indonesia's employment and manpower policies, especially as these apply to the supply and demand for labor and the capacity of the labor force to sustain an adequate level of output and growth.

a. The employment outlook for the "youth cohort" in rural Java.
b. Educational attainment -- wages and labor market absorption.
c. Priority investments by education level and manpower requirements.

3. Economic sector -- The economic simulation model, ECSIM, was to be used in connection with the ELF model to enable analysis of the impact of the education system upon the economic system through changes in the size and quality of the labor force. ECSIM would project growth of major economic indicators such as employment, domestic and foreign savings, investment by economic sector, consumption, government expenditures and revenue, gross national product and per capita GNP.

4. Family planning -- The family planning model, FMPLN, would analyze the impact of a national family planning program effort upon birth rates and the future growth of the population. The costs of the program could thus be compared to the benefits, the resulting increase in per capita income, the reduction in government social service expenditures, the decrease in unemployment rates, etc.

5. Health sector -- The health model, HEALTH, was to be used in the evaluation of health facility requirements and costs under different policy objectives in addition to determining the potential bottlenecks which are likely to constrain health delivery services. In addition, study of the cost effectiveness of alternative approaches to improved conditions of health, such as curative versus preventative approaches, was comtemplated.

A disaggregation of each of the above socio-economic profiles was also planned at the provincial level, the purpose of which was to provide support to micro level project and program planning and development.

IV. Given the availability of fairly rich aggregate data, development by UNDP of valuable economic and financial series, and the continuing diverse target population surveys conducted by the Government of Indonesia, we strongly urge our colleagues to consider continuation of socio-economic analyses through similar mechanisms responsible for producing the existing report.

## FOREWORD

This report is the initial product for ASIA/TECH/SPP/EP prepared by the Socio-Economic Analysis Staff of the International Statistical Programs Center, U. S. Bureau of the Census.

The two-year task, begun in June 1974, is to review, collect, describe, and analyze socio-economic variables in the context of AID's human resource and rural development policies and programs.

Although preliminary in nature, this report, based on Indonesian data, presents aggregate profiles of current and future program target populations that heretofore have not been described in terms of the dynamic variability between and among socio-economic factors.

Significant in this report are the magnitudes of the projected age-sex distribution of cohorts: (1) excluded from the education system; (2) migrating to urban areas; (3) needing family planning information; (4) entering the labor force; and (5) dependent upon the income of those employed in the modern and traditional sectors.

Given the sheer size of the population, there are no known short-term approaches to accelerating the aggregate human resource development process. However, there are correlations and determinants that explicitly optimize investments designed to mitigate the negative effects listed above.

I am grateful to the ASIA Bureau for its encouragement and support in this effort to begin an analytical process supportive of operational programs. I express my appreciation for the expert guidance of the ASIA/TECH leadership, as well as my gratitude for the cooperation of the SEA Staff who contributed directly or indirectly in producing this report.

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We also wish to thank the Socio-Economic Analysis Staff for the technical and secretarial support given in the preparation of this report.

The views, interpretations and conclusions expressed in the report are solely those of the authors; they do not necessarily represent positions of the Socio-Economic Analysis Staff or its supporting organizations.

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## TABLE OF CONTENTS


| | Page |
|---|---|
| Foreword | i |
| Acknowledgements | ii |
| Introduction | 1 |
| Main Report | |
| A. Socio-Economic Data Analysis: A Planning Tool | 5 |
| Policy Variables | 13 |
| B. Preliminary Results of Socio-Economic Projections in Indonesia | 19 |
| Appendix A: Preliminary Socio-Economic Profiles: Education | A-1 |
| Appendix B: Overview of Long-Range Planning Models | B-1 |
| Preliminary Socio-Economic Profiles: | |
| Appendix C: Demographic | C-1 |
| Appendix D: Housing | D-1 |
| Appendix E: Nutrition | E-1 |
| Appendix F: Labor Force, Employment, and Density | F-1 |
| Bibliography | |

# INTRODUCTION

The Asia Bureau has expressed a need for demographic and socio-economic information pertinent to their program and project planning and evaluation responsibilities in the field of human resources. To assist in the development of human resource programs and projects, the Asia Bureau has sought an analytical capability that would produce a series of quantitative profiles and analyses of the socio-economic characteristics of program and project target populations. The methodology is dynamic rather than static and assesses the changing size and structure of the target population over the short-, medium, and long-term.

This first quarterly report presents a preliminary, aggregative, socio-economic profile of Indonesia. Emphasis is placed upon population and education with additional analysis of housing, nutrition, and the labor force. The report is divided into two main parts: 1) The main report summarizes the analytical planning methodology used (Long-Range Planning Model),* and the major results of the socio-economic projections; and 2) A series of annexes which describe in greater detail both the methodological approach and the various assumptions and resultant profiles.

Under the terms of the PASA, future areas of consideration will include further national-level analysis of: a) education-manpower interrelations; b) economic sector; and c) family planning and health sectors.** In addition, greater disaggregation

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* This model was developed by the Socio-Economic Analysis Staff, ISPC, U.S. Bureau of the Census for use as a development planning tool.

** The Analysis will use the ELF, ECSIM, HEALTH, and FMPLN submodels of the Long-Range Planning Models; see Appendix B for description.

of the data base will be made, with particular emphasis upon subnational profiles pertinent for micro-level project planning and development. Finally, socio-economic profiles for other countries, including Pakistan, Afghanistan, and Nepal, will be developed to support AID program activities within those countries.

To proceed with the PASA work, visits to the recipient countries are scheduled. The objectives of the visits are threefold: 1) to update the preliminary projections to reflect current policy plans, institutional reforms, and recent survey data; 2) to investigate disaggregation of the socio-economic profiles to a subnational level more pertinent to project identification and development; and 3) to enhance technical cooperation with the planning ministries by presenting instructional seminars on the methodology and country results of the Long-Range Planning Model. Installation of the LRPM computer program for use by the planning ministries may be another beneficial by-product.

MAIN REPORT

## A. SOCIO-ECONOMIC DATA ANALYSIS: A PLANNING TOOL

In order to structure a viable technical assistance program which could address in a meaningful way the human resource needs within a country, it is necessary to consider, in a holistic way, those factors which determine the size and composition of human resources within that country. A modeling approach to human resource program development and planning, through its ability to accommodate various levels of abstraction and the capability of testing the impact of potential policies, meets such a need.

The modeling approach adopted in this analysis is dynamic. A desirable characteristic of a human resource planning methodology is that it enables policy-makers to look at both the present situation and problems in addition to the potential configuration which may exist five, ten, or thirty years from the present. Many aspects of human resource planning require a long-term view. For example, a demographic change such as a fertility decline will only affect educational planning after a decade and manpower planning after two decades. Similarly, the benefits of investment in human resources, such as in education, are frequently long-term. Thus the selection of the Long-Range Planning Model (LRPM) for this analysis was predicated on its ability to simulate in a dynamic way the interaction among selected socio-economic variables which determine the nature and rate of human resource development.

It should be noted at the outset that the simulated results of this analysis are projections and not forecasts or predictions. These latter forms state, with a given level of certainty, that certain events will occur. On the other hand, projections simply illustrate what would happen if their underlying assumptions were met over the projected time frame.

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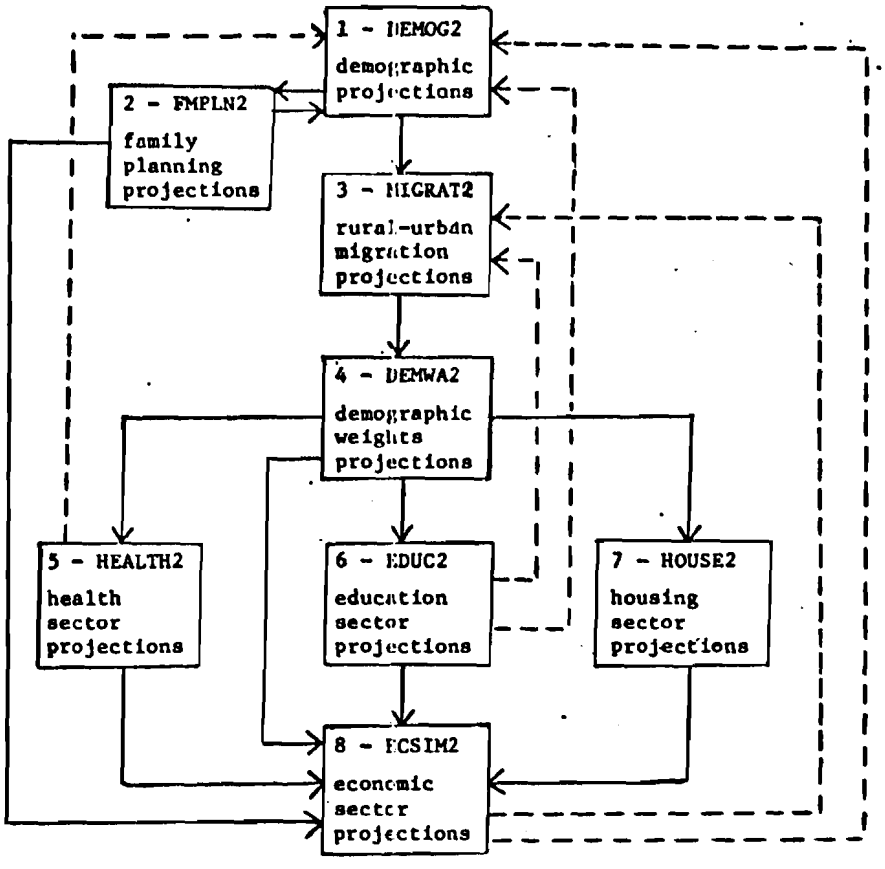
A further advantage of the LRPM methodology is the ease with which sensitivity analysis can be applied, enabling insight to be derived of the long-run implications of various policy options.

Another major aspect of the methodology chosen, besides its dynamic quality, is its multisectoral approach. The advantage of this approach is the ability to simulate sectoral interactions over time.

The long-range planning model has eight submodels through which the sectoral interactions are simulated: a) demographic; b) family planning; c) internal migration; d) demographic weights; e) education; f) health; g) housing; and h) economic. (See Figure 1)

FIGURE 1 -- LRPM INFORMATION FLOWCHART[1/]




1/ Solid lines refer to the impact of demographic factors on socio-economic variables.

Dotted lines refer to feedback impact of socio-economic variables on demographic factors.

The sub-models are highly integrated with the data output of one serving as input into another. The first submodel projects demographic trends such as the future size and age/sex structure of the population. The demographic trends may be made a function of socio-economic variables that affect fertility and mortality rates, such as changes in per capita income, education and health levels, labor force participation, etc. The family planning submodel projects the facility requirements and costs of a family planning program and its impact upon births averted. The implications of the family planning program for demographic trends, future social service requirements and costs, future labor force growth, savings, and economic growth can be traced through the interactive submodels. The internal migration submodel disaggregates the population by rural-urban location by simulating trends in rural-urban migration. Again, these migration trends may be made a function of other socio-economic development trends such as the rural-urban differences in income, employment opportunities, and social amenities.

The demographic weights submodel serves the role of transforming the demographic trends into the form of target populations relevant to the social service and economic submodels. For example, it projects the school-age populations used as input into the education submodel; the equivalent health consumers used as input for the health submodel; the labor force and the equivalent adult consumers used as input into the economic submodel. The three social service submodels, education, health, and housing, use the projections of their relevant user populations to estimate future facility requirements and program costs. The effect of the social service program costs upon government expenditures, the budget deficit, national savings, and economic growth can be traced through the economic submodel. Also, the effect of an education program upon the skill levels and productivity of the labor force is linked in a new Education-Labor Force subroutine (ELF).[1/] Other demographic-economic interactions in the LRPM include the implications of the population's age structure upon

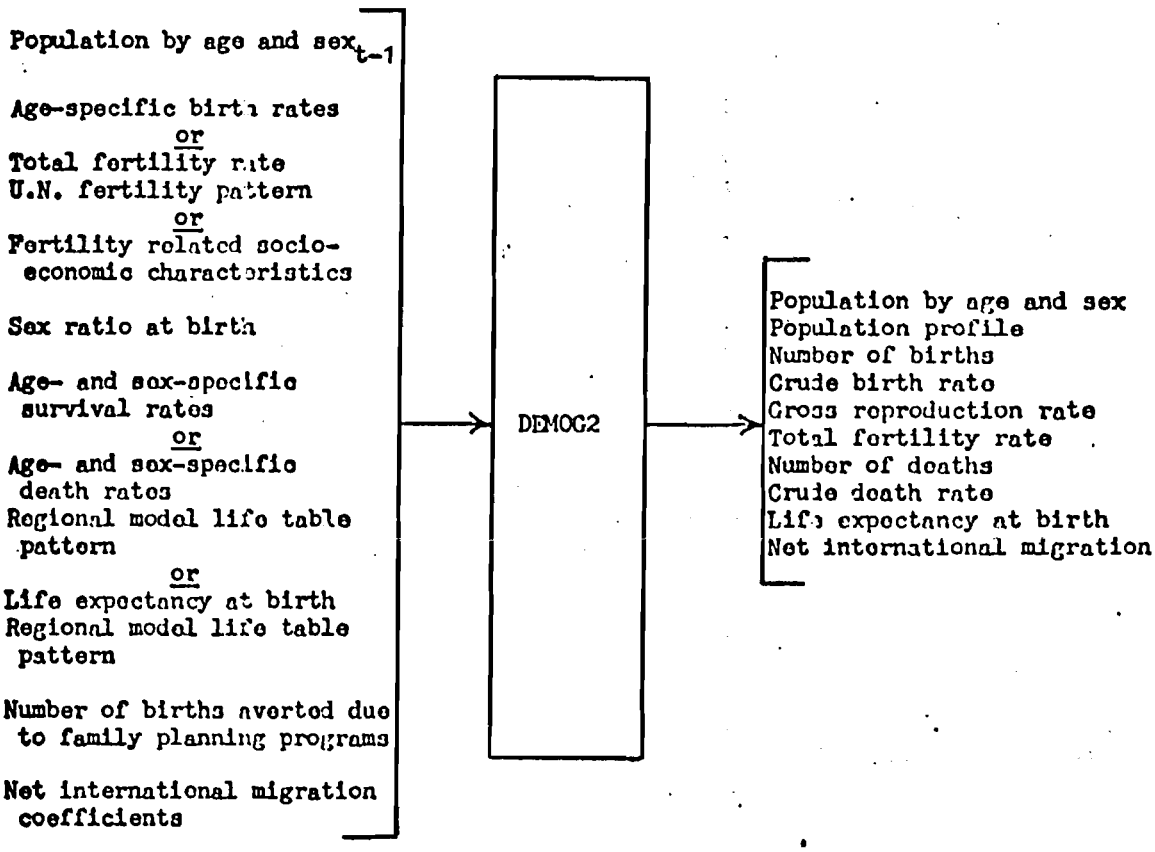
the 'dependency burden'[2/] and upon the nation's ability to save and invest. Another effect is the impact of demographic trends upon the size and location of the labor force, unemployment and employment, and economic growth.

In addition to its consideration of dynamic interaction among demographic, social service, and economic sectors, the long-range plan-planning model facilitates disaggregation by rural-urban location, or if desired it may be adapted to provincial or other subnational breakdown. Thus, there is the possibility of analyzing geographic sectors and their interactions as well as activity sectors.

For greater detail on the structure of the LRPM system, see Appendix B. The output of the LRPM is a series of quantitative, dynamic profiles of various demographic and socio-economic sectors. As can be seen from the following outline of the model's data input requirements and output, the type of information included in the projection results is of great relevance for human resource planning.

Figure 2 General Structure of LRPM2

A. DEMOG2




B. FMPLN2

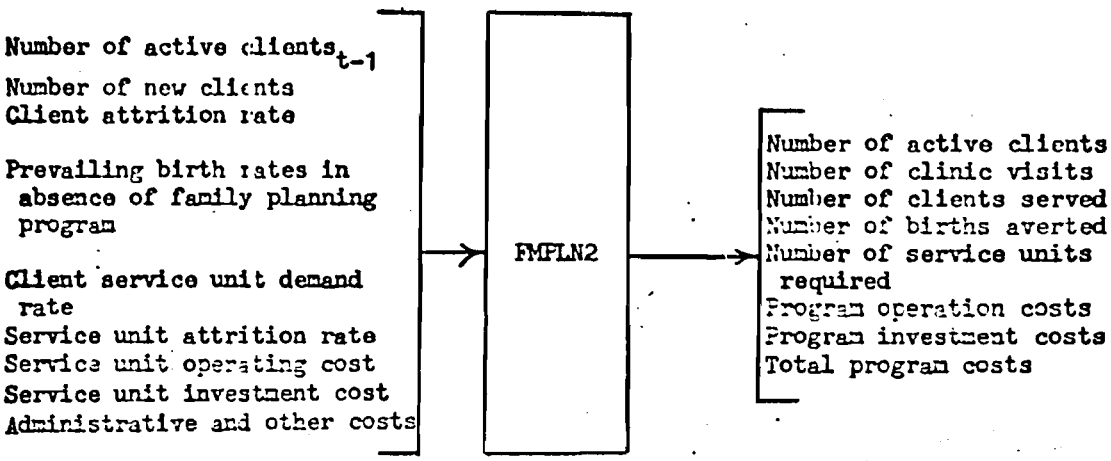



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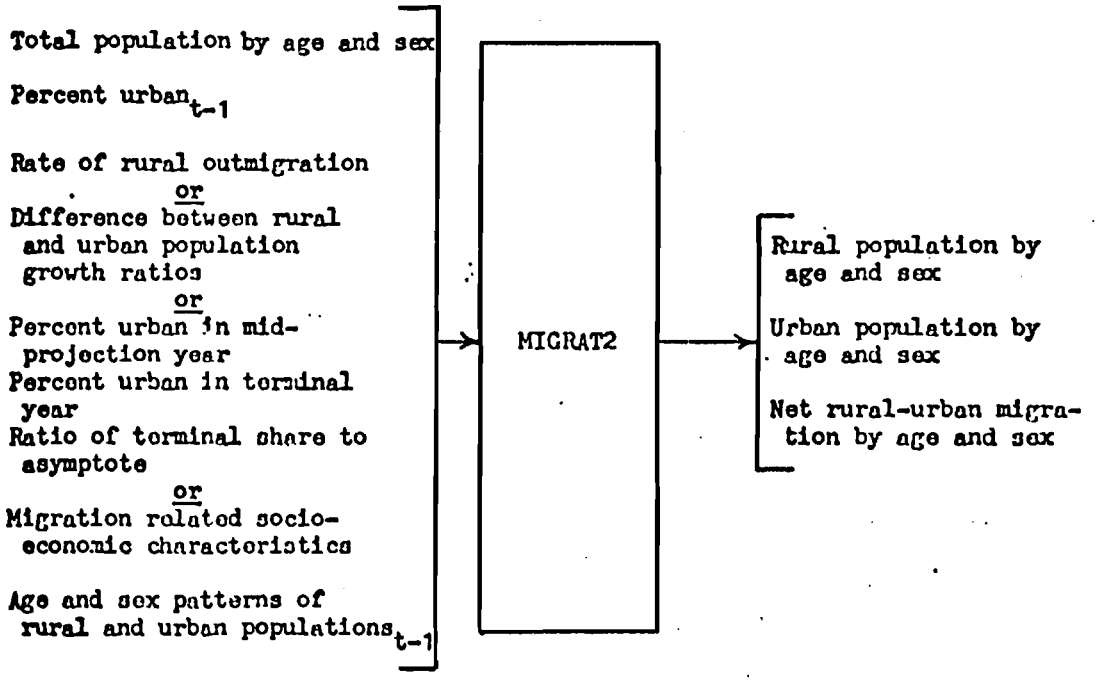
**Figure 2** General Structure of LRPM2 (contd.)

C. MIGRAT2




D. DEMWA2

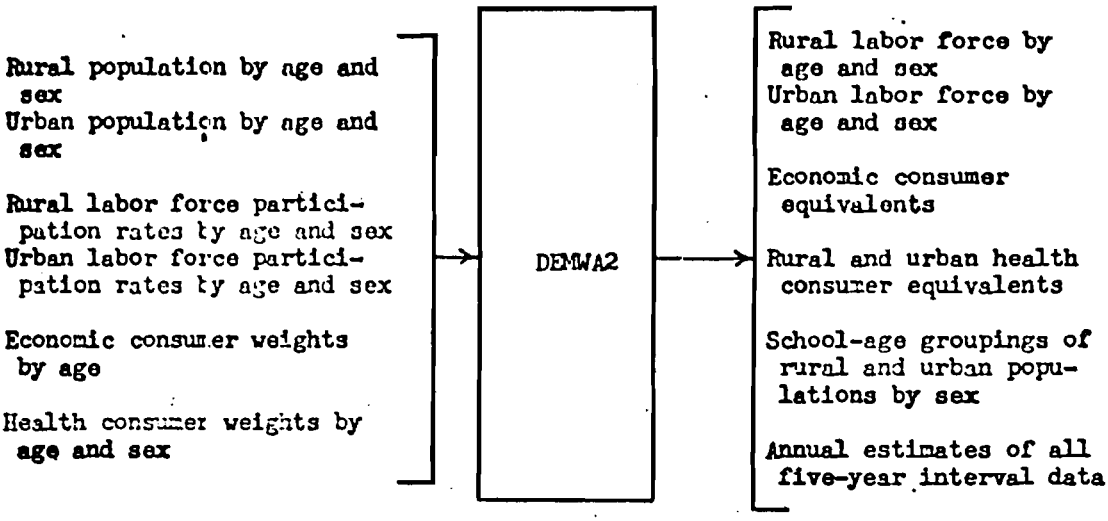



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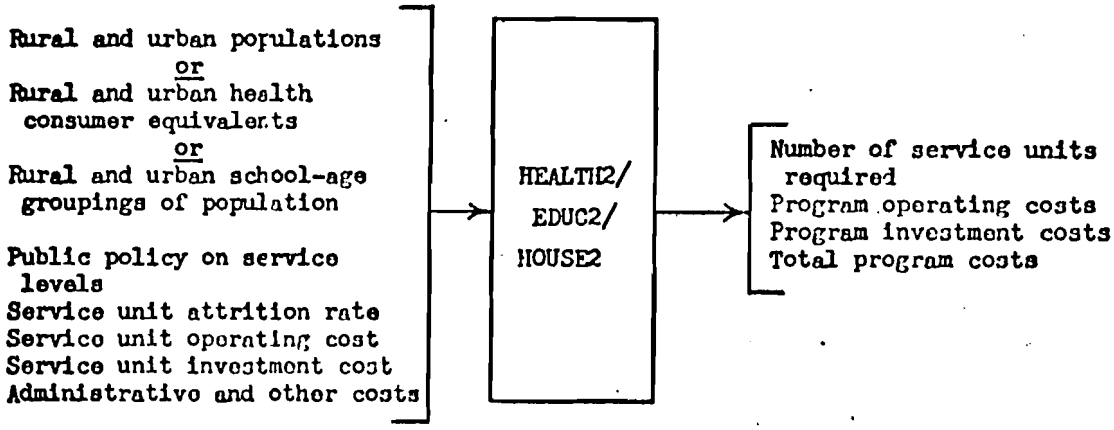
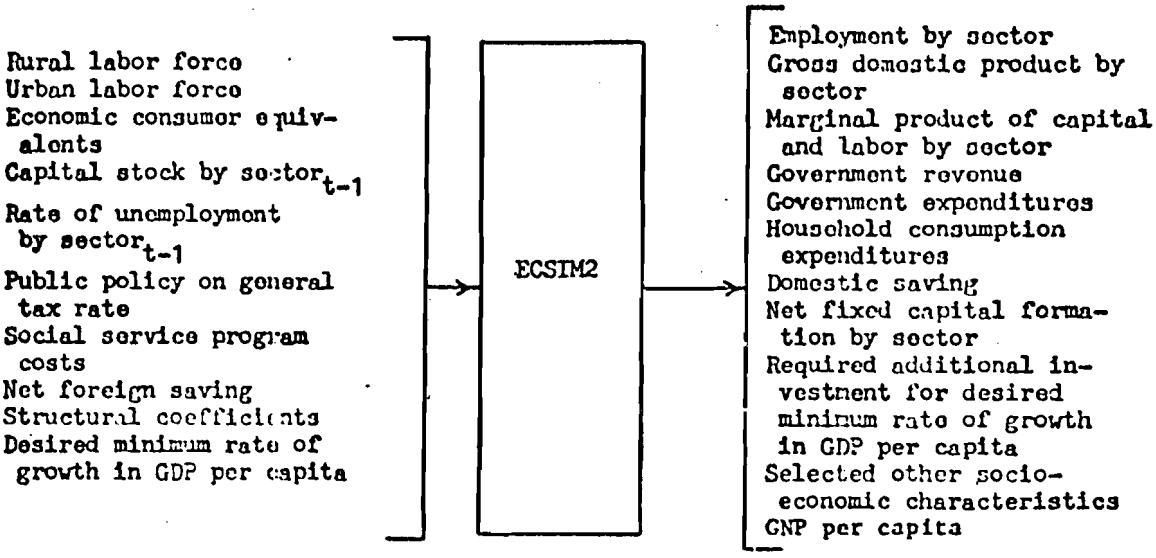
**Figure 2** General Structure of LRPM2 (contd.)

**E.** HEALTH2/EDUC2/HOUSE2




**F.** ECSIM2

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## SOCIO-ECONOMIC DATA ANALYSIS: POLICY VARIABLES

As noted above, the methodology employed in this analysis has the capability of gauging the impact of policy on the major demographic and socio-economic parameters projected. Because of the preliminary and aggregative nature of this first report, any attempt at indepth analysis of policy options will be extremely tentative. Thus, the task of analyzing the implications of various policy aspects will be done in a later stage. It may, however, be useful to list and discuss in a cursory way the policy variables and their linkages within the model structure.

### I. Demographic Policy Variables:

(a) The fertility rate -- A primary determinant of the extent of population changes, the fertility rate affects both the size and composition of the total population, the school-age population, the labor force and the level of dependency. The fertility rate can be directly affected by family planning policies, or indirectly through income policies, education -- especially of females -- female employment, and other policies which directly or indirectly encourage or limit the number of births.

(b) Survival rates -- Demographic trends, such as size and age/sex structure of the population, are also affected by survival rates. Survival rates are themselves affected by policies on health, sanitation, and nutrition. Various policy options designed to upgrade both the quality and quantity of health care, sanitation, and nutrition delivery systems can be evaluated in terms of their potential effect on demographic trends.

(c) International migration -- Policies may be designed to aid or discourage the entrance or exodus of people through international migration. For example, legal policies which control the issuance

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of exit visas, foreign exchange, exit taxes, etc., may reduce the rate of international out-migration. On the other hand, international in-migration may be encouraged by policies which assist migrants in resettling. For example, making resources such as land and capital available at preferential rates, etc. The rate of net in- or out-migration affects the future size of the national population, school-age population, labor force, and other target populations relevant to human resource planning.

II. Internal Migration Policy Variables:

(a) The rate of rural-urban migration -- The rate of rural-urban migration affects both the size and age/sex structure of the rural and urban populations and labor force; it is thus of significant relevance in sectoral planning. Policies which can influence the rate of rural-urban population movement such as wage differentials in the two sectors, the existence of employment and educational opportunities, difference in social services in the two sectors, and legal restrictions on free population movement can be evaluated for their potential impact on demographic and development trends.

III. Demographic Weights Policy Variables:

(a) Labor Force Participation Rates -- The size and quality of the labor force is of crucial importance in development planning. Labor force participation rates which affect the location, size, age and sex composition of the labor force can be modified by policies which influence the extent to which females are absorbed into the labor pool; provision of increased opportunities for employment, improvement in the skill level of the population through manpower training programs, etc. The potential impact of these policies upon development objectives can then be evaluated.

(b) Economic consumer weights -- Policies relating to commodity allocation and consumption patterns by age can be reflected in the structure of economic consumer weights. Thus, various options can be investigated in order to measure the impact on a given population by rural and urban breakdown.

(c) Health consumer weights -- Policy options relating to the distribution of health care services by age, and location can be reflected in the health consumer weights. The budgetary impact of various programs designed to impact a particular target population can be evaluated.

IV. Health Policy Variables:

(a) Service levels by type and sector -- The resource requirements for various levels of health service coverage by type (i.e., number of doctors, nurses, para-medical personnel, hospital beds, out-patient clinics, and family planning facilities) and location (i.e., rural and urban) can be evaluated under various policy options. For example, the costs of a program to construct rural clinics operated by para-medical personnel can be compared with the costs of a complete rural hospital facility; or the costs of quality changes (i.e., increasing the level of training for nurses) can be compared with the cost of quantity changes (i.e., increasing the number of nurses).

V. Housing Policy Variables:

(a) Service levels by type and sector -- The resource requirements for various levels of shelter services by type of construction, (i.e., concrete, wood, etc.) target groups, (i.e., low, moderate, or high income groups) location, (i.e., rural and urban) and type of services, (i.e., construction vs. provision of sites and services), can be evaluated under various policy options. Also, policies to improve sub-standard housing can be compared to increasing the housing stock.

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VI. Education Policy Variables:

(a) Enrollment rates by educational level, type, sector and sex -- The impact of various enrollment policies by educational level (i.e., primary, secondary, higher), type (i.e., vocational, technical, etc.), sector (i.e., rural and urban), and sex has serious implications for resource requirements. The requirements necessary to sustain specific educational policy objectives can be evaluated in order to determine the extent to which these targeted objectives are attainable or are likely to be constrained by inadequate resources such as teachers, administrators, classrooms, etc.

A policy of equity regarding the access to educational services of rural and urban, male and female, rich and poor children can be evaluated with respect to its costs (for example, the cost of eliminating the fee system in Indonesia can be evaluated). In addition, the costs of education expansion policies of both the formal and non-formal types can be evaluated.

VII. Economic Policy Variables:

(a) The rate of investment by sector -- The rate of investment (domestic and foreign) is a crucial determinant of the size and growth of the capital stock in both the rural and urban sectors. The capital stock along with labor and technology determine the level of output. The implications of policies designed to change the rate or sectoral allocation of investment can be assessed.

(b) Employment policies -- Policies (such as family planning, nutrition, and education) which affect the size, composition, and quality of the rural and urban labor force have a significant effect on economic development. The economic implications of a number of these policies can be evaluated within the framework of LRPM, in order to get some measure of the potential costs,

benefits, and trade-offs of the policy options. Also, the implications for employment opportunities of using labor or capital intensive technologies can be simulated.

(c) Rate of taxation -- Assessment can be made of the impact of various tax policies on government revenues, expenditures, budget surplus or deficit, and ability to meet social service targets in education, health, and housing. Also, the implications of the tax rate for disposable income, private savings, and investment can be traced.

(d) Rate of per capita income -- The economic model can also specify as a policy objective, a target rate of growth in per capita income and trace the implications for the amount of foreign aid required to fill the investment gap.

## B. PRELIMINARY RESULTS OF SOCIO-ECONOMIC PROJECTIONS IN INDONESIA

### Preliminary Demographic Projections: Major Indicators

Preliminary, aggregate projections were made of the size, age/sex structure and rural-urban movement of the population of Indonesia for the period 1971-2001. Later reports will disaggregate the demographic profiles to a provincial or other sub-national level. Two alternative demographic projections were made, representing both a slow and rapid rate of fertility decline.[3/] The resulting high and low estimates establish a range in which the actual population growth will probably fall. The alternative projections are also useful in pointing out the implications of demographic trends for social service requirements, employment, and economic growth.

The basic assumptions behind the projections are as follows: a) the population in the base year (1971) is estimated to be 126.7 million; b) female life expectancy increases gradually from 43 years in 1971 to 60 years in 2001; c) the total fertility rate declines slowly in Projection 1 from 6 in 1971 to 5 in 2001, and declines rapidly in Projection 3 from 6 in 1971 to 3 in 2001;[4/] and d) there is a two percent difference between urban and rural population growth rates throughout the 1971-2001 projection period.

The major results of the demographic projections are described below. In Projection 1, rapid population growth, the total population grows at an average annual rate of 2.7 percent over the projection period, reaching 279.4 million by 2001. In the slow population growth alternative, Projection 3, the population grows at an average annual rate of only 2.1 percent. By the year 2001, the total population has grown to 238.0 million, 41.4 million people less than in Projection 1. (Figure 3)

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The sex distribution in the base year is 62.5 million males and 64.2 million females, or a male/female ratio of .974. By 2001 there are 139.6 million males and 139.8 million females in Projection 1, implying a ratio of .999. In Projection 3 there are 118.6 million males and 119.4 million females, or a ratio of .994. Factors determining the sex distribution include a) the larger number of male births than female births; and b) the longer life expectancy of females than males.[5/] (Figure 3)

The different rates of fertility decline assumed under the two projections have significant implications for the future age structure of the population. Whereas in the base year 44.5 percent of the population is under age fifteen, by the year 2001 the percent of the population under age fifteen is 42.5 in Projection 1 and 35.4 in Projection 3. Thus, a more slowly declining fertility results in a younger population. (Figure 4 ) As will be discussed in later sections, the age structure of a population is of significant importance to planners, since it affects the size of target populations such as the school-age population, the work-age population, the female population in reproductive age groups, the elderly, etc. Similarly, knowledge of the sex structure of the population may be important for calculating labor force, enrollment, etc., particularly in countries with culturally determined sex roles.

Trends in the crude death rate are similar in both projections, declining from an average of about .020 during 1971-1976 to .010 during 1996-2001. The crude birth rate shows a rapid decline in Projection 3 from .043 during 1971-1976 to .028 during 1996-2001 compared to a slower decline in Projection 1 averaging .038 during 1996-2001.[6/] Thus the crude growth rate, which is the difference between the crude birth rate and crude death rate, increases in Projection 1 from 2.3 percent during 1971-1976 to 2.8 percent during 1996-2001. In Projection 3, the crude growth rate declines to 1.8 percent during 1996-2001. (Figure 3)

The projections also simulate trends in the rural and urban populations. In both projections, the percent of the total population living in urban areas,[7/] increases from 17.5 percent in

1971 to 27.9 percent in 2001. Of the 1971 total population of 126.7 million, approximately 22.2 million live in urban areas and the remaining 104.5 million live in rural areas. By 2001 under the rapid population growth Projection 1, the rural population has grown to 201.5 million and the urban to 77.9 million, under the slow population growth Projection 3, the magnitudes reach 171.7 million for rural and 66.4 million for urban. In terms of growth rates, this implies an average annual rate of growth over 1971-2001 of 2.2 percent and 1.7 percent for the rural population and of 4.3 percent and 3.7 percent for the urban population for Projections 1 and 3, respectively. (Figure 3)

The rural and urban populations have been peculiarities in their age/sex structure. For example, the urban population pyramid is distinguished by its 'bulge' in the 10-25 age groups, especially for males. This is explained by a greater propensity of male youths to migrate to urban areas. (Figure 4)

The projections also provide the number of rural-urban migrants within a given time interval. For example, in Projection 1, the number of rural-urban migrants during 1971-1976 total 2.1 million and rises to 5.5 million during 1996-2001. In Projection 3, the number of migrants during 1996-2001 is instead 4.7 million.

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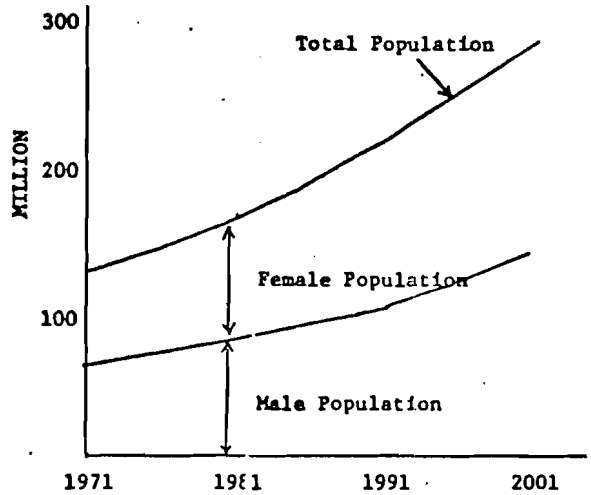
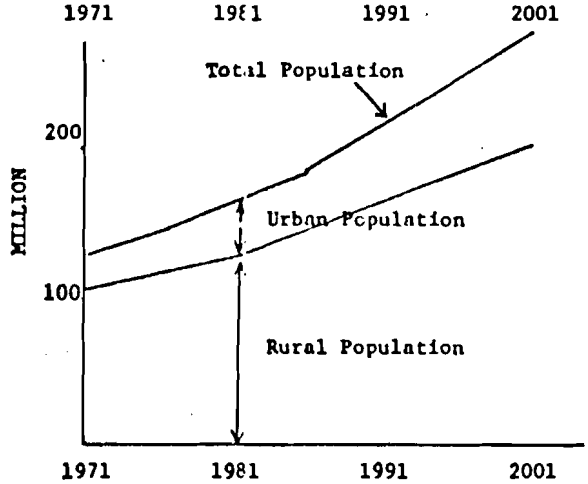
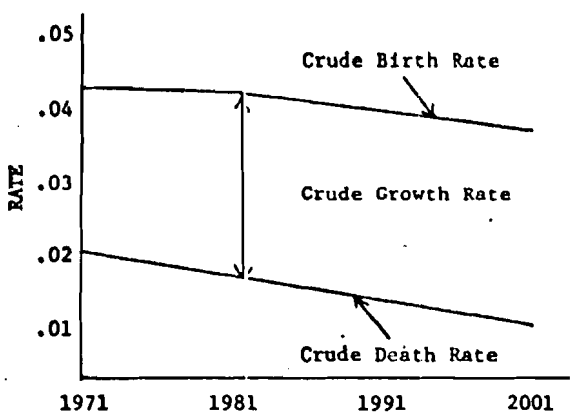
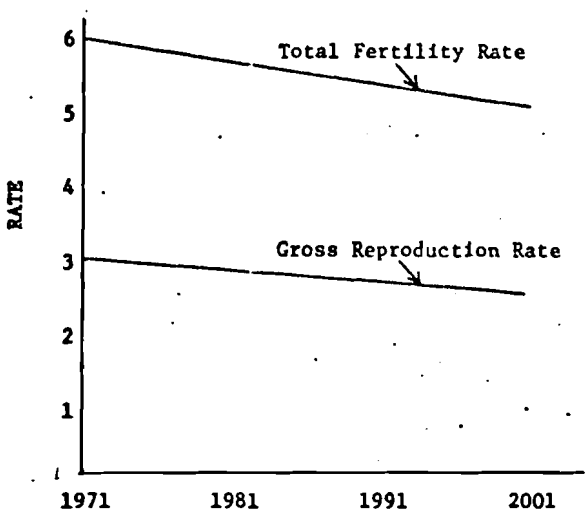
FIGURE 3 — DEMOGRAPHIC TRENDS

Projection 1

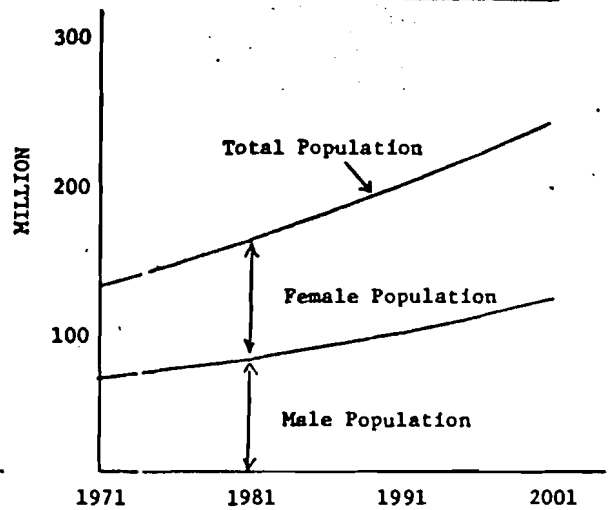


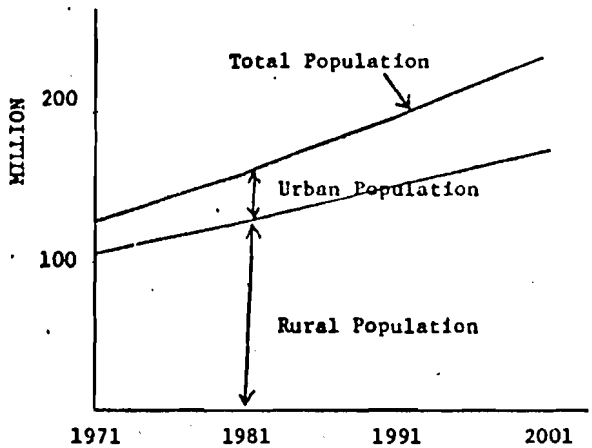



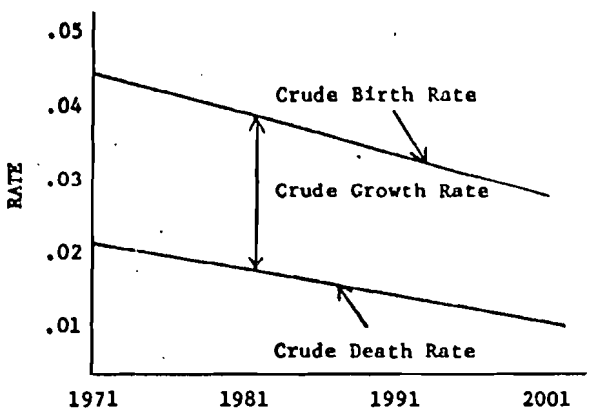




Projection 3



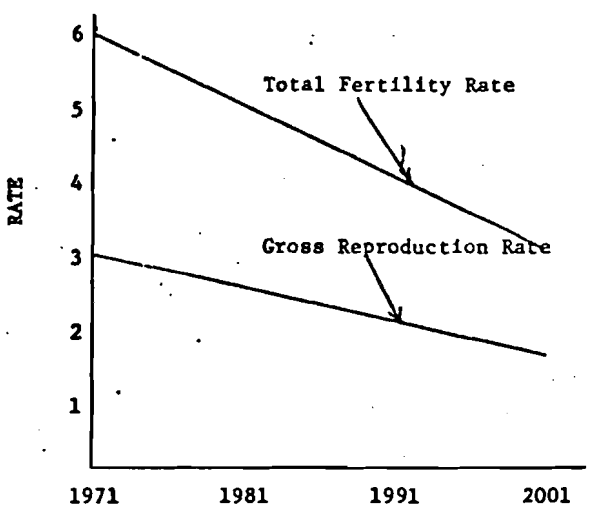
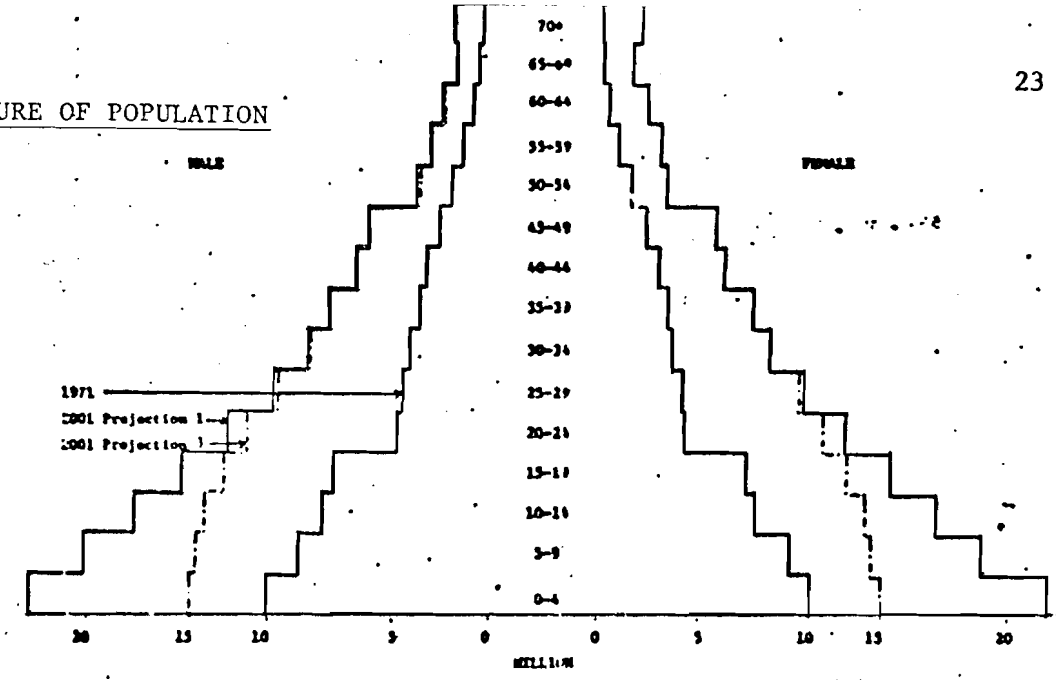



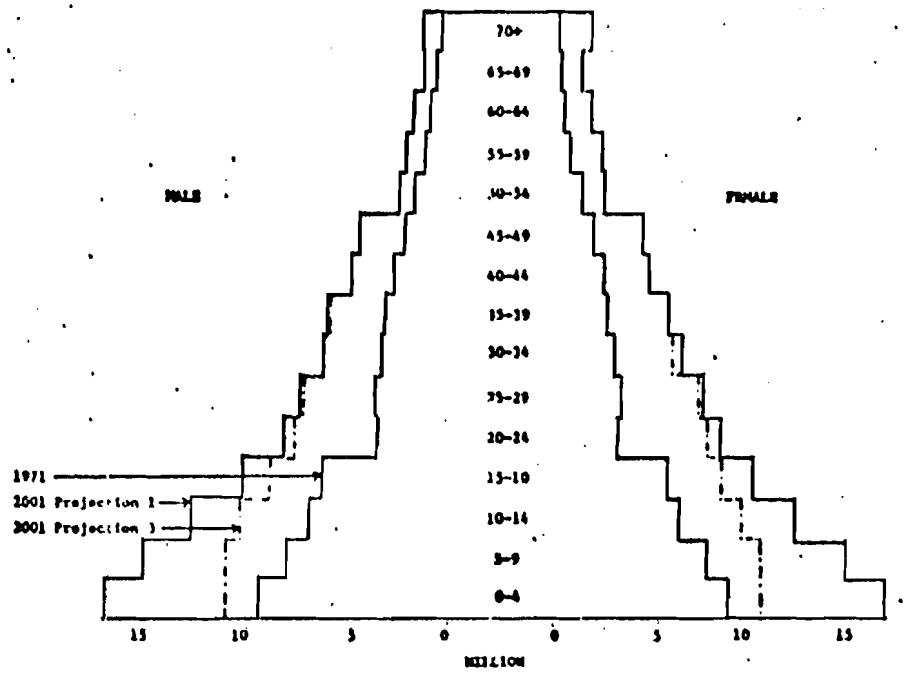
FIGURE 4 --

AGE/SEX STRUCTURE OF POPULATION

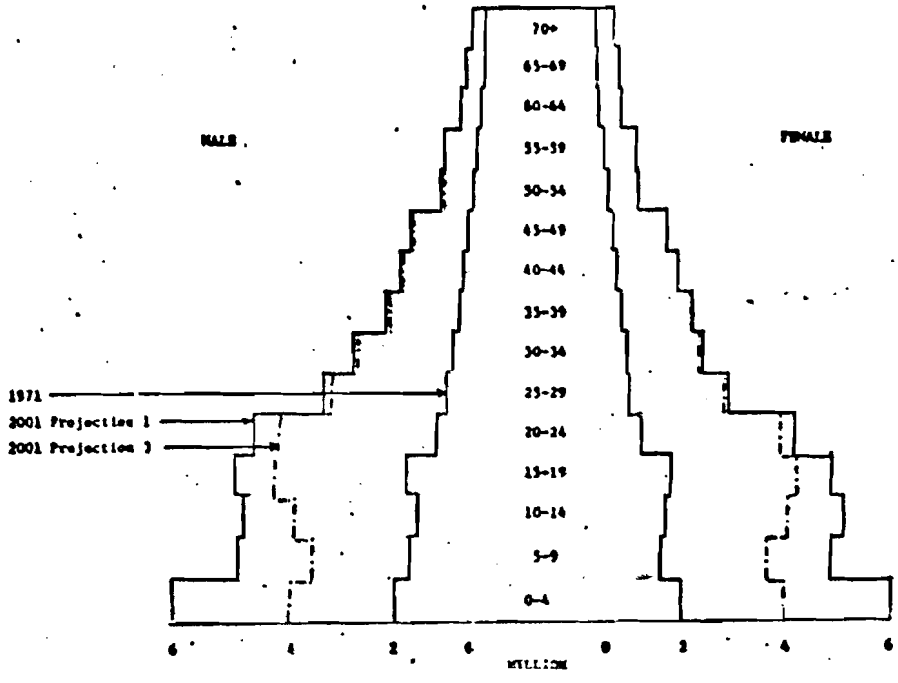
a) TOTAL




b) RURAL




c) URBAN

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## Preliminary Demographic Projections: Target Populations

Demographic trends, such as the size, age/sex structure, and rural-urban location of the population, have important implications for planners. In planning for social services, employment opportunities, food, and other requirements for the development of human resources, it is necessary to have dynamic estimates of the future size of target populations requiring service facilities, jobs, food, etc.

For example, the school-age population is a target population group, the projection of which will aid education planners in determining the number of teachers, classrooms, and other facilities that will be required if certain enrollment objectives or policies are met. In Indonesia, the primary school-age population includes children ages 7 to 12, the junior secondary school-age population includes the 13 to 15 age groups, and the senior secondary school-age population includes the 16 to 18 age groups. In 1971 the total school-age population (age groups 7 to 18) was 39.5 million: by 2001 it reaches 81.3 million and 64.7 million for Projections 1 and 3, respectively.[8/] The ratio of the total school-age population to the total population declines over the projection period, from about 31 percent in 1971 to 29 percent and 27 percent in 2001 for Projections 1 and 3, respectively. As expected, the ratio decline is most pronounced in the rapid fertility decline projection alternative, which tends to produce an older age structure.

A breakdown of the total school-age population by education level and rural-urban location is as follows:

| | | School-Age Population (in millions) | | | Average Annual Growth Rate | |
|---|---|---|---|---|---|---|
| | | 1971 | 2001 Projection 1 | 2001 Projection 3 | 1971-2001 Projection 1 | 1971-2001 Projection 3 |
| Primary | Rural | 17.3 | 32.4 | 24.6 | 2.1 | 1.2 |
| | Urban | 3.4 | 11.5 | 8.7 | 4.2 | 3.3 |
| | Total | 20.6 | 43.9 | 33.3 | 2.6 | 1.6 |
| Junior Secondary | Rural | 7.7 | 13.6 | 11.2 | 1.9 | 1.2 |
| | Urban | 1.8 | 5.9 | 4.8 | 3.9 | 3.3 |
| | Total | 9.5 | 19.5 | 16.0 | 2.4 | 1.7 |
| Senior Secondary | Rural | 7.4 | 12.0 | 10.3 | 1.6 | 1.1 |
| | Urban | 2.0 | 5.8 | 5.0 | 3.7 | 3.2 |
| | Total | 9.4 | 17.9 | 15.3 | 2.2 | 1.7 |

The impact of the alternative fertility decline assumptions (in Projection 1 and 3) upon the growth of the school-age population is not very large in the first projection decade, but becomes increasingly important in the long-term. The birth cohorts affected by the fertility decline first enter the primary school-age population after a six-year lag, and the secondary level after a thirteen-year lag. (Figure 5)

The urban school-age population grows at a more rapid rate than the rural, due largely to the projected rural-urban migration. (Figure 5)

Manpower planners have an interest in projections of another target population: the work-age population (here defined as the population in age groups 15-64). In the rapid population growth Projection 1, the work-age population increases from 68.2 million in 1971 to 152.8 million in 2001. In the slow population growth Projection 3, the work-age population reaches 145.9 million in 2001. The sizes of the work-age population in the two projections

only begin to diverge after fifteen years because the effect of alternative rates of fertility decline upon the growth of the work-age population is lagged.

To coordinate manpower requirements with labor supply, however, the data on work-age population should first be transformed into projections of the labor force. The size of the labor force, or supply available for employment, is smaller than the total work-age population. Factors that keep work-age people out of the labor force include a) high fertility and child care; b) job discrimination against women, minorities, youths, the uneducated, and other groups; c) educational opportunities for youth that delay their entrance into the labor market; d) morbidity; and e) lack of job opportunities. To calculate projections of the labor force, age-, sex-, and sector-specific labor force participation rates were applied to the population groups of work-age. The total labor force grew from 42.5 million in 1971 to 108.2 million in 2001 under Projection 1 and to 103.7 million in 2001 under Projection 3. The ratio of the labor force to the work-age population increases from approximately .62 in 1971 to .71 in 2001 in both projections. While increasing educational opportunities and earlier retirement are assumed to reduce labor force participation rates of the youthful and elderly work-age groups, other developmental trends, such as better health, lower fertility, greater job opportunities, and less employment discrimination, are assumed to increase the labor force participation rates in most work-age groups (particularly for women) over the projection period.

The major results of the labor force projections by sex and sector are as follows:

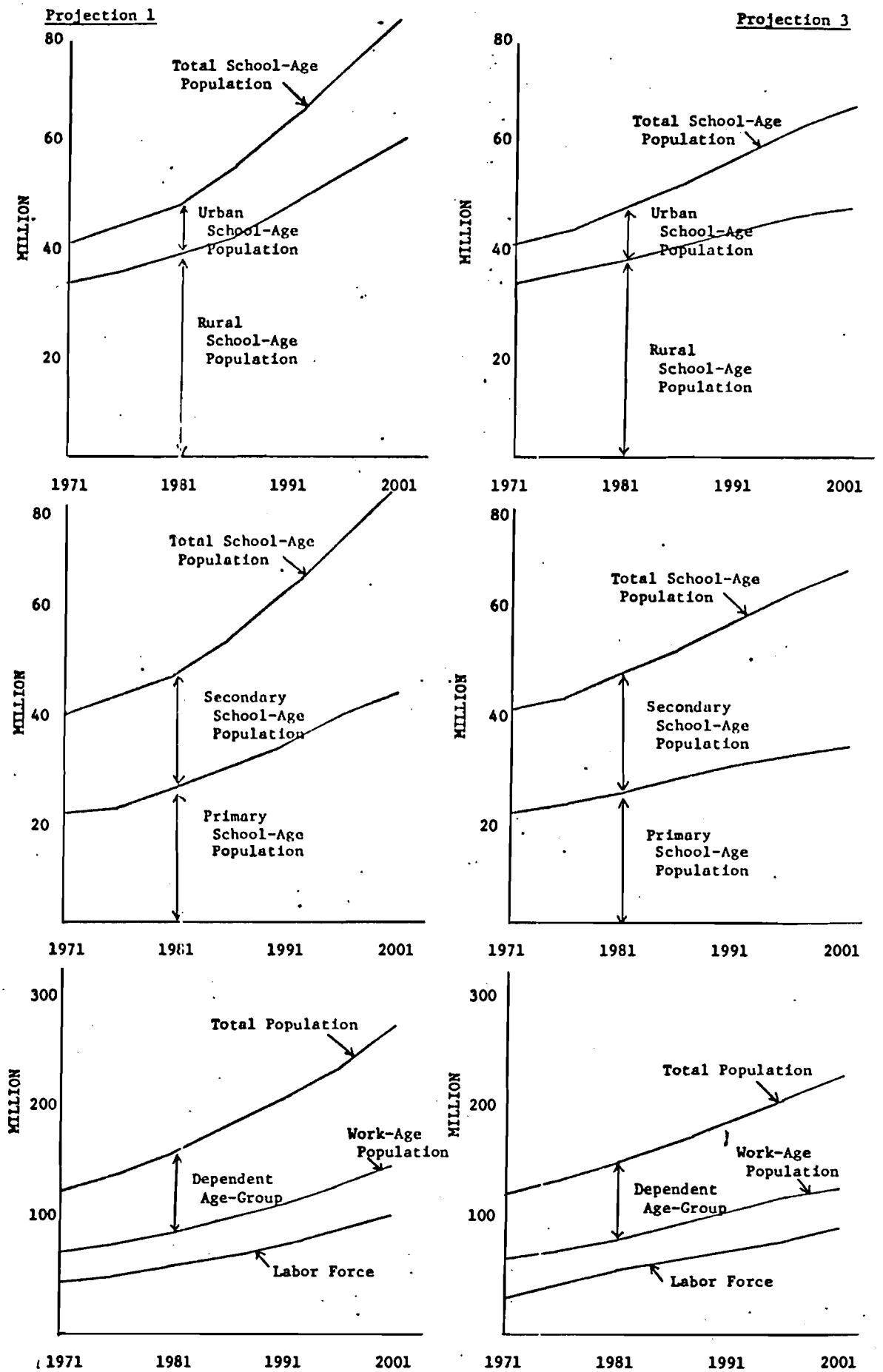
| | | Labor Force (in millions) | | | Average Annual Growth Rate | |
|---|---|---|---|---|---|---|
| | | 1971 | 2001 Projection 1 | 2001 Projection 3 | 1971-2001 Projection 1 | 1971-2001 Projection 3 |
| Rural | Males | 23.8 | 48.4 | 46.6 | 2.4 | 2.3 |
| | Females | 12.3 | 32.1 | 30.6 | 3.3 | 3.1 |
| | Total | 36.1 | 80.5 | 77.2 | 2.7 | 2.6 |
| Urban | Males | 4.7 | 18.0 | 17.3 | 4.6 | 4.4 |
| | Females | 1.7 | 9.8 | 9.2 | 6.0 | 5.8 |
| | Total | 6.4 | 27.8 | 26.5 | 5.0 | 4.8 |

Demographic trends affect economic planning in a way other than its implications for the size, structure, and location of the labor force. Arguments have been made that decreasing fertility enables a larger fraction of income to be available for investment than would be the case if fertility remained constant. The rationale for this is as follows: a reduction in fertility will lead to a smaller proportion of children relative to adults, i.e., a smaller 'dependency burden'. As families have fewer children to care for, they can divert more of their income away from consumption and into savings.

The major results of the demographic projections for the sizes of the work-age and dependent-age groups are as follows:

| | Population in Age-Group (in millions) | | | Ratio to Total Population | | | Number of Dependents per 100 Work-Age Population |
|---|---|---|---|---|---|---|---|
| | 0-14 | 15-64 | 65+ | 0-14 | 15-64 | 65+ | |
| Projections 1 & 3 - 1971 | 56.3 | 68.2 | 2.1 | .445 | .538 | .017 | 85 |
| Projection 1 - 2001 | 118.7 | 152.8 | 7.8 | .425 | .547 | .028 | 82 |
| Projection 3 - 2001 | 84.3 | 145.9 | 7.8 | .354 | .613 | .033 | 64 |

FIGURE 5 — TARGET POPULATIONS



Thus, it is evident that Projection 1, with the slow fertility decline assumptions, has a population with a younger age structure and a greater 'dependency burden' than Projection 3 which has a rapid fertility decline. The rate of fertility decline begins to affect the size of the 0-14 age group immediately but begins to affect the size of the work-age population only after a lag of fifteen years. (Figure 5)

There are numerous other possible target populations that planners may be interested in isolating. For example, a national family planning program would be concerned with servicing a particular user population: women in reproductive ages. In 1971, women in the 15-49 age group totaled 25.1 million in rural areas and 5.5 million in urban areas. By 2001 under Projection 1 this target group grew to 48.0 million in rural areas and 19.2 million in urban areas; under Projection 3 the size was 45.7 million in rural and 18.1 million in urban areas. Similarly, other programs may address a particular sub-group of the population. A youth corps program might chose to train skills to unemployed youths in urban areas, for example, or an agricultural extension program might provide technical assistance to the rural labor force engaged in agriculture. Having profiles or projections of the population, disaggregated by age, sex, location, and other relevant characteristics, can thus aid human resource planners by estimating the future magnitudes of target populations that particular programs or policies with to aid.

Two other target populations were projected: equivalent adult consumers and equivalent health consumers. Often in projecting requirements, as with food or health services, the total population is the relevant user population, but some persons may require more of the commodity or facilities than others. This problem is overcome by choosing relevant weights to apply to the age/sex sub-groups of the population. Thus, in estimating food requirements, the population may be converted into equivalent adult consumers (EAC) by accounting for the varying food consumption patterns of children,

adult males and females and the elderly. Similarly, equivalent health consumers may be calculated, considering the different health facility needs of infants, women of child-bearing ages, adults, the elderly, etc. The results of weighting the population into equivalent consumers were as follows:

| | Equivalent Adult Consumers (EAC) | | Equivalent Health Consumers | |
|---|---|---|---|---|
| | Number | Ratio to Total Population | Number | Ratio to Total Population |
| Projections 1 & 3 - 1971 | 126.7 | 1.0000 | 126.7 | 1.0000 |
| Projection 1 - 2001 | 280.7 | 1.0049 | 282.4 | 1.0108 |
| Projection 3 - 2001 | 246.8 | 1.0368 | 239.1 | 1.0044 |

Note that the rapidly declining fertility Projection 3 has the largest ratio of equivalent adult consumers to the total population in 2001. This is as expected, given the older age structure of Projection 3 and the EAC weights which assume children consume less food than adults. The age structure also affects the ratio of equivalent health consumers to total population. In 2001, this ratio is greater in Projection 1 due to the younger age structure combined with the greater health needs of infants and children relative to adults.

## Preliminary Projections of Education Sector Requirements

A major aspect of human resource planning is development of education. Generally education policy addresses two major objectives: meeting the skilled manpower requirements of the economy and meeting the educational aspirations of the population. Preliminary education profiles were made for Indonesia of future enrollments, educational facility requirements and program costs. Rather than one profile, alternative profiles were made, indicating a range of possible trends in school-age population growth, in enrollment expansion policies, and in education quality improvements.

A series of alternative education projections were made, each assuming that a different enrollment expansion policy is adopted. Here, the results of two alternative policies will be considered, a 'slow' and a 'rapid' spread of educational opportunity.[9/] In the 'slow' spread option, enrollment ratios grow at an annual rate of 1.5 percent at primary level, 1.0 percent at junior secondary level, and .5 percent at senior secondary level.[10/] The more optimistic option assumes a rapid enrollment expansion, with enrollment ratios increasing at 3.5 percent at primary level, 3.0 percent at junior secondary level, and 2.0 percent at senior secondary level.

In order to fulfill the above expansion policies, under the rapid and slow population projections, student enrollments would have to grow as follows:[11/]

ANNUAL RATES OF GROWTH IN NUMBER OF STUDENTS ENROLLED OVER THE 1971-2001 PROJECTION PERIOD

| | | Slow Enrollment Expansion Policy | Rapid Enrollment Expansion Policy |
|---|---|---|---|
| Projection 1 - (Rapid Population Growth) | Primary | 4.1* | 5.8** |
| | Junior Secondary | 3.4 | 5.4 |
| | Senior Secondary | 2.7 | 4.2 |
| Projection 3 - (Slow Population Growth) | Primary | 3.1* | 5.6** |
| | Junior Secondary | 2.7 | 4.8 |
| | Senior Secondary | 2.1 | 3.7 |

* 1971-2001
** 1971-1983

In the rapid enrollment expansion option, the proportion of the primary school-age population attending secular primary schools increases from 65 percent in 1971 to 100 percent by 1983. At the junior secondary level the proportion increases from 15 percent in 1971 to 36 percent by 2001, and at the senior secondary level it increases from 7 percent in 1971 to 13 percent by 2001. In the slow enrollment expansion option the spread of educational opportunity proceeds more slowly. At the primary level, universal enrollment of the primary school-age population is only attained by the year 2000, or 17 years later than in the rapid spread policy. By 2001, the percent of the junior secondary school-age population enrolled is only 20 percent, and of the senior secondary school-age population only 8 percent under the slow spread option.

In 1971, secular school enrollments totaled about 15.5 million; 13.5 million at the primary level, 1.4 million at the junior secondary level, and .7 million at the senior secondary level. By the year 2001, enrollments will have grown to the following sizes, given the alternative demographic trends and enrollment expansion policy objectives:

ENROLLMENTS BY 2001 (in millions)

| | Projection 1 | Projection 3 |
|---|---|---|
| Slow Enrollment Expansion Policy | | |
| Primary | 43.9 | 33.3 |
| Junior Secondary | 3.9 | 3.2 |
| Senior Secondary | 1.4 | 1.2 |
| Total | 49.2 | 37.8 |
| Rapid Enrollment Expansion Policy | | |
| Primary | 43.9 | 33.3 |
| Junior Secondary | 7.0 | 5.8 |
| Senior Secondary | 2.3 | 1.9 |
| Total | 53.2 | 41.0 |

In the above enrollment projections, growth in enrollments are due to two factors: increases in the school-age populations and increases in enrollment ratios (i.e., policies to spread educational opportunity over a larger percentage of the school-age population). To distinguish between these two factors, projections were also made holding enrollment ratios constant, thus representing the increase in enrollments due only to population growth (the dotted lines in Figure 6 ). Assuming no increase in the enrollment ratio, total enrollment by 2001 reached 32.8 million under the rapid population growth Projection 1 and 25.2 million under the slow population growth projection. The percent of enrollment increases due to population growth and due to enrollment ratio increases are as follows:

| | Percent of Enrollment Increases Due to Population Growth | Percent of Enrollment Increases Due to Enrollment Ratio Increases |
|---|---|---|
| Rapid Enrollment Expansion Policy | | |
| Projection 1 | 46 | 54 |
| Projection 3 | 38 | 62 |
| Slow Enrollment Expansion Policy | | |
| Projection 1 | 51 | 49 |
| Projection 3 | 44 | 56 |

Note that the projections with a rapid enrollment expansion policy have a higher percentage of enrollment increases attributable to enrollment spread policies than projections with a slow enrollment expansion policy. Also noteworthy is the fact that given an enrollment expansion policy objective, a more rapid rate of population growth increases the percent of enrollment increases due only to population growth.

Education planners are concerned with the implications of demographic trends and policy objectives of spreading educational opportunities upon formal school enrollments, requirements for teachers, classrooms, and other facilities and program costs. However, development planners should also have concern for the implications of the size of the non-enrolled school-age population. If due to rapid population growth even ambitious enrollment policies cannot reduce the non-enrolled group, this has serious consequences for development efforts to reduce inequality, poverty, unemployment due to lack of skills, etc.

In the above projections of school-age population and enrollments, it appears that despite increases in enrollments (and enrollment ratios) at all education levels, the size of the non-enrolled school-age population still increases at the secondary levels.

ANNUAL RATES OF INCREASE OF NON-ENROLLED SCHOOL-AGE POPULATION OVER THE 1971-2001 PROJECTION PERIOD

| | Slow Enrollment Expansion Policy | Rapid Enrollment Expansion Policy |
|---|---|---|
| Projection 1 - | | |
| Junior Secondary | 2.2 | 1.4 |
| Senior Secondary | 2.1 | 1.9 |
| Projection 3 - | | |
| Junior Secondary | 1.5 | .8 |
| Senior Secondary | 1.6 | 1.4 |

Even in the most optimistic case of slow population growth combined with a rapid enrollment expansion policy, the junior secondary school-age population not enrolled increases from 8.1 million in 1971 to 10.3 million in 2001 and the senior secondary school-age population not enrolled increases from 8.7 million in 1971 to 13.4 million in 2001. This non-enrolled secondary school-age group is a target population deserving attention and action programs. Unless trained through some inexpensive, non-formal education methods this group will become unskilled, low productive, and frequently unemployed labor.

In 1971 there were approximately 484 thousand teachers, of which 364 thousand were primary, 82 thousand were junior secondary, and 39 were senior secondary. Classrooms totaled 530 thousand in 1971, 465 thousand of which were primary, 43 thousand junior secondary, and 22 thousand senior secondary. By the year 2001, teacher and classroom requirements grew to the following magnitudes under alternative assumptions regarding population growth and enrollment expansion policies:

TEACHER REQUIREMENTS BY 2001 (in thousands)

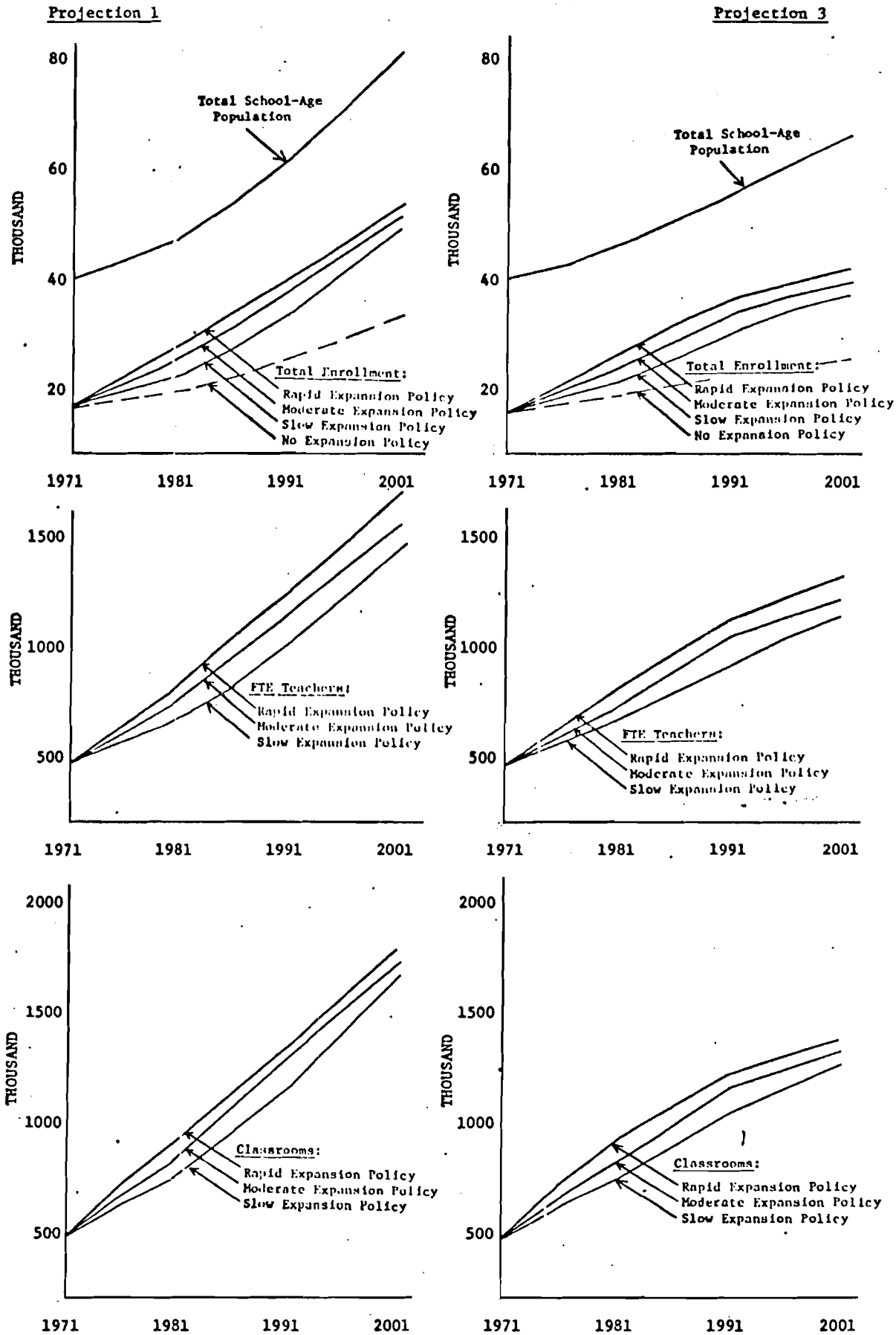
| | Projection 1 | Projection 3 |
|---|---|---|
| Slow Enrollment Expansion Policy | | |
| Primary | 1,186 | 900 |
| Junior Secondary | 225 | 185 |
| Senior Secondary | 85 | 73 |
| Total | 1,496 | 1,158 |
| Rapid Enrollment Expansion Policy | | |
| Primary | 1,186 | 900 |
| Junior Secondary | 406 | 334 |
| Senior Secondary | 134 | 115 |
| Total | 1,726 | 1,349 |

CLASSROOM REQUIREMENTS BY 2001 (in thousands)

| | Projection 1 | Projection 3 |
|---|---|---|
| Slow Enrollment Expansion Policy | | |
| Primary | 1,515 | 1,150 |
| Junior Secondary | 119 | 98 |
| Senior Secondary | 48 | 41 |
| Total | 1,682 | 1,289 |
| Rapid Enrollment Expansion Policy | | |
| Primary | 1,805 | 1,391 |
| Junior Secondary | 214 | 176 |
| Senior Secondary | 76 | 65 |
| Total | 1,805 | 1,392 |

Estimates of future teacher and classroom requirements were based on the assumption that the base year teacher/student and classroom/student ratios would remain constant throughout the projection period. The ratio estimates were 37 students per teacher at the primary level, 17 students per teacher at the junior

FIGURE 6 — ENROLLMENTS AND TEACHER/CLASSROOM REQUIREMENTS

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secondary, and 17 students per teacher at the senior secondary level; 29 students per classroom at the primary level, 32 students per classroom at the junior secondary level, and 30 students per classroom at the senior secondary level.[12/]

Calculations of education programs costs were made based upon estimates of per student recurrent and capital costs at each education level. The unit costs are assumed to increase over the projection period, reflecting policies to improve the quality of education that students receive (see Appendix A for the unit cost estimates). The results of the cost estimates for the first and last year of the projection period are as follows:

ANNUAL EDUCATION PROGRAM COSTS
(in billion Rupiahs)

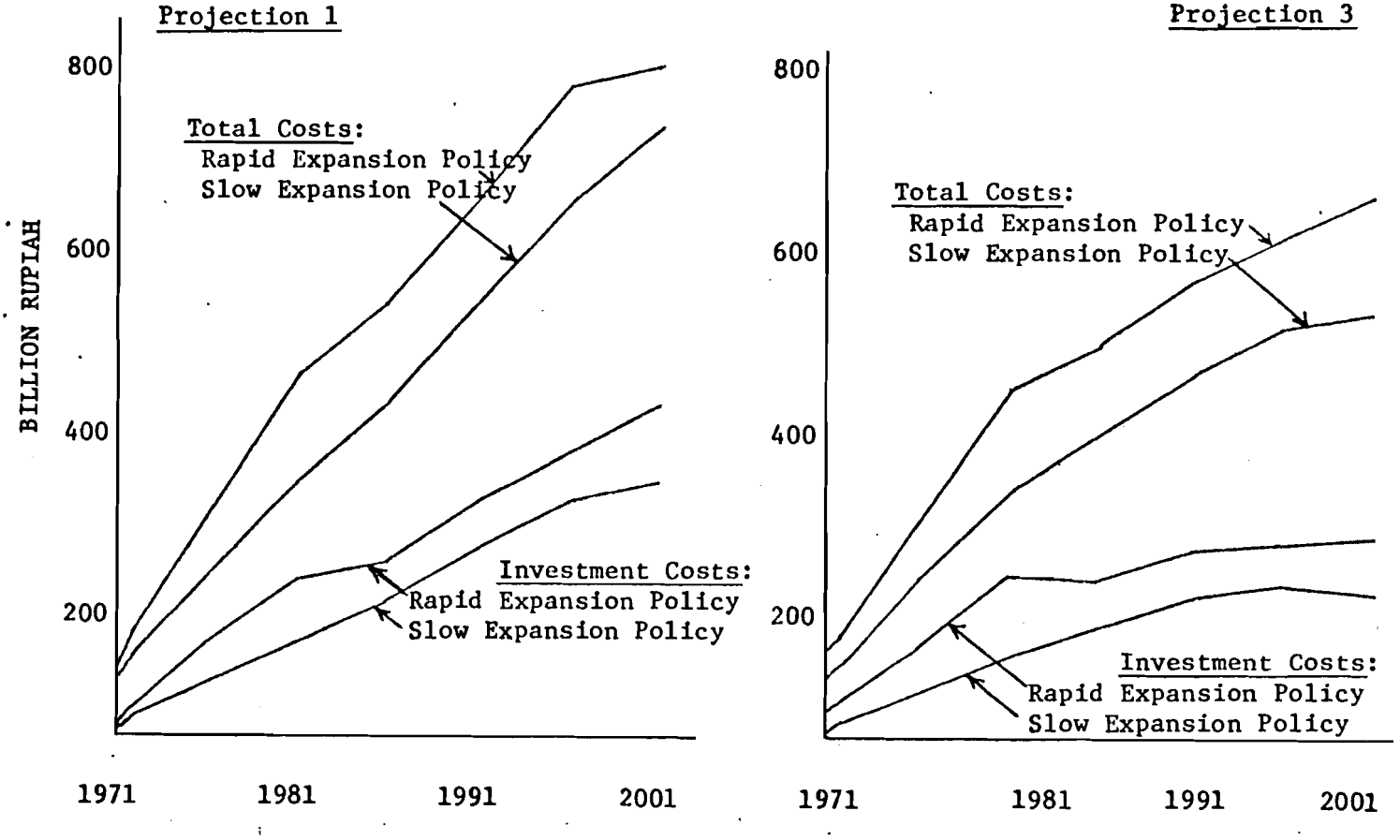
| | Recurrent Costs | | Capital Costs | | Total Costs | |
|---|---|---|---|---|---|---|
| | 1971-72 | 2000-01 | 1971-72 | 2001-01 | 1971-72 | 2000-01 |
| Slow Enrollment Expansion Policy | | | | | | |
| Projection 1 | 64.0 | 394.2 | 86.6 | 345.7 | 150.5 | 739.8 |
| Projection 3 | 64.0 | 307.6 | 86.7 | 224.0 | 150.7 | 531.6 |
| Rapid Enrollment Expansion Policy | | | | | | |
| Projection 1 | 65.7 | 471.4 | 112.7 | 434.8 | 178.4 | 906.3 |
| Projection 3 | 65.7 | 372.0 | 112.8 | 289.1 | 178.5 | 661.1 |

By comparing the above program costs for 2000-2001, one can examine the impact of the alternative population growth trends and of the alternative enrollment expansion policies upon program costs.

The major factors determining increases in educational facility requirements and thus in program costs include: 1) additional students due to growth of the school-age population; 2) additional students due to policies to increase the proportion of the school-age population enrolled; 3) replacement of retired teachers and old school buildings; and 4) increase in the quality of education reflected by increases in

per student costs. Analysis of the contribution to education program costs explained by some of the above factors is included in Appendix A.

FIGURE 7 -- EDUCATION PROGRAM COSTS



## FOOTNOTES -- MAIN REPORT

1/ ELF is a subroutine of a third version of LRPM.

2/ The ratio of dependent age-groups to the work-age population.

3/ There are three alternative demographic projections in the Appendix C. Here Projection 2 -- the moderate population growth option is left out in the Main Report.

4/ The total fertility rate is the average number of children ever-born per woman.

5/ The male/female ratio at birth is estimated to be 1.05. For 1971-1976 the average female life expectancy at birth is estimated to be about 44 years while male life expectancy is 41 years. By 1996-2001 the life expectancies increase to 58 years for females and 55 for males.

6/ The crude birth and death rates are the ratio of the number of births and deaths to the total population over a time interval.

7/ Urban area is defined roughly as towns with 20,000 or more inhabitants.

8/ See Appendix A for projections at five-year intervals.

9/ Appendix A includes another 'moderate' spread policy.

10/ An enrollment ratio is the ratio of the number of students enrolled to the school-age population at each level.

11/ Including secular primary and secondary schools only.

12/ Teachers here are full-time equivalent teacher jobs rather than individual persons.

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# APPENDIX A: Preliminary Socio-Economic Profiles: Education

## PRELIMINARY PROJECTIONS OF EDUCATION SECTOR REQUIREMENTS

In this report some preliminary projections are made of the future school-age population, enrollments, educational facility requirements, and program costs.[1/] Initially, three educational levels are considered: primary (SD), junior secondary (SLTP), and senior secondary (SLTA).[2/] The analysis is limited to public and private secular schools.[3/] The data on religious schools is inadequate, but is fairly unimportant except at the primary level where about 2.5 million students, or about 15 percent of all primary students, are enrolled.

Projections of student enrollments depend upon both demographic and non-demographic factors. Demographic trends affect the future size of the school-age population and thus indicate a ceiling on potential enrollments. However, in Indonesia education is far from universal, even at the primary level. Trends in enrollments will also depend upon many non-demographic factors such as the priority placed upon education, the policy emphasis given to the various education levels and the policy alternatives of rapid enrollment expansion versus quality improvements. Other socio-economic factors play a role, such as the aspirations of the public for education, the private expense of sending a child to school, etc. Generally education policy addresses two major objectives: meeting the manpower requirements of the economy and meeting the educational aspirations of the population.

The following paragraphs explain the major data assumptions behind the education requirement projections.

School-Age Population: The official age groupings in the Indonesian education system are as follows:

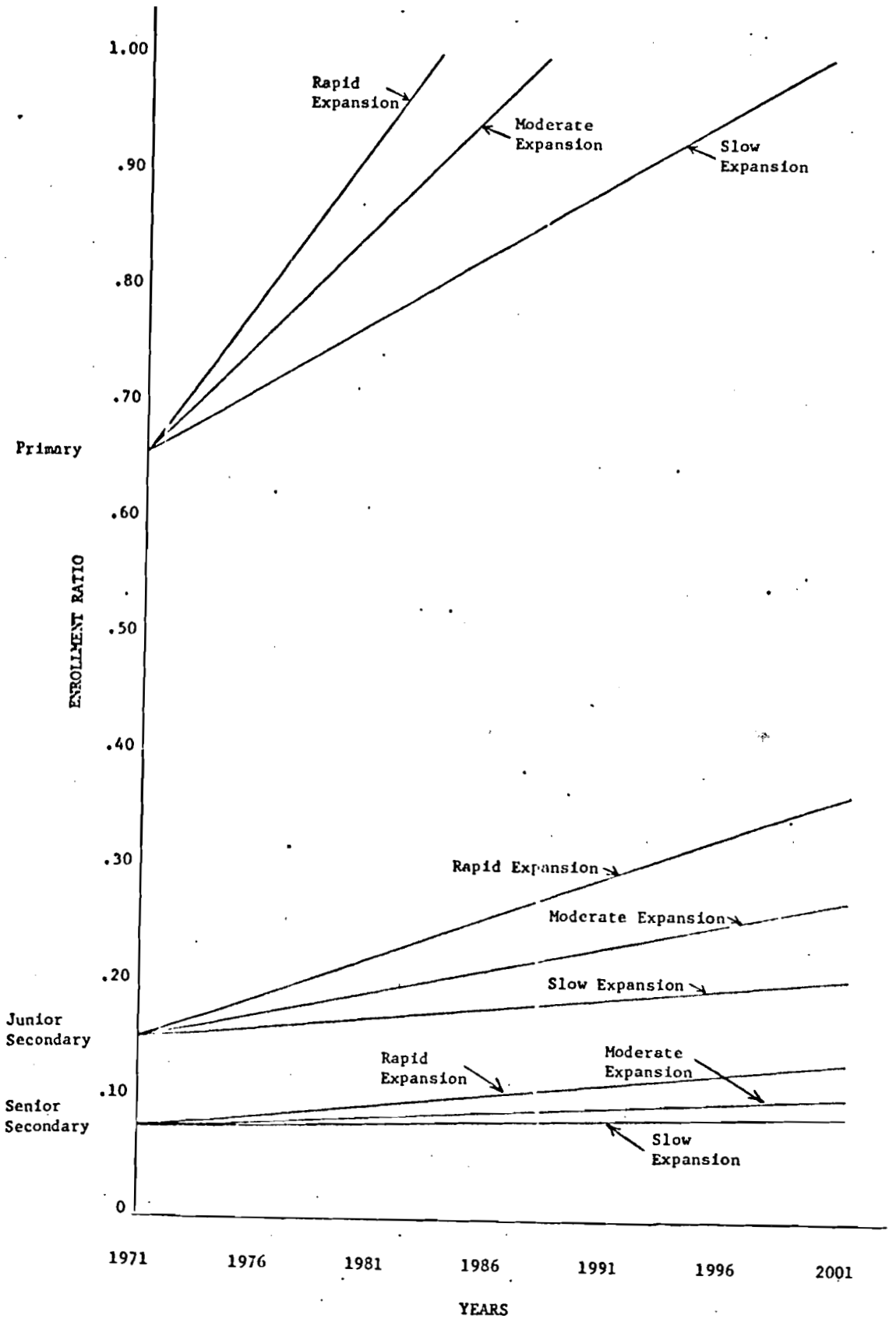
| | | |
|---|---|---|
| Ages | 7 to 12 | Primary level (Grade 1 to 6) |
| Ages | 13 to 15 | Junior Secondary level (Grade 7 to 9) |
| Ages | 16 to 18 | Senior Secondary level (Grade 10 to 12) |

These official age groups were used to project school-age populations.[4/] For comparative purposes, three alternative projections of school-age population were made, based upon different fertility decline assumptions explained in Appendix C-1, the demographic projections.

Enrollment Ratios: An enrollment ratio is the ratio of the number of students enrolled at a particular level to the relevant school-age population. In Indonesia, primary enrollment in secular schools in 1971 numbered about 13.5 million. The population in the age group 7 to 12 years was 20.6 million. Thus, the primary level enrollment ratio was approximately .65. Enrollment in 1971 at the junior secondary level was approximately 1.4 million. Since the relevant school-age population ages 13 to 15 totaled 9.5 million, the enrollment ratio is about .15. At the senior secondary level the enrollment ratio is .07; only about .7 million were enrolled from a school-age population of 9.4 million.[5/] It should be noted that these enrollment figures include the over-age students and thus enlarge the enrollment ratios.

The assumed trends in enrollment ratios at various levels reflect planning priorities; greatest emphasis is to be upon the spread of primary level education, with less upon the higher levels. This is partly due to equity considerations but also due to the limited absorptive capacity of the economy for highly educated graduates.[6/] For comparative purposes, projections of future enrollment were based upon three alternative policies regarding the rate of expansion or spread of educational opportunity at the primary, junior secondary, and senior secondary levels. The three options simulate possible policies of slow, moderate, and rapid expansion of educational opportunity. The annual rates of growth

FIGURE A-1 -- ENROLLMENT RATIOS UNDER ALTERNATIVE EDUCATIONAL EXPANSION POLICIES



in enrollment ratios assumed under the three options are as follows:

TABLE A-1 -- ANNUAL RATES OF GROWTH IN ENROLLMENT RATIOS OVER 1971-2001 PROJECTION PERIOD

| Education Level | Slow Enrollment Expansion Policy | Moderate Enrollment Expansion Policy | Rapid Enrollment Expansion Policy |
|---|---|---|---|
| Primary | 1.5* | 2.5** | 3.5*** |
| Junior Secondary | 1.0 | 2.0 | 3.0 |
| Senior Secondary | .5 | 1.0 | 2.0 |

Under the slow expansion policy, universal primary enrollment is attained by the year 2000, whereas with the moderate expansion policy it is attained by 1988, and with the rapid expansion policy by 1983. By the end of the projection, year 2001, the junior secondary enrollment ratio is about .20 in the slow expansion option, .27 in the moderate, and .36 in the rapid. The senior secondary enrollment ratio in 2001 is .08 in the slow expansion policy, .09 in the moderate, and .13 in the rapid. (See Figure A-1)

Service Ratios: To calculate future teacher and classroom requirements, estimates have to be made of the desired ratio of teachers per student and classrooms per student. The service ratio is defined as the number of units of an educational facility required per student.

1) Full-Time Equivalent Teachers -- According to the 1971 Educational Statistics Survey, there were about 415 thousand primary school teachers. However, many teachers at the primary level have part-time or no teaching duties. Adjusting for these non-active

teachers, the service ratio for full-time equivalent primary school teachers is estimated to be .027 (about one FTE teacher for every 37 students). At the junior secondary level, in 1971 there were about 67 thousand full-time and 37 thousand part-time teachers, or an estimated 81 thousand full-time equivalent teachers. Thus the ratio of full-time equivalent teachers per student at this level is .058 (about 17 students per FTE teacher). Similarly, the survey indicated that there were 25 thousand full-time and 32 thousand part-time senior secondary school teachers. It is estimated that the number of senior secondary full-time equivalents is about 39 thousand, which implies a service ratio of .059 (again about 17 students per FTE teachers).

Thus, it appears that while the primary level is overcrowded, there may be a surplus of teachers at the secondary level. However, this may merely be an illusion since the survey counted the number of teacher posts or jobs rather than persons. One full-time equivalent job at the secondary level involves only 18 periods of instruction per week, or a few hours per day. The practice of holding more than one full-time job at the secondary level is common (estimated in a small survey to average 1.4 jobs per teacher). Thus the favorably high service ratios for secondary level teachers hide the low average numbers of hours of instruction and a probable real shortage. At the primary level, holding multiple jobs is apparently rarer, but hours of instruction are probably still very low due to limited school-building space. Thus, many primary teachers may be unwillingly underemployed.

2) Classrooms -- According to the Education Statistics Survey, the average class size in 1971 was 29 students at primary level, 32 students at junior secondary, and 30 students at senior secondary level. This implies a classroom service ratio of .035 for primary, .031 for junior secondary, and .033 for senior secondary.

As with the teacher ratios, these classroom ratios may be misleading due to problems hidden in the survey data. Most important is the common practice at all education levels of holding more than one class session. Commonly several schools share one building by shortening the hours of instruction of each class. Furthermore, the average class size at each school level hides the fact of overcrowding at lower grades and frequent unused capacity at higher grades, due to high dropout rates.[7/]

The service ratios used for the projection of teacher and classroom requirements are found in Table A-2 below. The ratios are assumed to remain constant over the projection period.

TABLE A-2 — SERVICE RATIOS FOR TEACHERS AND CLASSROOMS BY EDUCATION LEVEL (1971-2001)

| Education Level | Full-Time Equivalent Teachers per Student | Classrooms per Student |
|---|---|---|
| Primary | .0270 | .0345 |
| Junior Secondary | .0580 | .0306 |
| Senior Secondary | .0589 | .0333 |

Attrition Rates: An attrition or replacement rate is that proportion of a service facility that needs replacement every year. Teachers have an average service life after which they retire or enter another occupation. Similarly, classrooms may be used only for a limited period before they must be replaced. (The length of which depends largely upon the type of construction of the building). There is little data on length of service life for teachers or classrooms in Indonesia. However, there are indications of high teacher turnover, particularly at the primary level.[8/] The attrition rates used in the projections are as follows.

TABLE A-3 -- ATTRITION RATES FOR TEACHERS AND CLASSROOMS BY EDUCATION LEVEL (1971-2001)

| Education Level | Full-Time Equivalent Teachers 1971 | Full-Time Equivalent Teachers 2001 | Classroom 1971 | Classroom 2001 |
|---|---|---|---|---|
| Primary | .100 | .070 | .070 | .050 |
| Junior Secondary | .070 | .050 | .070 | .050 |
| Senior Secondary | .050 | .040 | .070 | .050 |

Education Program Costs: Recurrent and capital education program costs were projected based upon per student estimates. Recurrent costs per student in Indonesia are among the lowest in the world. Though salaries have increased substantially since 1971, teachers are still under paid. As a result, they are forced to hold a number of jobs and the per student quality of instruction is lowered. Furthermore, it has led to a fee system to supplement teachers' salaries that has discriminated against the children of poor parents. Non-salary recurrent costs per student are also extremely low in Indonesia; generally about 10 percent of salary expenditures. There are few textbooks available or other teaching aids such as maps, blackboards, paper, pencils, laboratory equipment, etc., and as a result education is little more than rote memorization and recitation. Emphasis in educational planning has been placed upon improvement in the quality of education; this will require substantial increases in per student recurrent expenditures.

The capital budget in Indonesia has also been inadequate in the past. School buildings are in need of major renovation. Also, the rapid increases in enrollment have not been met by adequate construction of school buildings. As a result, a large percent of the buildings are rented and hours of instruction are shortened to enable multiple sessions.

Estimates of the base year unit recurrent and capital costs per student used in the projections are displayed below:[9/]

TABLE A-4 — ESTIMATE OF UNIT RECURRENT COST FOR EACH STUDENT IN 1971
(in Rupiah)

| Level | Salary | Non-Salary | Total |
|---|---|---|---|
| Primary | 2,366 | 217 | 2,583 |
| Junior Secondary | 5,357 | 698 | 6,055 |
| Senior Secondary | 5,994 | 1,026 | 7,020 |

TABLE A-5 -- ESTIMATE OF UNIT CAPITAL COST FOR EACH NEW STUDENT PLACE in 1971
(in Rupiah)

| Level | Construction Cost Per $M^2$ | Area in $M^2$ Required Per Student Place | Construction Cost Per Student Place | Site Cost | Equipment | Total |
|---|---|---|---|---|---|---|
| Primary | 16,000 | 2.0 | 32,000 | 3,500 | 6,500 | 42,000 |
| Junior Secondary | 22,000 | 3.5 | 77,000 | 23,000 | 40,000 | 140,000 |
| Senior Secondary | 25,000 | 4.0 | 100,000 | 25,000 | 45,000 | 170,000 |

Unit recurrent costs are assumed to grow from 1971 to 1979 at annual rates of about 12 percent for primary level, 14 percent for junior secondary level, and 20 percent for senior secondary level. Unit capital costs are assumed to grow from 1971 to 1979 at annual rates of 5 percent for all education levels.[10/] All unit costs are assumed to remain constant after 1979, reflecting that the desired quality improvements have been attained. The projections of recurrent costs assume that the proportion going to salaries remains constant at .92 for primary, .86 for junior secondary, and .85 for senior secondary.

EDUCATION PROJECTION RESULTS --

School-Age Population Projections: The most relevant implications of demographic trends for education planning is the impact on future growth of the primary, junior secondary, and senior secondary school-age populations. The impact of fertility decline on the rate of population growth and age-structure affects the school-age population. Tables A-10 - 13 and Figures A-2 - 4 show the differences in the size of the school-age populations under the three demographic projections. It should be noted that in the early years of the projection period the differences are minimal since fertility decline has a lagged effect on school-age population; the impact becomes greater in the last two decades of the projection period. A decline in fertility first affects the primary school-age population after about six years, the junior secondary school-age population after thirteen years, and the senior secondary school-age population after sixteen years.

In 1971 the primary school-age population was 20.6 million, the junior secondary school-age population was 9.5 million, and the senior secondary school-age population was 9.4 million. By the year 2001 the projected size of school-age populations are as follows:

| | Projection 1 | Projection 2 | Projection 3 |
|---|---|---|---|
| Primary | 43.9 million | 38.3 million | 33.3 million |
| Junior Secondary | 19.5 million | 17.6 million | 16.0 million |
| Senior Secondary | 17.9 million | 16.5 million | 15.3 million |

In 1971 the total school-age population, those between ages 7 to 18, was about 31 percent of the total population. This percentage declines slightly over the projection period in all three projections, but the decline is most pronounced in the rapid fertility decline alternative. By 2001 the percent of the total population in the school-age group is 29 percent for Projection 1, 28 percent for Projection 2, and 27 percent for Projection 3. (Table A-10)

FIGURE A-2 -- PRIMARY SCHOOL-AGE POPULATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

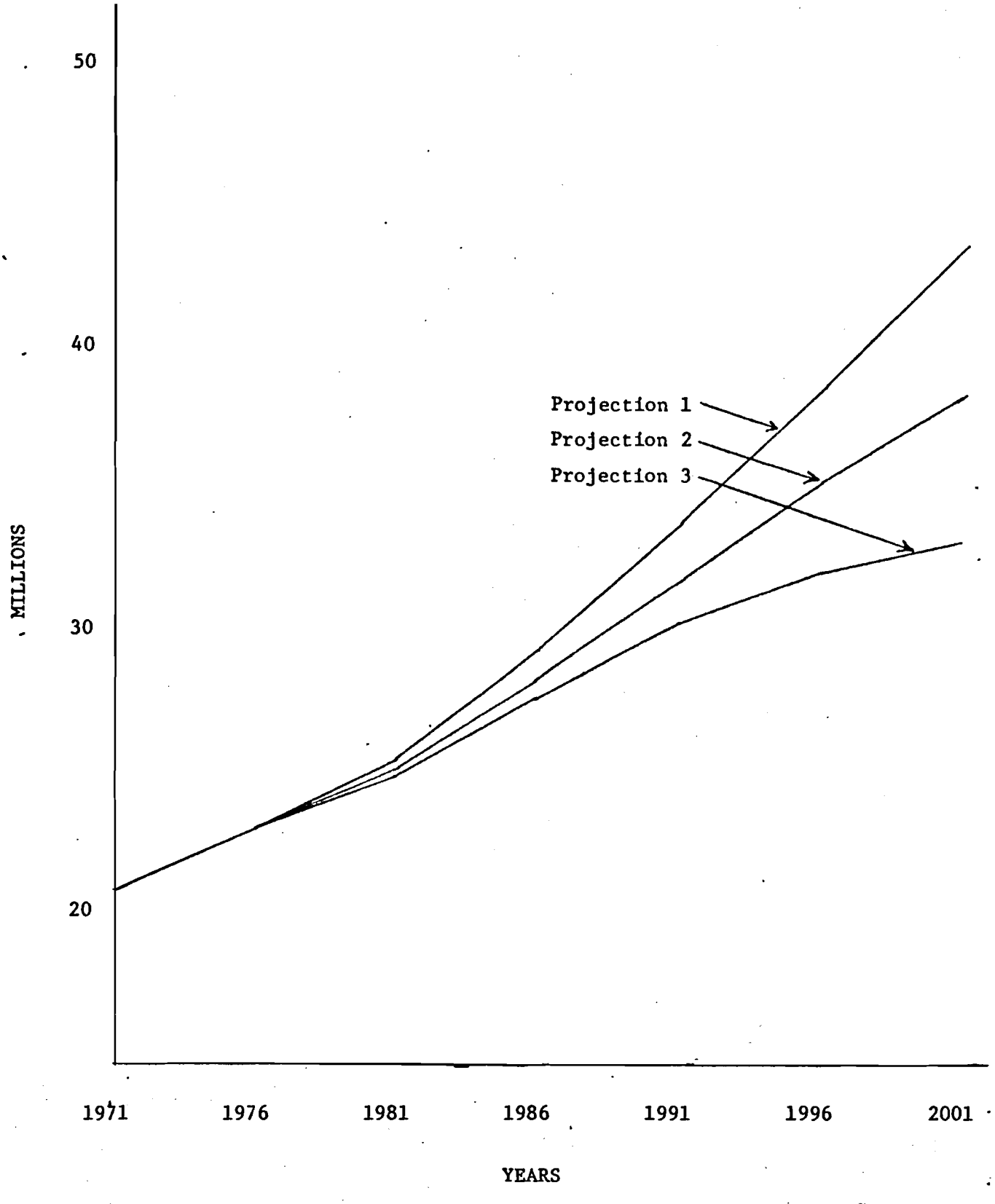


FIGURE A-3 -- JUNIOR SECONDARY SCHOOL-AGE POPULATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

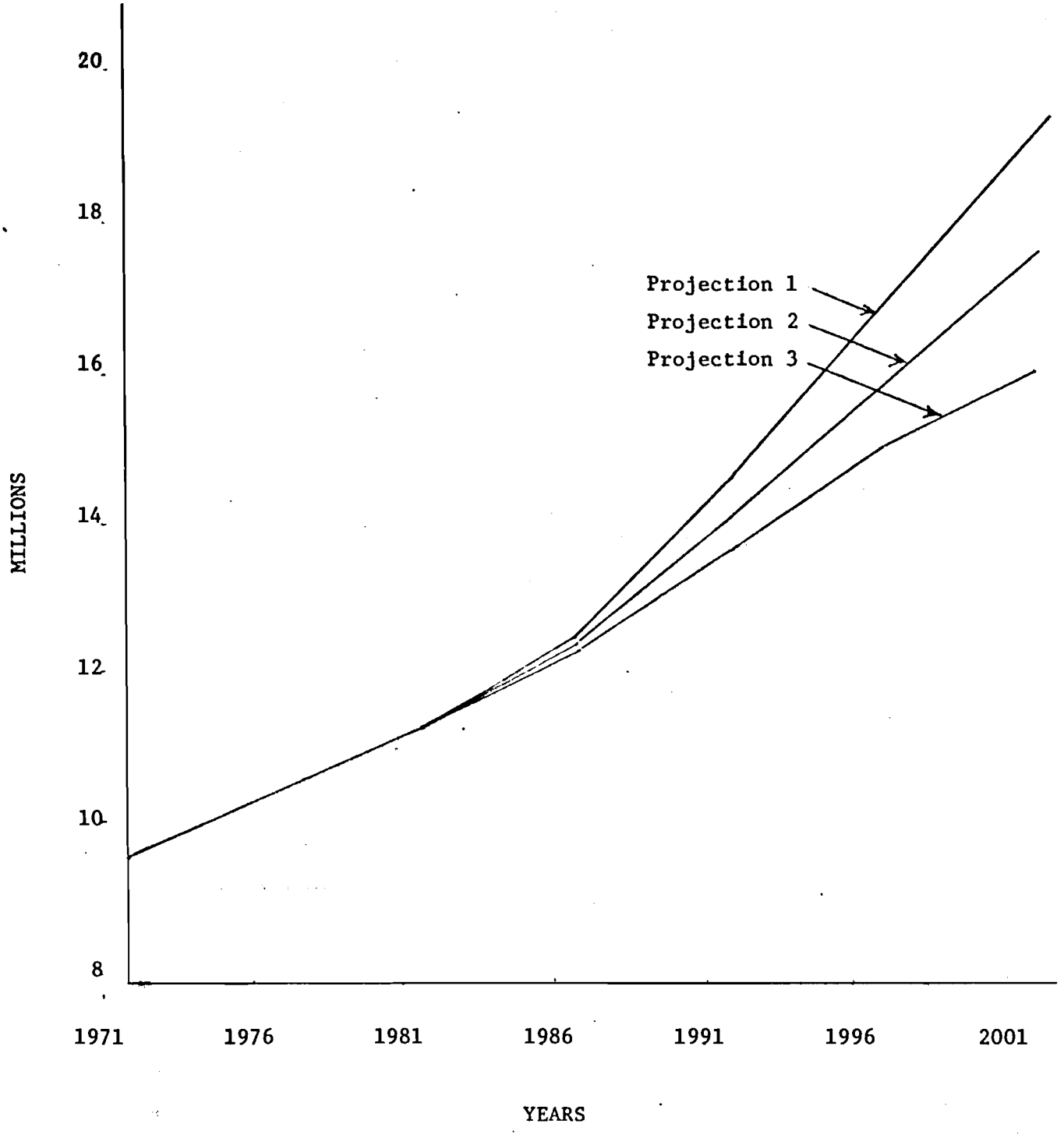
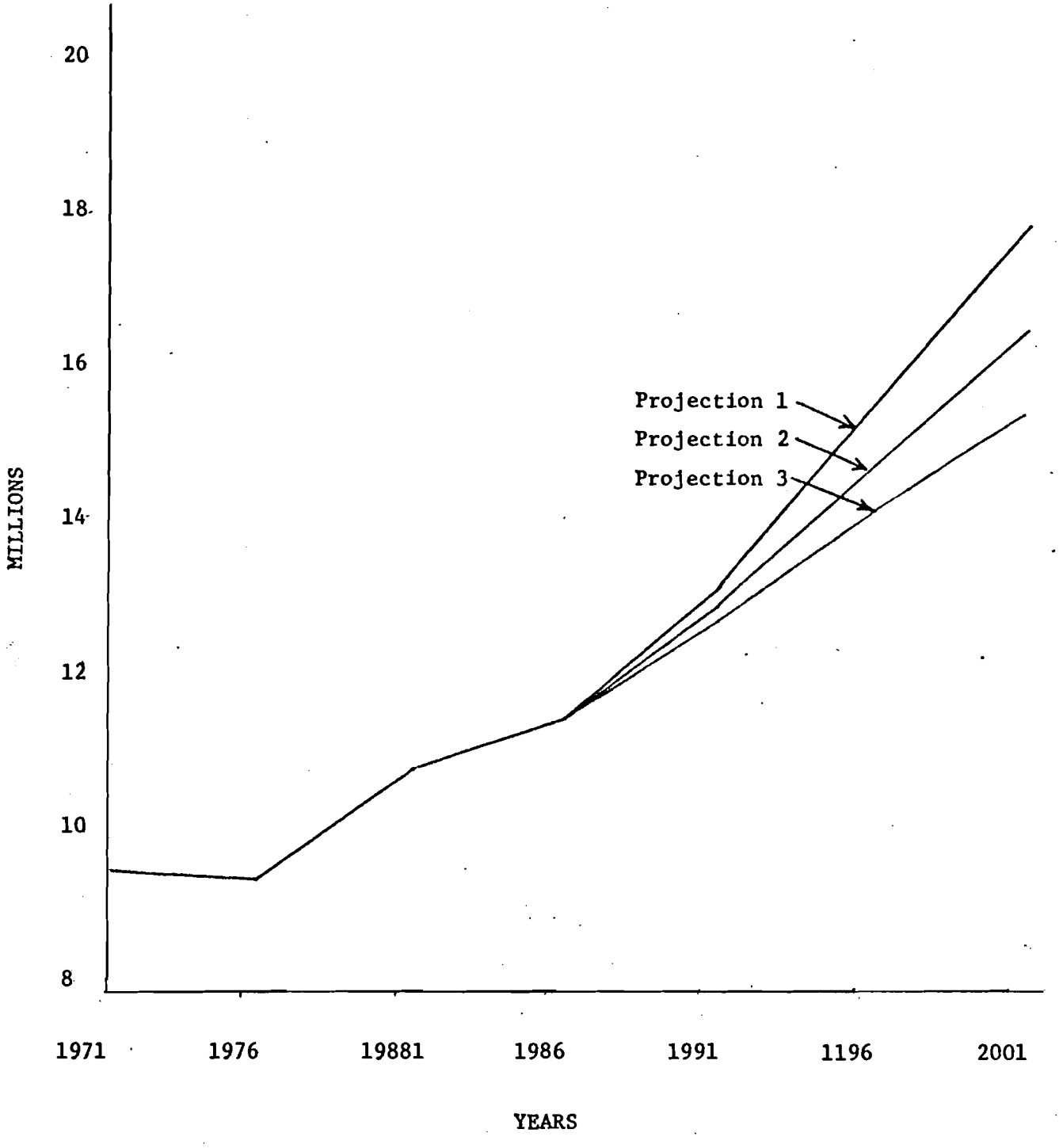


FIGURE A-4 -- SENIOR SECONDARY SCHOOL-AGE POPULATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS



The average annual rates of growth for the primary, junior secondary, and senior secondary school-age population projections are as follows:

TABLE A-6 — ANNUAL RATES OF GROWTH IN SCHOOL-AGE POPULATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Education Level | Total School-Age Population 1971-1981 | Total School-Age Population 1971-2001 | Rural School-age Population 1971-2001 | Urban School-age Population 1971-2001 |
|---|---|---|---|---|---|
| 1. Rapid Population Growth | Primary (7-12) | 2.0 | 2.6 | 2.1 | 4.2 |
| | Junior Secondary (13-15) | 1.6 | 2.4 | 1.9 | 3.9 |
| | Senior Secondary (16-18) | 1.3 | 2.2 | 1.6 | 3.7 |
| 2. Moderate Population Growth | Primary (7-12) | 1.9 | 2.1 | 1.7 | 3.7 |
| | Junior Secondary (13-15) | 1.6 | 2.1 | 1.6 | 3.6 |
| | Senior Secondary (16-18) | 1.3 | 1.9 | 1.5 | 3.4 |
| 3. Slow Population Growth | Primary (7-12) | 1.9 | 1.6 | 1.2 | 3.3 |
| | Junior Secondary (13-15) | 1.6 | 1.7 | 1.2 | 3.3 |
| | Senior Secondary (16-18) | 1.3 | 1.7 | 1.1 | 3.2 |

While the impact of the alternative fertility decline assumptions (in Projections 1, 2, and 3) under the growth of the school-age populations is not very large in the first projection decade, it becomes increasingly important in the long-term.

The school-age populations are also disaggregated by their rural-urban location (Tables A-11 & A-12). The urban school-age populations grow at a more rapid rate than the rural, due largely to the projected rural-urban migration.

Enrollment Projections: Future enrollment depends both upon demographic trends and non-demographic factors, particularly policy targets regarding the rate of expansion or spread of educational

opportunity desired. Here we have a total of nine alternative enrollment projections for each educational level including the following combinations:

Rapid Population Growth
- Slow Enrollment Expansion
- Moderate Enrollment Expansion
- Rapid Enrollment Expansion

Moderate Population Growth
- Slow Enrollment Expansion
- Moderate Enrollment Expansion
- Rapid Enrollment Expansion

Slow Population Growth
- Slow Enrollment Expansion
- Moderate Enrollment Expansion
- Rapid Enrollment Expansion

In 1971, approximately 13.5 million students were enrolled in primary level, 1.4 million in junior secondary, and .7 million in senior secondary. By the year 2001 the number of enrolled students reached the following magnitudes under the different assumptions:[11/]

TABLE A-7 — STUDENT ENROLLMENTS BY 2001 (in millions)

| | | Rapid Enrollment Expansion Policy | Moderate Enrollment Expansion Policy | Slow Enrollment Expansion Policy |
|---|---|---|---|---|
| Projection 1 | Primary | 43.9 | 43.9 | 43.9 |
| | Junior Secondary | 7.0 | 5.2 | 3.9 |
| | Senior Secondary | 2.3 | 1.7 | 1.4 |
| Projection 2 | Primary | 38.3 | 38.3 | 38.3 |
| | Junior Secondary | 6.3 | 4.7 | 3.5 |
| | Senior Secondary | 2.1 | 1.6 | 1.3 |
| Projection 3 | Primary | 33.3 | 33.3 | 33.3 |
| | Junior Secondary | 5.8 | 4.3 | 3.2 |
| | Senior Secondary | 1.9 | 1.4 | 1.2 |

The average annual rates of growth in student enrollments over the 1971-2001 projection period under the nine alternative combinations are as follows:

TABLE A-8 -- ANNUAL RATES OF GROWTH IN NUMBER OF STUDENTS ENROLLED OVER THE 1971-2001 PROJECTION PERIOD

| Projection | Education Level | Slow Enrollment Expansion Policy | Moderate Enrollment Expansion Policy | Rapid Enrollment Expansion Policy |
|---|---|---|---|---|
| 1. Rapid Population Growth | Primary | 4.1* | 5.1** | 5.8*** |
| | Junior Secondary | 3.4 | 4.5 | 5.4 |
| | Senior Secondary | 2.7 | 3.2 | 4.2 |
| 2. Moderate Population Growth | Primary | 3.6* | 4.8** | 5.7*** |
| | Junior Secondary | 3.1 | 4.1 | 5.1 |
| | Senior Secondary | 2.4 | 2.9 | 4.0 |
| 3. Slow Population Growth | Primary | 3.1* | 4.5** | 5.6*** |
| | Junior Secondary | 2.7 | 3.8 | 4.8 |
| | Senior Secondary | 2.1 | 2.6 | 3.7 |

* 1971-2000
** 1971-1988
*** 1971-1983

Despite these increases in enrollments at all education levels, the size of the non-enrolled school-age population still increases at the secondary levels, as indicated in Table A-9 below. In the case of the primary level, the non-enrolled school-age population decreases until universal enrollment is attained.[12/]

TABLE A-9 – ANNUAL RATES OF INCREASE OF NON-ENROLLED SCHOOL-AGE POPULATION[1/] OVER THE 1971-2001 PROJECTION PERIOD

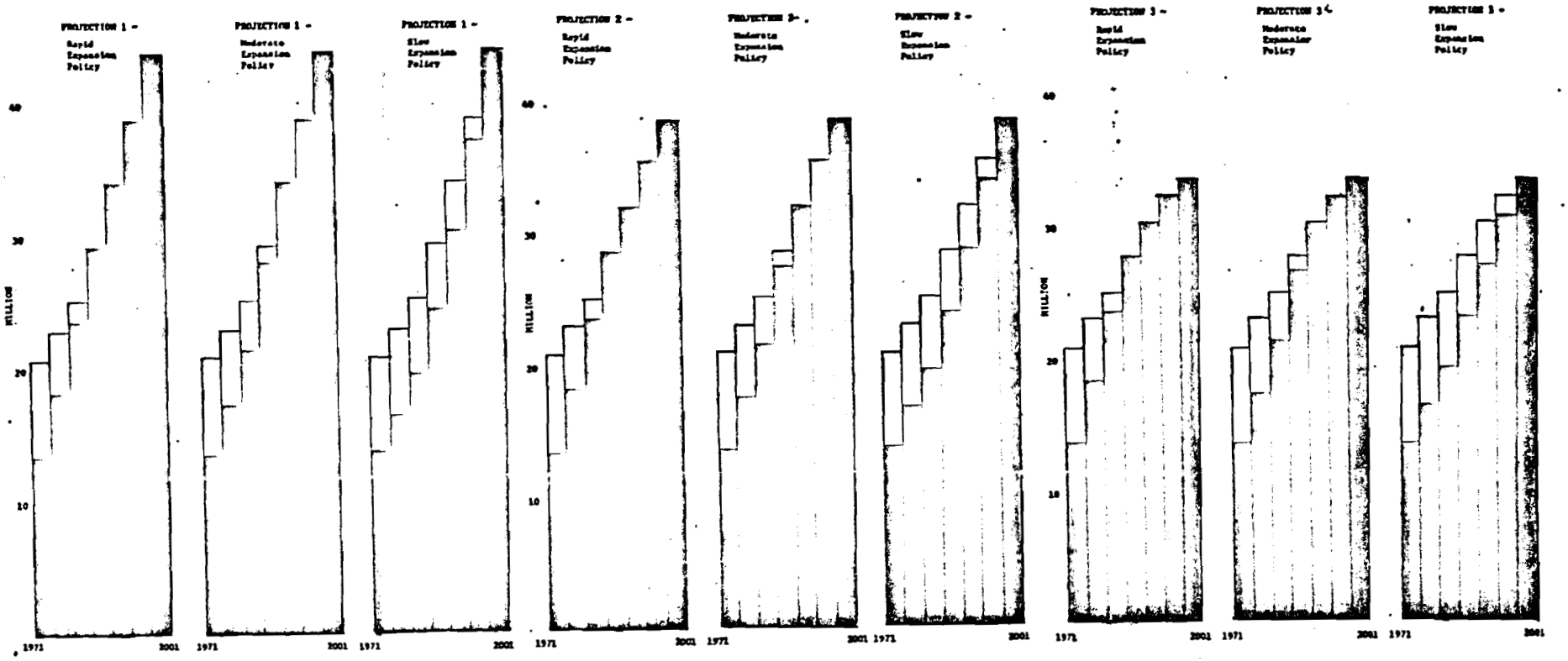
| Projection | Education Level | Slow Enrollment Expansion Policy | Moderate Enrollment Expansion Policy | Rapid Enrollment Expansion Policy |
|---|---|---|---|---|
| 1. Rapid Population Growth | Junior Secondary (13-15) | 2.2 | 1.9 | 1.4 |
| | Senior Secondary (16-18) | 2.1 | 2.0 | 1.9 |
| 2. Moderate Population Growth | Junior Secondary (13-15) | 1.9 | 1.6 | 1.1 |
| | Senior Secondary (16-18) | 1.9 | 1.8 | 1.7 |
| 3. Slow Population Growth | Junior Secondary (13-15) | 1.5 | 1.2 | .8 |
| | Senior Secondary (16-18) | 1.6 | 1.5 | 1.4 |

1/ The primary non-enrolled group is excluded because it decreases to zero as universal enrollment is achieved.

A graphic summary of the enrolled and non-enrolled school-age populations under alternative enrollment expansion policies and demographic assumptions is given in Figures A-5 - 7. The total school-age populations grow most rapidly in the rapid population Projection 1. At the primary level, by 2001 all three enrollment expansion policies have universal enrollment, but it is attained earliest in the rapid expansion policy alternative. At the secondary levels, the non-enrolled school-age population grows despite increases in those enrolled.

Figures A-8 - 12 present growth in enrollments under alternative fertility decline assumptions. The growth in enrollments are due to two factors; increases in school-age populations

FIGURE A-5 -- PRIMARY SCHOOL-AGE POPULATION, ENROLLMENT, AND NON-ENROLLMENT UNDER ALTERNATIVE ENROLLMENT EXPANSION POLICIES AND FERTILITY DECLINE ASSUMPTIONS




Non-Enrolled School-Age Population.

Enrolled School-Age Population.



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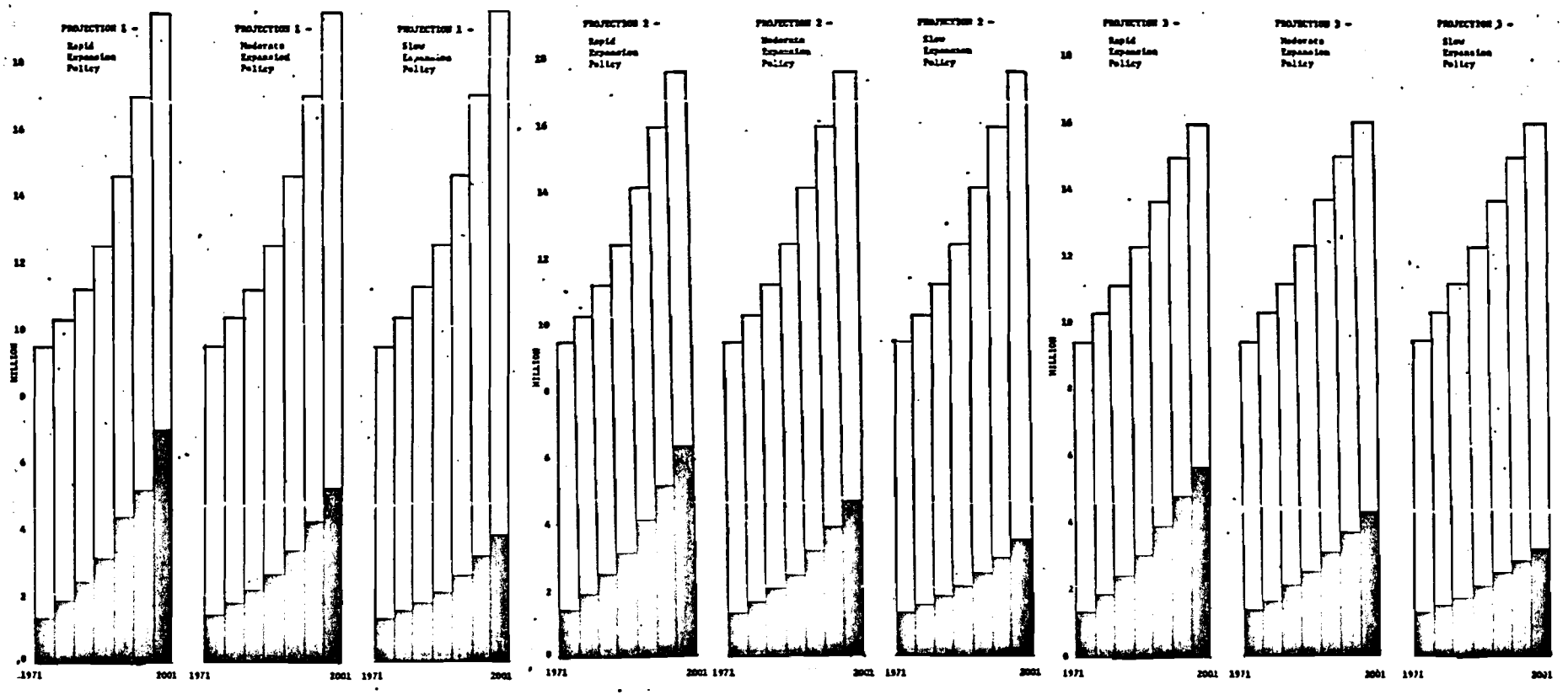
FIGURE A-6 -- JUNIOR SECONDARY SCHOOL-AGE POPULATION, ENROLLMENT, AND NON-ENROLLMENT UNDER ALTERNATIVE ENROLLMENT EXPANSION POLICIES AND FERTILITY DECLINE ASSUMPTIONS




Non-Enrolled School-Age Population.

Enrolled School-Age Population.

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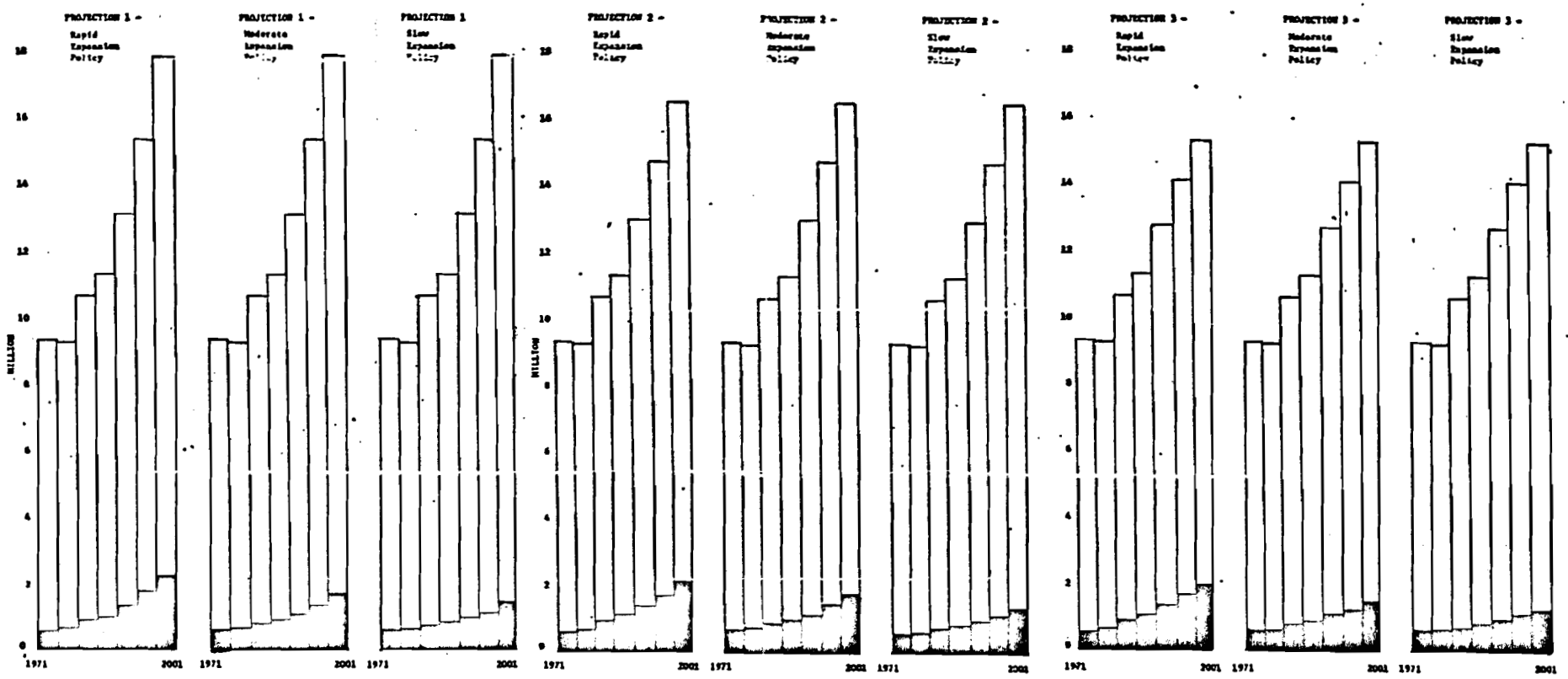
FIGURE A-7 -- SENIOR SECONDARY SCHOOL-AGE POPULATION, ENROLLMENT, AND NON-ENROLLMENT UNDER ALTERNATIVE ENROLLMENT EXPANSION POLICIIES AND FERTILITY DECLINE ASSUMPTIONS




Non-Enrolled School-Age Population.

Enrolled School-Age Population.

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and increases in enrollment ratios. To distinguish between these two factors, projections were also made holding enrollment ratios constant, thus representing the increase in enrollments due only to population growth. (The dotted lines) The percent of enrollment increases due to population growth alone in the projections are displayed in Table A-17. The remainder of the increases are due to increases in the enrollment ratio, i.e., spread of educational opportunity.

Teacher and Classroom Projections: Projections of total teacher (full-time equivalents) and classroom requirements were made based upon the enrollment projections and estimated service ratios presented earlier. (Tables A-21 - A-23). The additional number of teachers and classrooms required for every five-year interval were also calculated.[13/] (Tables A-24 - A-29). These additional requirements in teachers and classrooms provide for increases in student enrollments and for attrition. None of the additions are to improve the student/teacher or student/classroom ratios; these ratios were assumed to remain constant. Note that both demographic trends and the choice of enrollment expansion policy have important implications for the additional number of teachers that must be trained and classrooms that must be built within each five-year interval.

Education Program Cost Projections: Total recurrent costs were calculated by multiplying the number of students enrolled in each year by the recurrent unit costs for each education level. These costs consist mainly of salaries (about 90 percent). The remainder is for non-salary operating costs, such as teaching materials and maintenance. (Tables A-30 - A-32). The capital costs are construction costs required to provide school-building places for additional students (resulting from population growth and enrollment expansion policies) and attrition. The number of additional student places required were multiplied by the unit capital cost to arrive at total capital costs. (Tables A-33 - A-35).

The total education program costs under the alternative assumptions regarding population growth and enrollment expansion policy are summarized in Table A-36. Separate projections were also made assuming enrollment ratios remain constant, in order to analyze the additional costs of policies to spread educational opportunity. (Tables A-36 - 37).

## FOOTNOTES FOR APPENDIX A

## PRELIMINARY PROJECTIONS OF EDUCATION SECTOR REQUIREMENTS

1/ The LRPM2 submodels DEMWA2 and EDUC2 were used for these projections.

2/ In later reports, the projections for junior and senior secondary levels may be further disaggregated by type, i.e., general, economic, technical, home economics, or teacher training. Presently there is some uncertainty regarding reform plans for integration of these types. Also, projections for higher education may be considered.

3/ Those schools represented in the survey Statistik Persekolahan Seluruh Indonesia Tahun 1971, BPP Ministry of Education and Culture, Jakarta 1973.

4/ Though these are the 'official' ages, there is significant enrollment of over-age students. For example, about 14 percent of all primary students are over 12 years old, 39 percent of all junior secondary students are over 15 years old, and 34 percent of all senior secondary students are over 18 years old.

5/ Enrollment figures are from Statistik Persekolahan Seluruh Indonesia Tahun 1971, BPP, Ministry of Education and Culture, Jakarta 1973.

6/ Policy statement, page 2. This is different from the historical trend in which primary level increased least rapidly.

7/ For example, at primary level, grade six has a class size approximately half the size of grade one.

8/ The Education Statistics Survey reveals that a quarter of all teachers have less than four years experience. This turnover may be due to low salaries.

9/ Estimates of unit recurrent and capital costs are from the National Assessment of Education Project.

10/ In constant 1971 prices. The cost increases reflect quality improvement rather than inflation.

11/ Note that by 2001 primary enrollment is universal under all expansion policies; primary enrollment is equivalent to the primary school-age population regardless of which expansion policy is followed.

12/ By 2001 in the slow enrollment expansion policy option, by 1988 in the moderate option, and by 1983 in the rapid option.

13/ For annual additions required see computer printouts.

FIGURE A-8 -- PRIMARY ENROLLMENTS UNDER POLICY OF RAPID EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

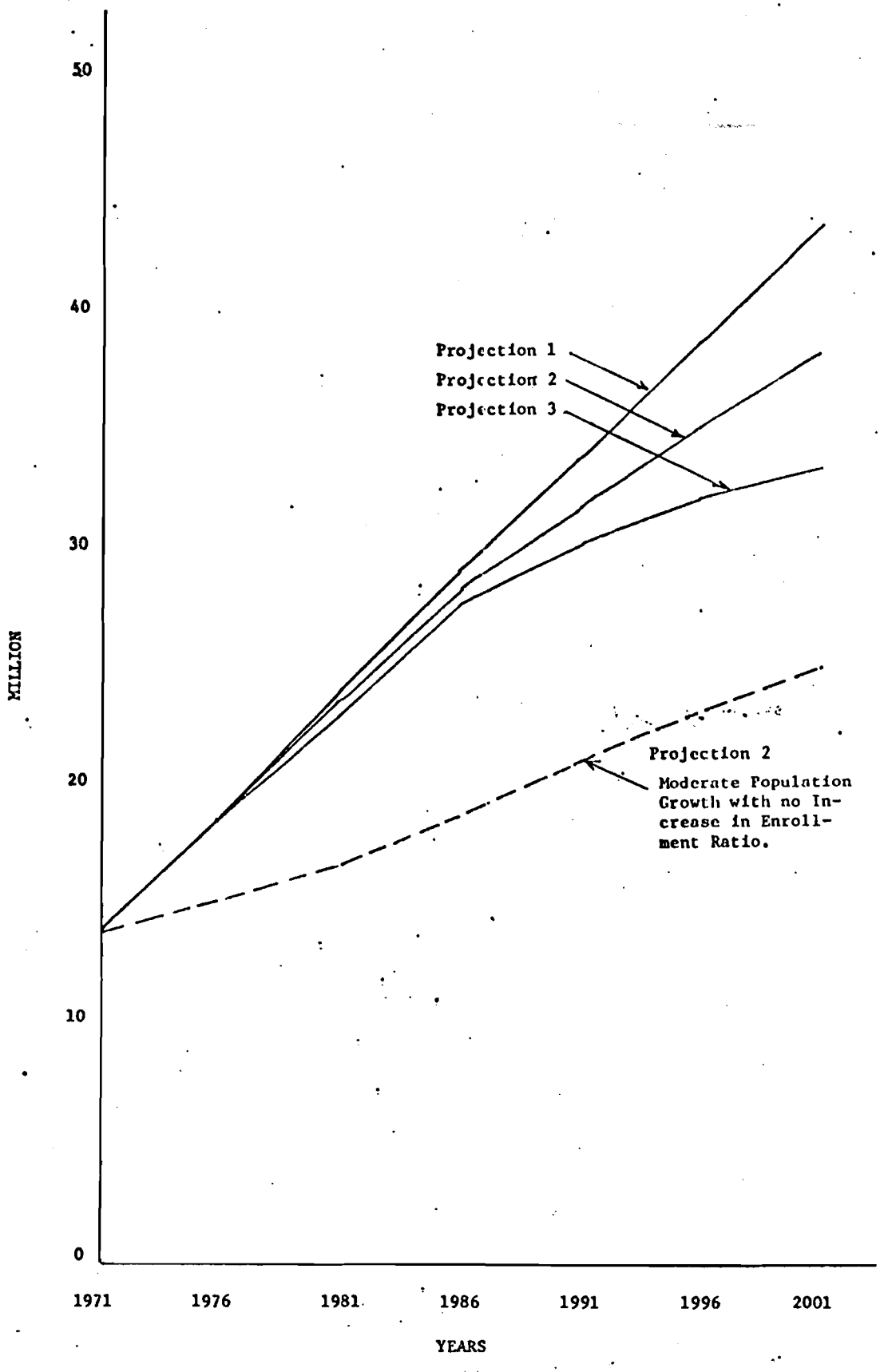

FIGURE A-9 -- PRIMARY ENROLLMENTS UNDER POLICY OF MODERATE EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

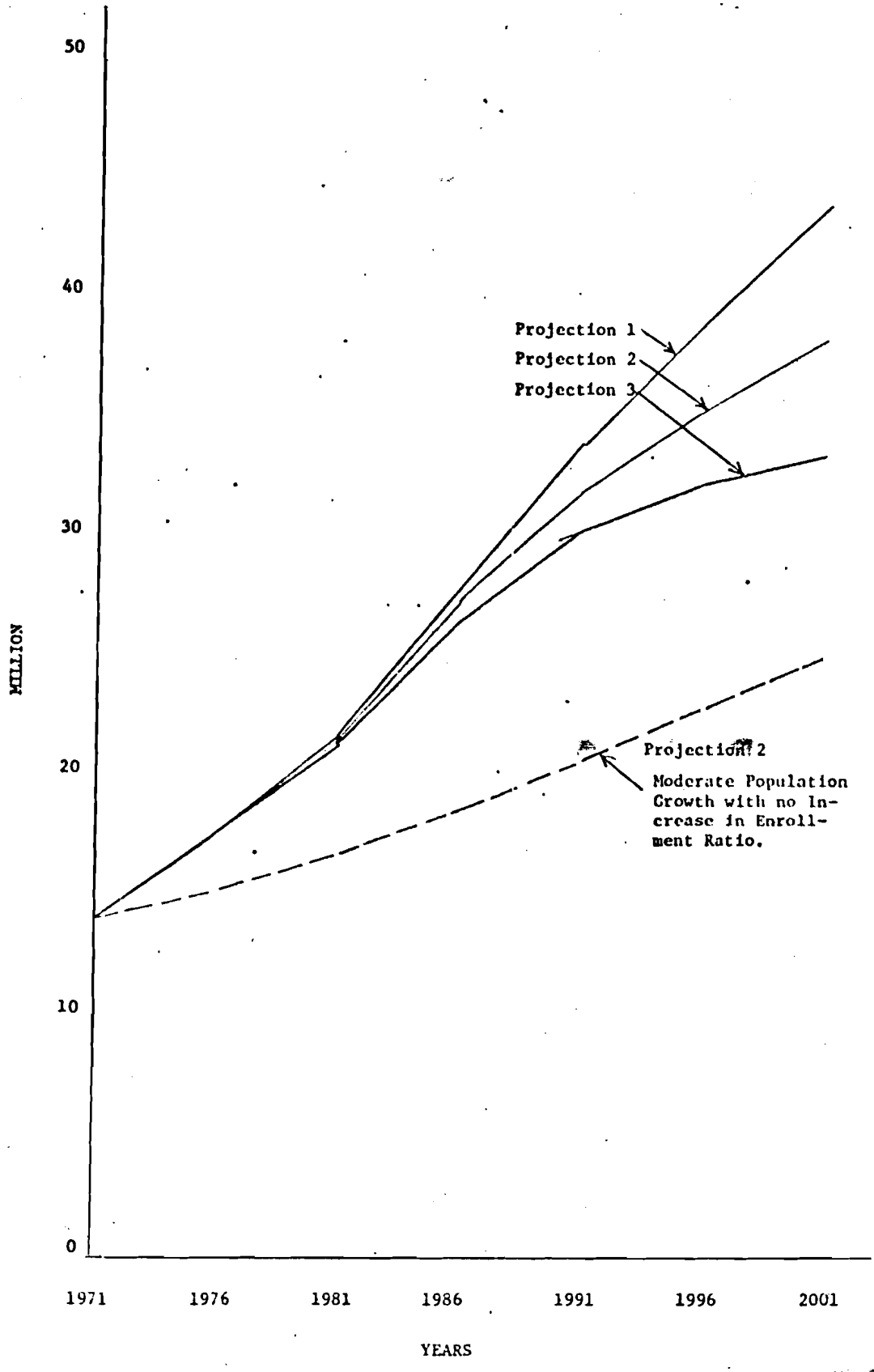

FIGURE A-10 -- PRIMARY ENROLLMENT UNDER POLICY OF SLOW EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

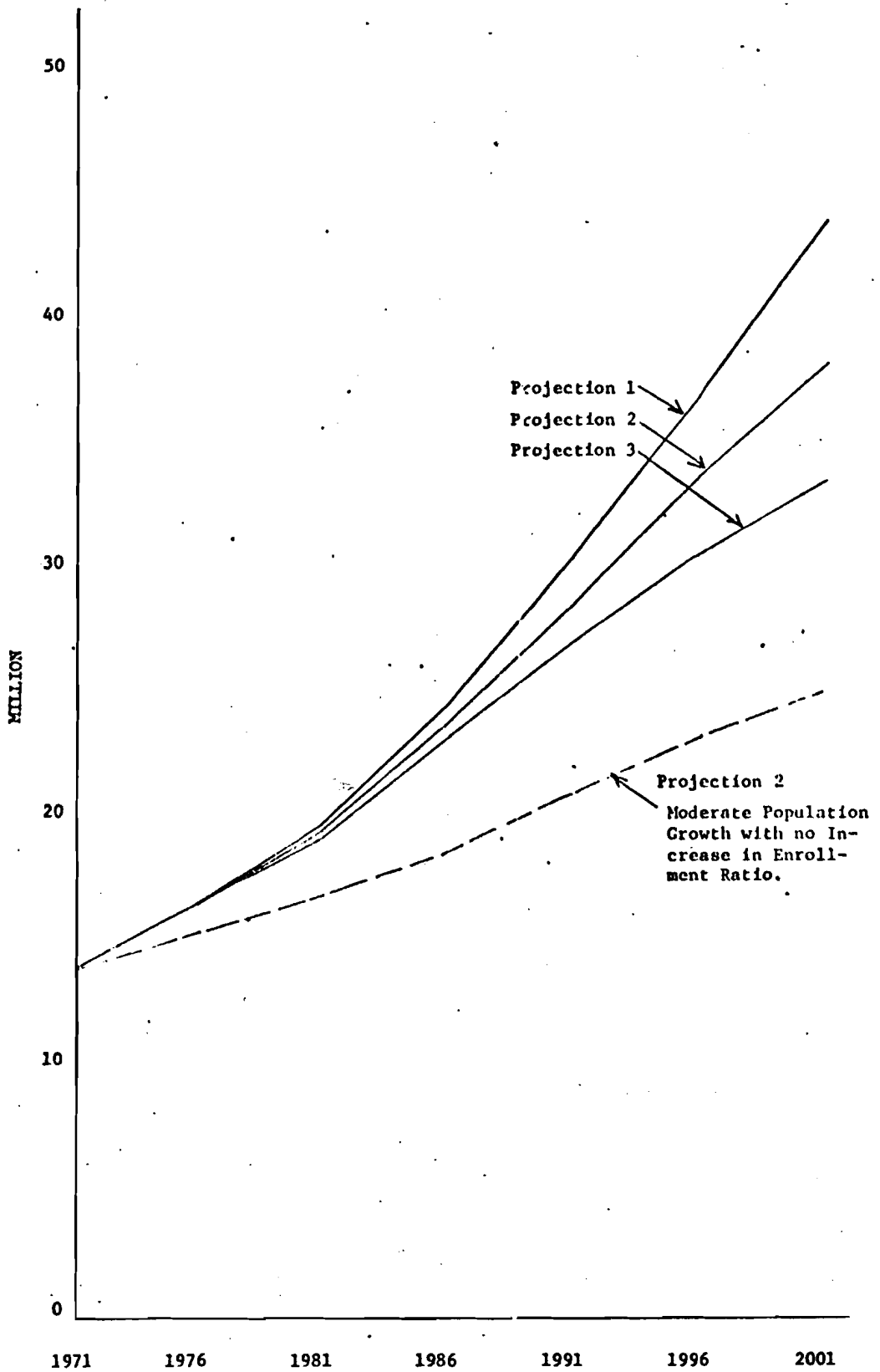

FIGURE A-11 -- JUNIOR SECONDARY ENROLLMENT UNDER POLICY OF RAPID EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

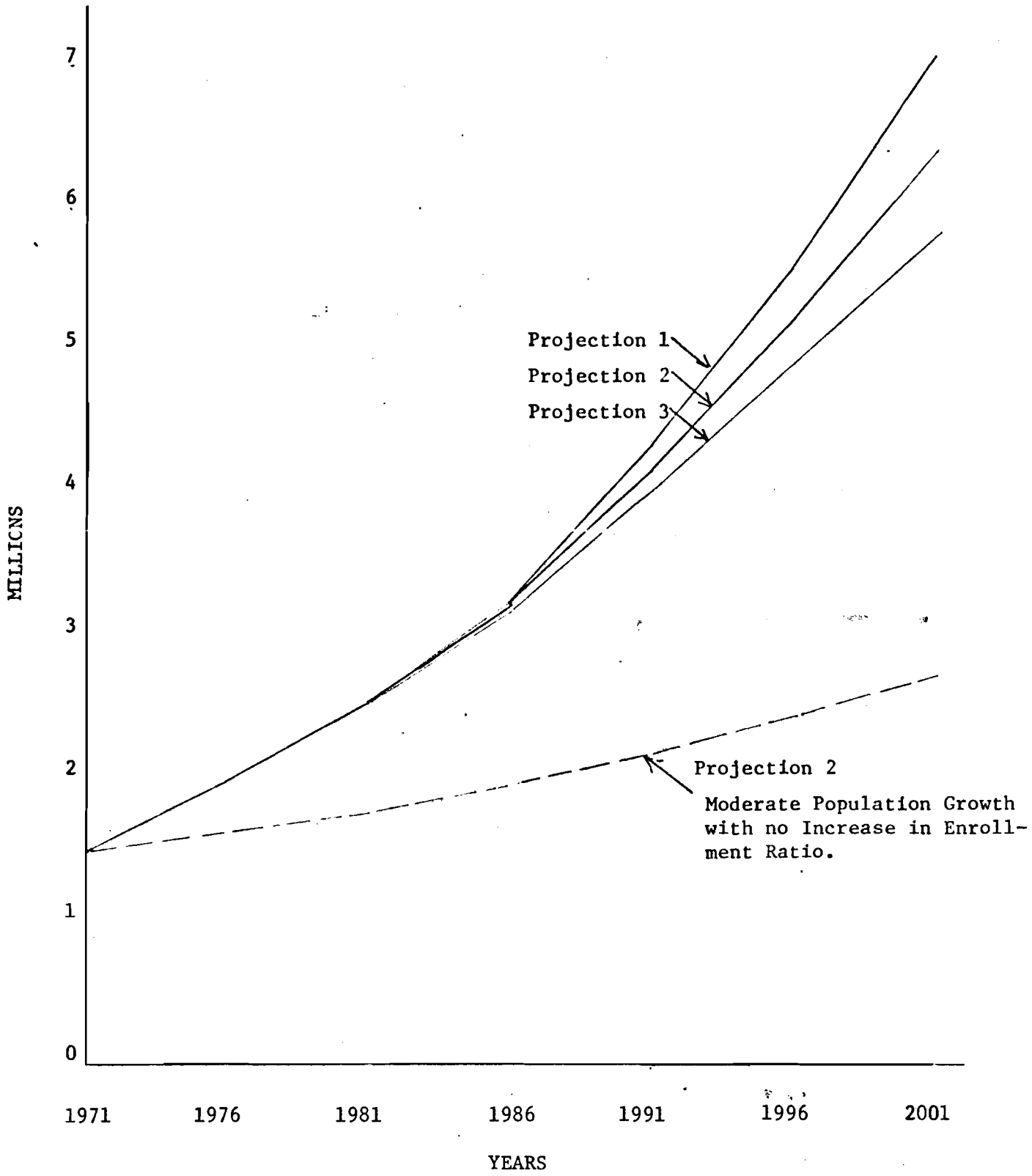

FIGURE A-12 -- JUNIOR SECONDARY ENROLLMENT UNDER POLICY OF MODERATE EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

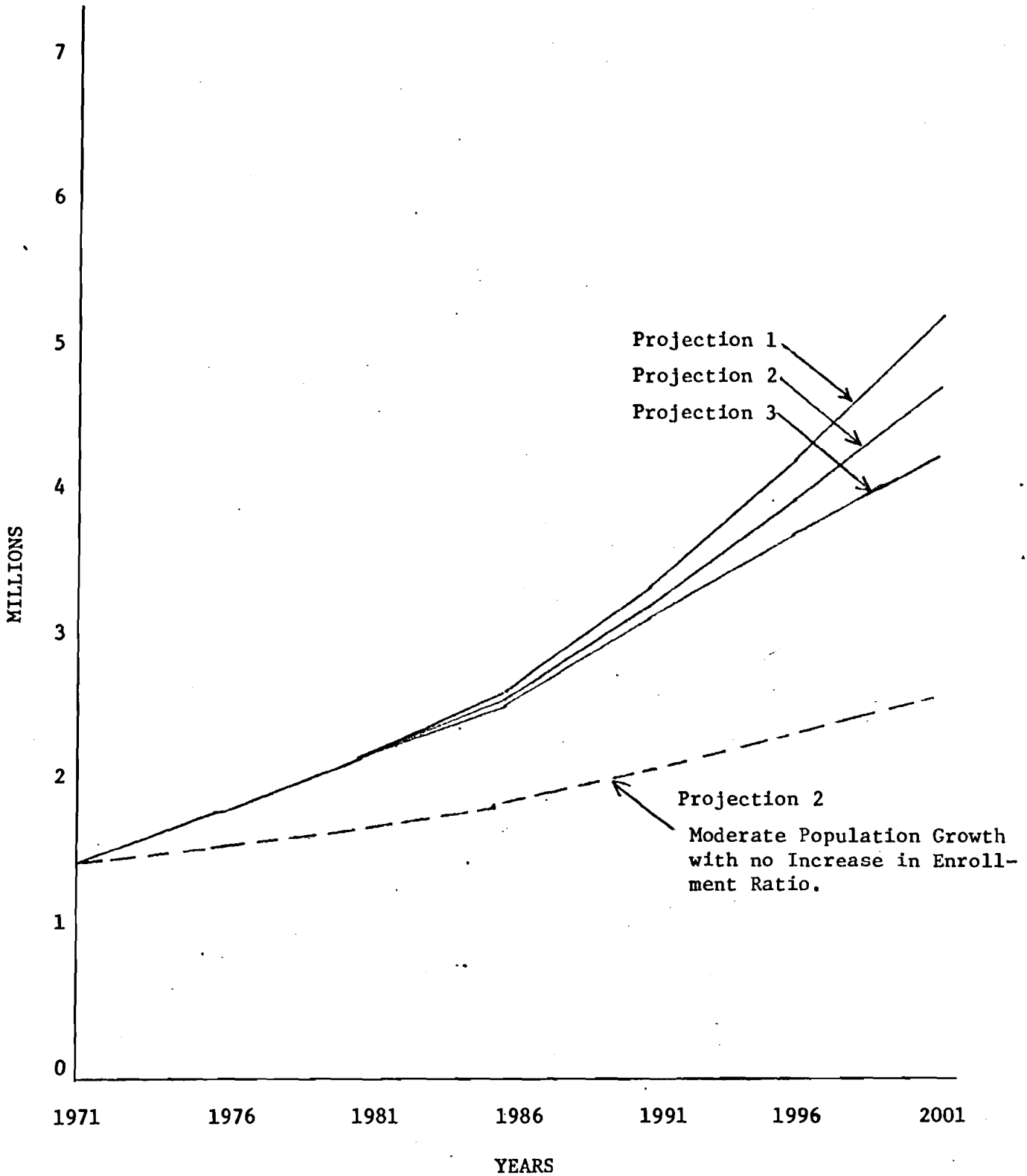

FIGURE A-13 -- JUNIOR SECONDARY ENROLLMENTS UNDER POLICY OF SLOW EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

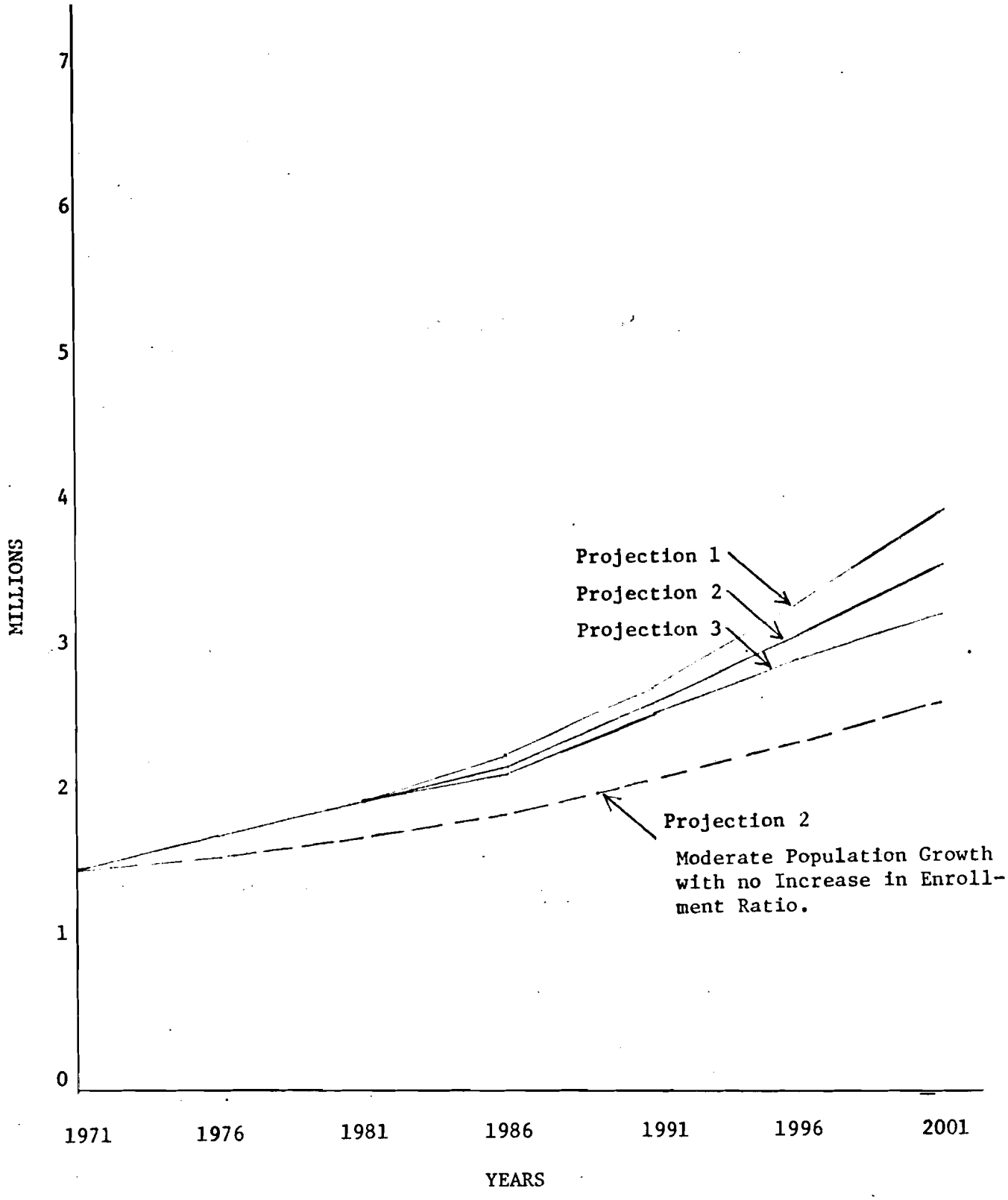

FIGURE A-14 -- SENIOR SECONDARY ENTOLLMENTS UNDER POLICY OF RAPID EXPANSION OF EDUCATIONAL OPPORTUITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

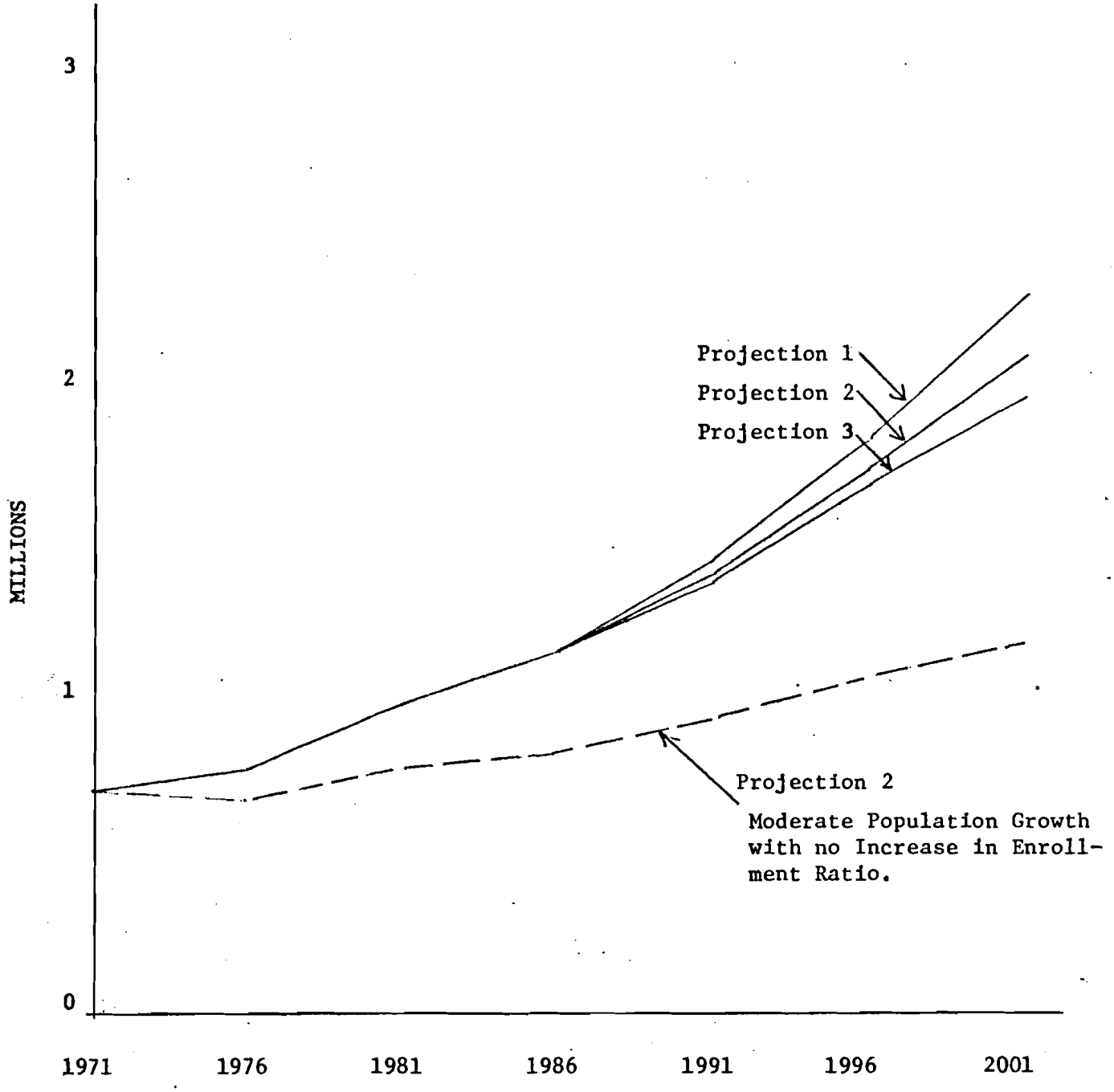

FIGURE A-15 -- SENIOR SECONDARY ENROLLMENTS UNDER POLICY OF MODERATE EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

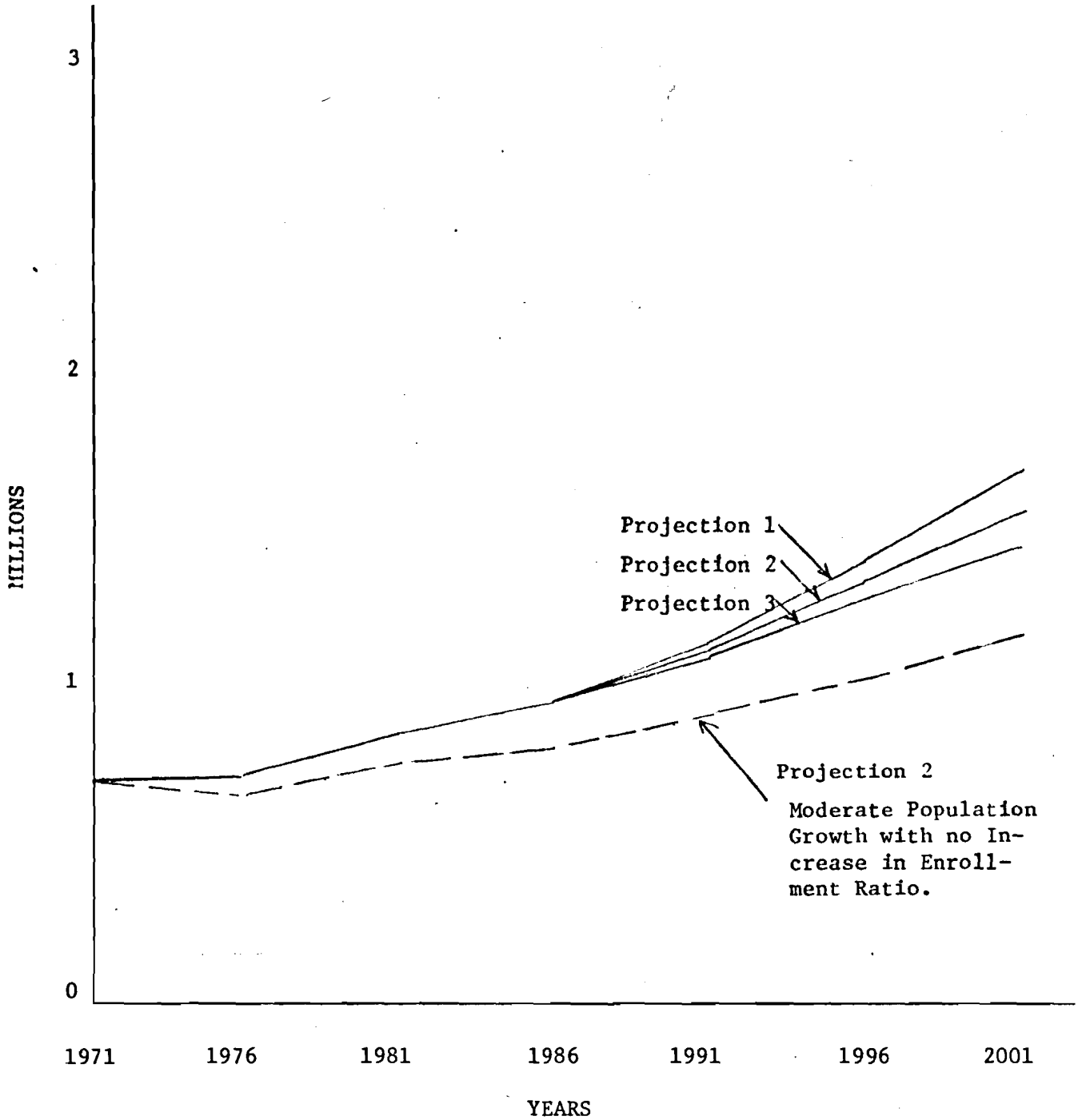

FIGURE A-16-- SENIOR SECONDARY ENROLLMENTS UNDER POLICY OF SLOW EXPANSION OF EDUCATIONAL OPPORTUNITY WITH ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

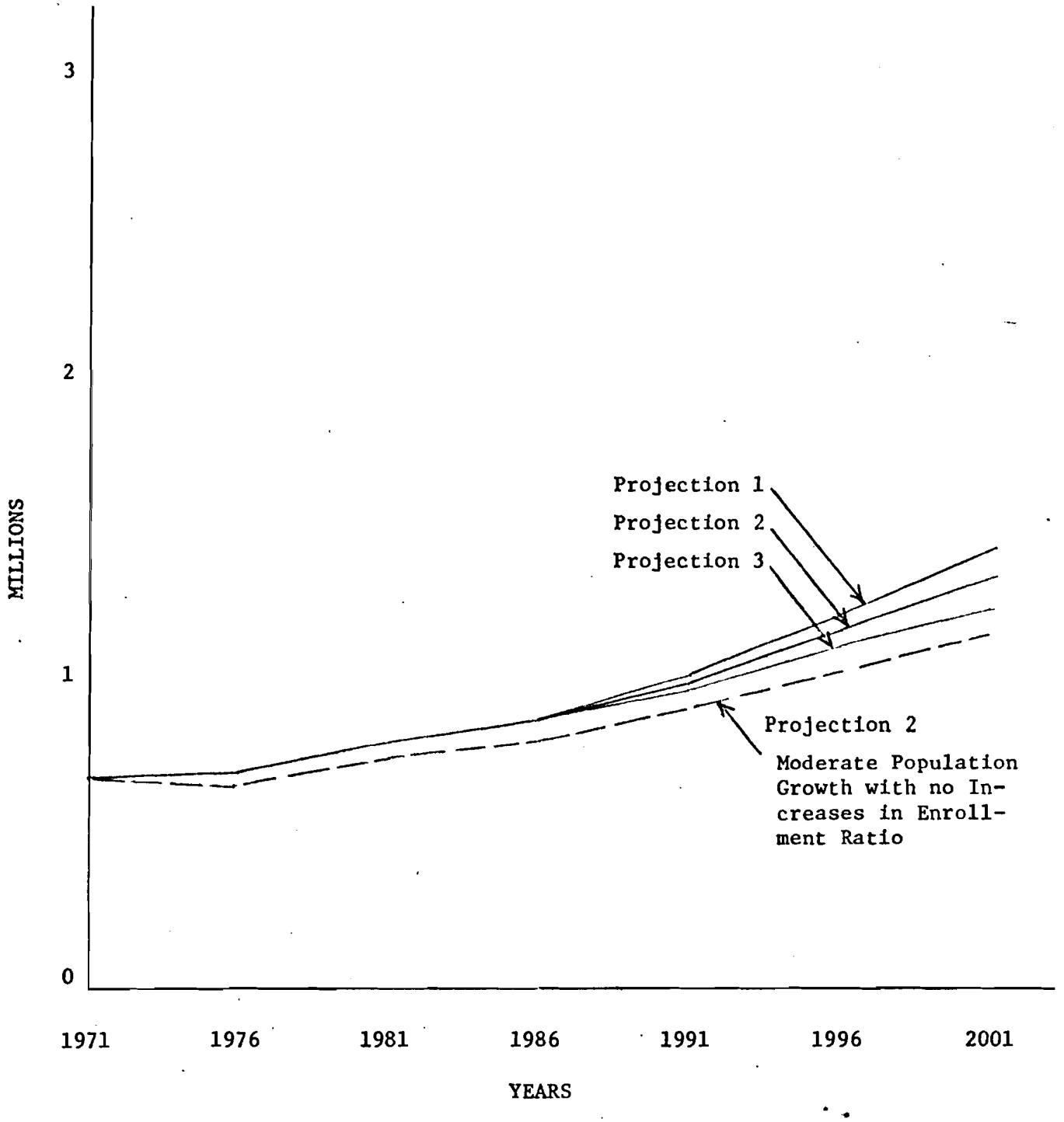

TABLE A-10 -- TOTAL SCHOOL-AGE POPULATION BY LEVEL UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Primary (SD) 7 to 12 | | Junior Secondary (SLTP) 13 to 15 | | Senior Secondary (SLTA) 16 to 18 | | Total 7 to 18 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Ratio to Total Population | Number | Ratio to Total Population | Number | Ratio to Total Population | Number | Ratio to Total Population |
| PROJECTION 1 -- | | | | | | | | | |
| Rapid Population Growth | 1971 | 20,625 | .163 | 9,540 | .075 | 9,382 | .074 | 39,547 | .312 |
| | 1976 | 22,812 | .160 | 10,323 | .072 | 9,223 | .065 | 42,358 | .297 |
| | 1981 | 25,052 | .154 | 11,201 | .069 | 10,685 | .066 | 46,938 | .289 |
| | 1986 | 29,179 | .157 | 12,502 | .067 | 11,314 | .061 | 52,996 | .286 |
| | 1991 | 33,907 | .160 | 14,616 | .069 | 13,116 | .062 | 61,640 | .290 |
| | 1996 | 38,823 | .160 | 17,016 | .070 | 15,394 | .063 | 71,233 | .293 |
| | 2001 | 43,922 | .157 | 19,499 | .070 | 17,867 | .064 | 81,288 | .291 |
| PROJECTION 2 -- | | | | | | | | | |
| Moderate Population Growth | 1971 | 20,625 | .163 | 9,540 | .075 | 9,382 | .074 | 39,547 | .312 |
| | 1976 | 22,829 | .160 | 10,320 | .072 | 9,223 | .065 | 42,372 | .298 |
| | 1981 | 24,917 | .155 | 11,216 | .070 | 10,681 | .066 | 46,815 | .291 |
| | 1986 | 28,351 | .156 | 12,429 | .068 | 11,320 | .062 | 52,100 | .287 |
| | 1991 | 31,875 | .156 | 14,160 | .069 | 12,942 | .063 | 58,978 | .288 |
| | 1996 | 35,241 | .153 | 15,949 | .069 | 14,717 | .064 | 65,907 | .287 |
| | 2001 | 38,282 | .149 | 17,643 | .069 | 16,519 | .064 | 72,444 | .282 |
| PROJECTION 3 -- | | | | | | | | | |
| Slow Population Growth | 1971 | 20,625 | .163 | 9,540 | .075 | 9,382 | .074 | 39,547 | .312 |
| | 1976 | 22,845 | .161 | 10,318 | .073 | 9,223 | .065 | 42,385 | .298 |
| | 1981 | 24,793 | .156 | 11,231 | .071 | 10,678 | .067 | 46,702 | .293 |
| | 1986 | 27,620 | .155 | 12,360 | .069 | 11,326 | .064 | 51,306 | .288 |
| | 1991 | 30,108 | .152 | 13,759 | .070 | 12,783 | .065 | 56,650 | .286 |
| | 1996 | 32,117 | .147 | 15,024 | .069 | 14,125 | .065 | 61,265 | .281 |
| | 2001 | 33,335 | .140 | 16,024 | .067 | 15,349 | .064 | 64,708 | .272 |

TABLE A-11— URBAN SCHOOL-AGE POPULATION BY LEVEL UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Urban Primary 7 to 12 | | Urban Junior Secondary 13 to 15 | | Urban Senior Secondary 16 to 18 | | Urban Total 7 to 18 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Ratio to Urban Population | Number | Ratio to Urban Population | Number | Ratio to Urban Population | Number | Ratio to Urban Population |
| PROJECTION 1 — | | | | | | | | | |
| Rapid Population Growth | 1971 | 3,353 | .151 | 1,842 | .083 | 1,977 | .089 | 7,173 | .324 |
| | 1976 | 4,023 | .148 | 2,128 | .079 | 2,087 | .077 | 8,239 | .304 |
| | 1981 | 4,786 | .143 | 2,515 | .075 | 2,613 | .078 | 9,914 | .297 |
| | 1986 | 6,056 | .147 | 3,030 | .073 | 2,987 | .072 | 12,072 | .293 |
| | 1991 | 7,637 | .150 | 3,828 | .075 | 3,737 | .073 | 15,201 | .298 |
| | 1996 | 9,440 | .150 | 4,791 | .076 | 4,706 | .075 | 18,937 | .300 |
| | 2001 | 11,507 | .148 | 5,894 | .076 | 5,847 | .075 | 23,248 | .299 |
| PROJECTION 2 — | | | | | | | | | |
| Moderate Population Growth | 1971 | 3,353 | .151 | 1,842 | .083 | 1,977 | .089 | 7,173 | .324 |
| | 1976 | 4,025 | .149 | 2,128 | .079 | 2,087 | .077 | 8,240 | .305 |
| | 1981 | 4,760 | .144 | 2,516 | .076 | 2,611 | .079 | 9,887 | .299 |
| | 1986 | 5,880 | .146 | 3,006 | .074 | 2,985 | .074 | 11,871 | .294 |
| | 1991 | 7,170 | .146 | 3,701 | .075 | 3,680 | .075 | 14,551 | .296 |
| | 1996 | 8,560 | .144 | 4,482 | .075 | 4,490 | .075 | 17,532 | .294 |
| | 2001 | 10,025 | .140 | 5,324 | .074 | 5,397 | .075 | 20,746 | .289 |
| PROJECTION 3 — | | | | | | | | | |
| Slow Population Growth | 1971 | 3,353 | .151 | 1,842 | .083 | 1,977 | .089 | 7,173 | .324 |
| | 1976 | 4,028 | .149 | 2,127 | .079 | 2,087 | .077 | 8,242 | .306 |
| | 1981 | 4,736 | .145 | 2,517 | .077 | 2,609 | .080 | 9,861 | .301 |
| | 1986 | 5,725 | .144 | 2,985 | .075 | 2,983 | .075 | 11,692 | .295 |
| | 1991 | 6,765 | .142 | 3,589 | .075 | 3,269 | .076 | 13,983 | .294 |
| | 1996 | 7,793 | .138 | 4,214 | .075 | 4,301 | .076 | 16,309 | .289 |
| | 2001 | 8,726 | .132 | 4,828 | .073 | 5,007 | .075 | 18,561 | .280 |

TABLE A-12-- RURAL SCHOOL-AGE POPULATION BY LEVEL UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Rural Primary 7 to 12 | | Rural Junior Secondary 13 to 15 | | Rural Senior Secondary 16 to 18 | | Rural Total 7 to 18 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Ratio to Rural Population | Number | Ratio to Rural Population | Number | Ratio to Rural Population | Number | Ratio to Rural Population |
| PROJECTION 1 -- | | | | | | | | | |
| Rapid Population Growth | 1971 | 17,272 | .165 | 7,698 | .074 | 7,405 | .071 | 32,374 | .310 |
| | 1976 | 18,789 | .163 | 8,195 | .071 | 7,136 | .062 | 34,119 | .295 |
| | 1981 | 20,265 | .157 | 8,686 | .067 | 8,072 | .063 | 37,023 | .287 |
| | 1986 | 23,124 | .160 | 9,473 | .066 | 8,327 | .058 | 40,923 | .284 |
| | 1991 | 26,270 | .163 | 10,789 | .067 | 9,379 | .058 | 46,438 | .288 |
| | 1996 | 29,384 | .163 | 12,224 | .068 | 10,689 | .059 | 52,297 | .290 |
| | 2001 | 32,415 | .161 | 13,605 | .068 | 12,020 | .060 | 58,041 | .288 |
| PROJECTION 2 -- | | | | | | | | | |
| Moderate Population Growth | 1971 | 17,272 | .165 | 7,698 | .074 | 7,405 | .071 | 32,374 | .310 |
| | 1976 | 18,803 | .163 | 8,193 | .071 | 7,136 | .062 | 34,132 | .296 |
| | 1981 | 20,157 | .158 | 8,701 | .062 | 8,070 | .063 | 36,928 | .289 |
| | 1986 | 22,471 | .159 | 9,423 | .067 | 8,335 | .059 | 40,229 | .285 |
| | 1991 | 24,705 | .159 | 10,459 | .067 | 9,262 | .060 | 44,426 | .286 |
| | 1996 | 26,681 | .157 | 11,467 | .067 | 10,227 | .060 | 48,375 | .284 |
| | 2001 | 28,257 | .152 | 12,319 | .066 | 11,122 | .060 | 51,698 | .279 |
| PROJECTION 3 -- | | | | | | | | | |
| Slow Population Growth | 1971 | 17,272 | .165 | 7,698 | .074 | 7,405 | .071 | 32,374 | .310 |
| | 1976 | 18,817 | .164 | 8,191 | .071 | 7,136 | .062 | 34,144 | .297 |
| | 1981 | 20,057 | .159 | 8,714 | .069 | 8,069 | .064 | 36,840 | .291 |
| | 1986 | 21,895 | .158 | 9,375 | .068 | 8,343 | .060 | 39,613 | .286 |
| | 1991 | 23,343 | .155 | 10,169 | .068 | 9,155 | .061 | 42,667 | .284 |
| | 1996 | 24,323 | .151 | 10,810 | .067 | 9,823 | .061 | 44,956 | .278 |
| | 2001 | 24,609 | .143 | 11,197 | .065 | 10,342 | .060 | 46,148 | .269 |

TABLE A-13 -- SCHOOL-AGE POPULATION BY SEX UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| | | MALE | | | FEMALE | | |
|---|---|---|---|---|---|---|---|
| | | Primary | Junior Secondary | Senior Secondary | Primary | Junior Secondary | Senior Secondary |
| Projection | Year | 7-12 | 13-15 | 16-18 | 7-12 | 13-15 | 16-18 |
| 1. Rapid Population Growth | 1971 | 10,314 | 4,769 | 4,682 | 10,310 | 4,771 | 4,700 |
| | 1976 | 11,415 | 5,168 | 4,609 | 11,397 | 5,155 | 4,614 |
| | 1981 | 12,594 | 5,604 | 5,349 | 12,458 | 5,597 | 5,336 |
| | 1986 | 14,844 | 6,296 | 5,661 | 14,435 | 6,207 | 5,652 |
| | 1991 | 17,142 | 7,386 | 6,623 | 16,766 | 7,230 | 6,493 |
| | 1996 | 19,648 | 8,604 | 7,777 | 19,175 | 8,412 | 7,617 |
| | 2001 | 22,251 | 9,868 | 9,035 | 21,671 | 9,631 | 8,831 |
| 2. Moderate Population Growth | 1971 | 10,314 | 4,769 | 4,682 | 10,310 | 4,771 | 4,700 |
| | 1976 | 11,424 | 5,166 | 4,609 | 11,405 | 5,154 | 4,614 |
| | 1981 | 12,526 | 5,612 | 5,347 | 12,391 | 5,604 | 4,334 |
| | 1986 | 14,326 | 6,259 | 5,664 | 14,025 | 6,170 | 5,655 |
| | 1991 | 14,114 | 7,156 | 6,536 | 15,761 | 7,004 | 6,406 |
| | 1996 | 17,835 | 8,065 | 7,434 | 17,406 | 7,885 | 7,282 |
| | 2001 | 19,393 | 8,929 | 8,354 | 18,888 | 8,714 | 8,165 |
| 3. Slow Population Growth | 1971 | 10,314 | 4,769 | 4,682 | 10,310 | 4,771 | 4,700 |
| | 1976 | 11,432 | 5,165 | 4,609 | 11,413 | 5,152 | 4,614 |
| | 1981 | 12,463 | 5,619 | 5,345 | 12,329 | 5,611 | 5,333 |
| | 1986 | 13,957 | 6,224 | 5,667 | 13,663 | 6,136 | 5,658 |
| | 1991 | 15,221 | 6,953 | 6,455 | 14,887 | 6,805 | 6,328 |
| | 1996 | 16,254 | 7,597 | 7,135 | 15,862 | 7,427 | 6,989 |
| | 2001 | 16,887 | 8,110 | 7,762 | 16,447 | 7,914 | 7,587 |

TABLE A-14 -- STUDENTS ENROLLED IN MINISTRY OF EDUCATION SCHOOLS ASSUMING RAPID EXPANSION OF EDUCATIONAL OPPORTUNITY (in thousands)

| Projection | Year | Primary Enrollment Increases at 3.5% Per Annum | | Junior Secondary Enrollment Increases at 3.0% Per Annum | | Senior Secondary Enrollment Increases at 2.0% Per Annum | |
|---|---|---|---|---|---|---|---|
| | | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio |
| PROJECTION 1 Rapid Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 18,194 | .798 | 1,891 | .183 | 733 | .079 |
| | 1981 | 23,603 | .942 | 2,446 | .218 | 951. | .089 |
| | 1986 | 29,180 | 1.000 | 3,169 | .253 | 1,114 | .098 |
| | 1991 | 33,908 | 1.000 | 4,219 | .289 | 1,417 | .108 |
| | 1996 | 38,823 | 1.000 | 5,510 | .324 | 1,809 | .117 |
| | 2001 | 43,922 | 1.000 | 7,000 | .359 | 2,269 | .127 |
| PROJECTION 2 Moderate Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 18,208 | .798 | 1,890 | .183 | 733 | .079 |
| | 1981 | 23,476 | .942 | 2,449 | .218 | 951 | .089 |
| | 1986 | 28,351 | 1.000 | 3,151 | .253 | 1,115 | .098 |
| | 1991 | 31,875 | 1.000 | 4,088 | .289 | 1,398 | .108 |
| | 1996 | 35,241 | 1.000 | 5,165 | .324 | 1,729 | .117 |
| | 2001 | 38,282 | 1.000 | 6,334 | .359 | 2,098 | .127 |
| PROJECTION 3 Slow Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 18,221 | .789 | 1,890 | .183 | 733 | .079 |
| | 1981 | 23,359 | .942 | 2,452 | .218 | 950 | .089 |
| | 1986 | 27,620 | 1.000 | 3,133 | .253 | 1,116 | .098 |
| | 1991 | 30,108 | 1.000 | 3,972 | .289 | 1,660 | .108 |
| | 1996 | 32,117 | 1.000 | 4,865 | .324 | 1,660 | .117 |
| | 2001 | 33,335 | 1.000 | 5,753 | .359 | 1,949 | .127 |

TABLE A-15 -- STUDENTS ENROLLED IN MINISTRY OF EDUCATION SCHOOLS ASSUMING MODERATE EXPANSION OF EDUCATIONAL OPPORTUNITY (in thousands)

| Projection | Year | Primary Enrollment Increases at 2.5% Per Annum | | Junior Secondary Enrollment Increases at 2.0% Per Annum | | Senior Secondary Enrollmen Increases at 1.0% Per Annu | |
|---|---|---|---|---|---|---|---|
| | | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio |
| PROJECTION 1 Rapid Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 17,224 | .755 | 1,734 | .168 | 683 | .074 |
| | 1981 | 21,472 | .857 | 2,106 | .188 | 833 | .078 |
| | 1986 | 27,988 | .959 | 2,601 | .208 | 928 | .082 |
| | 1991 | 33,908 | 1.000 | 3,333 | .228 | 1,128 | .086 |
| | 1996 | 38,823 | 1.000 | 4,220 | .248 | 1,386 | .090 |
| | 2001 | 43,922 | 1.000 | 5,226 | .268 | 1,680 | .094 |
| PROJECTION 2 Moderate Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 17,237 | .755 | 1,734 | .168 | 683 | .074 |
| | 1981 | 21,357 | .857 | 2,109 | .188 | 833 | .078 |
| | 1986 | 27,194 | .959 | 2,585 | .208 | 928 | .082 |
| | 1991 | 31,875 | 1.000 | 3,229 | .228 | 1,113 | .086 |
| | 1996 | 35,241 | 1.000 | 3,955 | .248 | 1,325 | .090 |
| | 2001 | 38,282 | 1.000 | 4,728 | .268 | 1,553 | .094 |
| PROJECTION 3 Slow Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 17,249 | .755 | 1,733 | .168 | 683 | .074 |
| | 1981 | 21,250 | .857 | 2,111 | .188 | 833 | .078 |
| | 1986 | 26,492 | .959 | 2,571 | .208 | 929 | .082 |
| | 1991 | 30,108 | 1.000 | 3,137 | .228 | 1,099 | .086 |
| | 1996 | 32,117 | 1.000 | 3,726 | .248 | 1,271 | .090 |
| | 2001 | 33,335 | 1.000 | 4,295 | .268 | 1,443 | .094 |

TABLE A-16 -- STUDENTS ENROLLED IN MINISTRY OF EDUCATION SCHOOLS ASSUMING SLOW EXPANSION OF EDUCATIONAL OPPORTUNITY (in thousands)

| Projection | Year | Primary Enrollment Increases at 1.5% Per Annum | | Junior Secondary Enrollment Increases at 1.0% Per Annum | | Senior Secondary Enrollment Increases at .5% Per Annum | |
|---|---|---|---|---|---|---|---|
| | | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio | Enrollment | Enrollment Ratio |
| PROJECTION 1 Rapid Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 16,261 | .713 | 1,616 | .156 | 663 | .072 |
| | 1981 | 19,356 | .773 | 1,848 | .165 | 787 | .074 |
| | 1986 | 24,291 | .832 | 2,169 | .173 | 854 | .075 |
| | 1991 | 30,256 | .892 | 2,660 | .182 | 1,014 | .077 |
| | 1996 | 36,965 | .952 | 3,242 | .190 | 1,219 | .079 |
| | 2001 | 43,922 | 1.000 | 3,880 | .199 | 1,447 | .081 |
| PROJECTION 2 Moderate Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 16,273 | .713 | 1,615 | .156 | 663 | .072 |
| | 1981 | 19,252 | .773 | 1,851 | .165 | 787 | .074 |
| | 1986 | 23,602 | .832 | 2,156 | .173 | 855 | .075 |
| | 1991 | 28,443 | .892 | 2,577 | .182 | 1,001 | .077 |
| | 1996 | 33,554 | .952 | 3,038 | .190 | 1,165 | .079 |
| | 2001 | 38,282 | 1.000 | 3,511 | .199 | 1,338 | .081 |
| PROJECTION 3 Slow Population Growth | 1971 | 13,468 | .653 | 1,412 | .148 | 657 | .070 |
| | 1976 | 16,284 | .713 | 1,615 | .156 | 663 | .072 |
| | 1981 | 19,156 | .773 | 1,853 | .165 | 787 | .074 |
| | 1986 | 22,993 | .832 | 2,144 | .173 | 855 | .075 |
| | 1991 | 26,866 | .892 | 2,504 | .182 | 989 | .077 |
| | 1996 | 30,579 | .952 | 2,862 | .190 | 1,118 | .079 |
| | 2001 | 33,335 | 1.000 | 3,189 | .199 | 1,243 | .081 |

TABLE A-17 -- INCREASES IN TOTAL ENROLLMENTS DUE TO POPULATION GROWTH AND DUE TO ENROLLMENT RATIO INCREASES
(in thousands)

| | | Total Enrollment 1971 | Total Enrollment 2001 | Increase in Enrollment 1971--2001 | Annual Average Rate of Growth 1971--2001 | Percent of Enrollment Increases Due to Population Growth Alone |
|---|---|---|---|---|---|---|
| Enrollment Increases with Constant Enrollment Ratio (due only to population growth) | Projection 1 | 15,537 | 32,818 | 17,281 | 2.5 | 100 |
| | Projection 2 | 15,537 | 28,765 | 13,228 | 2.1 | 100 |
| | Projection 3 | 15,537 | 25,215 | 9,678 | 1.6 | 100 |
| Enrollment Increases with Rapid Enrollment Expansion Policy | Projection 1 | 15,537 | 53,191 | 37,654 | 4.2 | 46 |
| | Projection 2 | 15,537 | 46,714 | 31,177 | 3.7 | 42 |
| | Projection 3 | 15,537 | 41,037 | 25,500 | 3.3 | 38 |
| Enrollment Increases with Moderate Enrollment Expansion Policy | Projection 1 | 15,537 | 50,828 | 35,291 | 4.0 | 49 |
| | Projection 2 | 15,537 | 44,563 | 29,026 | 3.6 | 46 |
| | Projection 3 | 15,537 | 39,073 | 23,536 | 3.1 | 41 |
| Enrollment Increases with Slow Enrollment Expansion Policy | Projection 1 | 15,537 | 49,249 | 33,712 | 3.9 | 51 |
| | Projection 2 | 15,537 | 43,131 | 27,594 | 3.5 | 48 |
| | Projection 3 | 15,537 | 37,767 | 22,230 | 3.0 | 44 |

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TABLE A-18 -- SCHOOL-AGE POPULATION NOT ENROLLED, ASSUMING RAPID EXPANSION OF EDUCATIONAL OPPORTUNITY
(in thousands)

| | | Primary | | Junior Secondary | | Senior Secondary | |
|---|---|---|---|---|---|---|---|
| Projection | Year | Number | Ratio | Number | Ratio | Number | Ratio |
| 1. Rapid Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 4,617.5 | .20 | 8,432.0 | .82 | 8,489.9 | .92 |
| | 1981 | 1,448.8 | .06 | 8,755.5 | .78 | 9,733.9 | .91 |
| | 1986 | - | - | 9,333.1 | .75 | 10,199.2 | .90 |
| | 1991 | - | - | 10,396.9 | .70 | 11,699.6 | .89 |
| | 1996 | - | - | 11,505.4 | .68 | 13,585.6 | .88 |
| | 2001 | - | - | 12,498.9 | .64 | 15,597.9 | .87 |
| 2. Moderate Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 4,621.0 | .20 | 8,429.8 | .82 | 8,489.9 | .92 |
| | 1981 | 1,441.0 | .06 | 8,767.5 | .78 | 9,730.7 | .91 |
| | 1986 | - | - | 9,278.2 | .75 | 10,204.9 | .90 |
| | 1991 | - | - | 10,072.6 | .70 | 11,544.5 | .89 |
| | 1996 | - | - | 10,784.5 | .68 | 12,987.3 | .88 |
| | 2001 | - | - | 11,309.3 | .64 | 14,421.3 | .87 |
| 3. Slow Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 4,624.1 | .20 | 8,427.7 | .82 | 8,489.9 | .92 |
| | 1981 | 1,433.8 | .06 | 8,778.8 | .78 | 9,727.7 | .91 |
| | 1986 | - | - | 9,226.6 | .75 | 10,210.4 | .90 |
| | 1991 | - | - | 9,786.9 | .70 | 11,402.5 | .87 |
| | 1996 | - | - | 10,158.6 | .68 | 12,465.2 | .88 |
| | 2001 | - | - | 10,271.7 | .64 | 13,400.0 | .87 |

TABLE A-19 -- SCHOOL-AGE POPULATION NOT ENROLLED, ASSUMING MODERATE EXPANSION OF EDUCATIONAL OPPORTUNITY
(in thousands)

| | | Primary | | Junior Secondary | | Senior Secondary | |
|---|---|---|---|---|---|---|---|
| Projection | Year | Number | Ratio | Number | Ratio | Number | Ratio |
| 1. Rapid Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 5,587.5 | .25 | 8,588.6 | .83 | 8,540.6 | .73 |
| | 1981 | 3,579.5 | .14 | 9,095.2 | .82 | 9,851.5 | .92 |
| | 1986 | 1,191.2 | .04 | 9,901.9 | .79 | 10,385.9 | .92 |
| | 1991 | - | - | 11,283.6 | .77 | 11,988.1 | .91 |
| | 1996 | - | - | 12,795.7 | .76 | 14,008.9 | .91 |
| | 2001 | - | - | 14,273.3 | .73 | 16,187.5 | .91 |
| 2. Moderate Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 5,591.7 | .25 | 8,586.3 | .83 | 8,540.6 | .92 |
| | 1981 | 3,560.2 | .14 | 9,107.7 | .81 | 9,848.2 | .92 |
| | 1986 | 1,157.4 | .04 | 9,843.7 | .79 | 10,391.7 | .92 |
| | 1991 | - | - | 10,931.6 | .77 | 11,829.2 | .91 |
| | 1996 | - | - | 11,994.0 | .75 | 13,392.0 | .91 |
| | 2001 | - | - | 12,914.8 | .73 | 14,966.4 | .91 |
| 3. Slow Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 5,595.6 | .25 | 8,584.2 | .83 | 8,540.6 | .93 |
| | 1981 | 3,542.4 | .14 | 9,119.4 | .81 | 9,845.1 | .92 |
| | 1986 | 1,127.6 | .04 | 9,789.0 | .79 | 10,397.3 | .92 |
| | 1991 | - | - | 10,621.6 | .77 | 11,683.8 | .91 |
| | 1996 | - | - | 11,287.8 | .75 | 12,853.6 | .91 |
| | 2001 | - | - | 11,729.9 | .73 | 13,906.6 | .91 |

TABLE A-20 -- SCHOOL-AGE POPULATION NOT ENROLLED, ASSUMING SLOW EXPANSION OF EDUCATIONAL OPPORTUNITY
(in thousands)

| | | Primary | | Junior Secondary | | Senior Secondary | |
|---|---|---|---|---|---|---|---|
| Projection | Year | Number | Ratio | Number | Ratio | Number | Ratio |
| 1. Rapid Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 6,550.9 | .29 | 8,707.3 | .84 | 8,560.6 | .93 |
| | 1981 | 5,695.4 | .23 | 9,352.8 | .83 | 9,897.8 | .93 |
| | 1986 | 4,888.1 | .17 | 10,333.2 | .83 | 10,459.4 | .93 |
| | 1991 | 3,651.5 | .11 | 11,956.0 | .82 | 12,101.8 | .93 |
| | 1996 | 1,858.2 | .05 | 13,774.1 | .81 | 14,175.7 | .92 |
| | 2001 | - | - | 15,618.7 | .80 | 16,417.8 | .92 |
| 2. Moderate Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 6,555.8 | .29 | 8,705.0 | .84 | 8,560.6 | .93 |
| | 1981 | 5,664.8 | .23 | 9,365.7 | .84 | 9,894.4 | .93 |
| | 1986 | 4,749.3 | .17 | 10,272.5 | .83 | 10,465.3 | .93 |
| | 1986 | 4,749.3 | .17 | 10,272.5 | .83 | 10,465.3 | .93 |
| | 1991 | 3,432.6 | .11 | 11,483.0 | .82 | 11,941.3 | .92 |
| | 1996 | 1,686.7 | .05 | 12,911.0 | .81 | 13,551.5 | .92 |
| | 2001 | - | - | 14,132.2 | .80 | 15,181.2 | .92 |
| 3. Slow Population Growth | 1971 | 7,156.8 | .35 | 8,128.4 | .85 | 8,725.2 | .93 |
| | 1976 | 6,560.3 | .29 | 8,702.8 | .84 | 8,560.6 | .93 |
| | 1981 | 5,636.9 | .23 | 9,377.7 | .84 | 9,891.4 | .93 |
| | 1986 | 4,626.8 | .17 | 10,215.4 | .83 | 10,470.9 | .93 |
| | 1991 | 3,242.4 | .11 | 11,254.5 | .82 | 11,794.5 | .92 |
| | 1996 | 1,537.2 | .05 | 12,161.7 | .81 | 13,006.6 | .92 |
| | 2001 | - | - | 12,835.6 | .80 | 14,106.1 | .92 |

TABLE A-21 --TOTAL FULL TIME EQUIVALENT TEACHERS AND CLASSROOMS REQUIRED BY EDUCATION LEVEL ASSUMING RAPID ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year | Primary | | Junior secondary | | Senior secondary | |
|---|---|---|---|---|---|---|---|
| | | FTE teachers | Classrooms | FTE teachers | Classrooms | FTE teachers | Classrooms |
| 1. Rapid population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 491.24 | 627.70 | 109.67 | 57.86 | 43.19 | 24.42 |
| | 1981 | 637.28 | 814.30 | 141.84 | 74.83 | 56.01 | 31.67 |
| | 1986 | 787.85 | 1,006.69 | 183.82 | 96.98 | 65.64 | 37.11 |
| | 1991 | 915.50 | 1,169.81 | 244.71 | 129.11 | 83.43 | 47.17 |
| | 1996 | 1,048.23 | 1,339.41 | 319.59 | 168.61 | 106.54 | 60.23 |
| | 2001 | 1,185.90 | 1,515.32 | 406.01 | 214.20 | 133.65 | 75.56 |
| 2. Moderate population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 491.61 | 628.17 | 109.64 | 57.84 | 43.19 | 24.42 |
| | 1981 | 633.85 | 809.92 | 142.04 | 74.94 | 55.99 | 31.66 |
| | 1986 | 765.48 | 978.12 | 182.74 | 96.41 | 65.67 | 37.13 |
| | 1991 | 860.63 | 1,099.69 | 237.08 | 125.08 | 82.33 | 46.55 |
| | 1996 | 951.50 | 1,215.81 | 299.57 | 158.05 | 101.85 | 57.58 |
| | 2001 | 1,033.61 | 1,320.72 | 367.37 | 193.82 | 123.57 | 69.86 |
| 3. Slow population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 491.95 | 628.61 | 109.61 | 57.83 | 43.19 | 24.42 |
| | 1981 | 630.69 | 805.88 | 142.22 | 75.03 | 55.98 | 31.65 |
| | 1986 | 745.73 | 952.88 | 181.73 | 95.88 | 65.71 | 37.15 |
| | 1991 | 812.93 | 1,038.74 | 230.35 | 121.53 | 81.32 | 45.97 |
| | 1996 | 867.15 | 1,108.02 | 282.18 | 148.87 | 97.75 | 55.27 |
| | 2001 | 900.03 | 1,150.04 | 333.66 | 176.03 | 114.82 | 64.91 |

TABLE A-22 --TOTAL FULL TIME EQUIVALENT TEACHERS AND CLASSROOMS REQUIRED BY EDUCATION LEVEL ASSUMING MODERATE ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year | Primary | | Junior secondary | | Senior secondary | |
|---|---|---|---|---|---|---|---|
| | | FTE teachers | Classrooms | FTE teachers | Classrooms | FTE teachers | Classrooms |
| 1. Rapid population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 465.05 | 594.23 | 100.59 | 53.07 | 40.20 | 22.73 |
| | 1981 | 579.75 | 740.79 | 122.13 | 64.44 | 49.09 | 27.75 |
| | 1986 | 755.68 | 965.60 | 150.83 | 79.57 | 54.64 | 30.89 |
| | 1991 | 915.50 | 1,169.81 | 193.28 | 101.97 | 66.44 | 37.56 |
| | 1996 | 1,048.23 | 1,339.41 | 244.75 | 129.13 | 81.60 | 46.14 |
| | 2001 | 1,185.90 | 1,515.32 | 303.09 | 159.91 | 98.92 | 55.93 |
| 2. Moderate population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 465.40 | 594.68 | 100.56 | 56.05 | 40.20 | 22.73 |
| | 1981 | 576.64 | 736.81 | 122.30 | 64.53 | 49.07 | 27.74 |
| | 1986 | 734.23 | 938.19 | 149.94 | 79.11 | 54.67 | 30.91 |
| | 1991 | 860.63 | 1,099.69 | 187.25 | 98.79 | 65.56 | 37.06 |
| | 1996 | 951.50 | 1,215.81 | 229.41 | 121.04 | 78.01 | 44.10 |
| | 2001 | 1,033.61 | 1,320.72 | 274.24 | 144.69 | 91.46 | 51.71 |
| 3. Slow population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 465.72 | 595.09 | 100.53 | 53.04 | 40.20 | 22.73 |
| | 1981 | 573.75 | 733.13 | 122.46 | 64.61 | 49.06 | 27.73 |
| | 1986 | 715.29 | 913.98 | 149.11 | 78.67 | 54.70 | 30.93 |
| | 1991 | 812.93 | 1,038.74 | 181.94 | 95.99 | 64.75 | 36.61 |
| | 1996 | 867.14 | 1,108.02 | 216.10 | 114.01 | 74.87 | 42.33 |
| | 2001 | 900.03 | 1,150.04 | 249.08 | 131.41 | 84.98 | 48.05 |

TABLE A-23 --TOTAL FULL TIME EQUIVALENT TEACHERS AND CLASSROOMS REQUIRED BY EDUCATION LEVEL ASSUMING SLOW ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year | Primary | | Junior secondary | | Senior secondary | |
|---|---|---|---|---|---|---|---|
| | | FTE teachers | Classrooms | FTE teachers | Classrooms | FTE teachers | Classrooms |
| 1. Rapid population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 439.04 | 561.00 | 93.70 | 49.43 | 39.02 | 22.06 |
| | 1981 | 522.62 | 667.79 | 107.19 | 56.55 | 46.36 | 26.21 |
| | 1986 | 655.87 | 838.05 | 125.81 | 66.38 | 50.31 | 28.44 |
| | 1991 | 816.91 | 1,043.83 | 154.29 | 81.40 | 59.74 | 33.78 |
| | 1996 | 998.06 | 1,275.30 | 188.01 | 99.19 | 71.78 | 40.58 |
| | 2001 | 1,185.90 | 1,515.32 | 225.06 | 118.74 | 85.24 | 48.19 |
| 2. Moderate population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 439.37 | 561.42 | 93.67 | 49.42 | 39.02 | 22.06 |
| | 1981 | 519.81 | 664.20 | 107.34 | 56.63 | 46.35 | 26.20 |
| | 1986 | 637.25 | 814.27 | 125.07 | 65.99 | 50.34 | 28.46 |
| | 1991 | 767.95 | 981.27 | 149.47 | 78.86 | 58.95 | 33.33 |
| | 1996 | 905.96 | 1,157.62 | 176.22 | 92.97 | 68.62 | 38.80 |
| | 2001 | 1,033.61 | 1,320.72 | 203.64 | 107.44 | 78.81 | 44.56 |
| 3. Slow population growth | 1971 | 363.63 | 464.64 | 81.90 | 43.21 | 38.68 | 21.87 |
| | 1976 | 439.67 | 561.81 | 93.65 | 49.41 | 39.02 | 22.02 |
| | 1981 | 517.22 | 660.89 | 107.48 | 56.70 | 46.33 | 26.19 |
| | 1986 | 620.81 | 793.26 | 124.38 | 65.62 | 50.37 | 28.48 |
| | 1991 | 725.38 | 926.88 | 145.23 | 76.62 | 58.23 | 32.92 |
| | 1996 | 825.64 | 1,054.99 | 166.00 | 87.58 | 65.86 | 37.24 |
| | 2001 | 900.03 | 1,150.04 | 184.95 | 97.58 | 73.23 | 41.40 |

TABLE A-24 --ADDITIONAL FULL TIME EQUIVALENT TEACHERS REQUIRED WITH RAPID ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year* | Additional primary FTE teachers required to provide for | | | Additional jr. secondary FTE teachers required to provide for | | | Additional sr. secondary FTE teachers required to provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional students | Attrition | Total | Additional students | Attrition | Total | Additional students | Attrition | Total |
| 1. Rapid population growth | 1976 | 127.61 | 200.04 | 327.65 | 27.77 | 31.48 | 59.25 | 4.51 | 9.92 | 14.42 |
| | 1981 | 146.04 | 251.73 | 397.76 | 32.18 | 39.46 | 71.64 | 12.82 | 11.38 | 24.20 |
| | 1986 | 150.57 | 307.55 | 458.12 | 41.98 | 48.41 | 90.39 | 9.63 | 13.65 | 23.27 |
| | 1991 | 127.66 | 343.07 | 470.72 | 60.89 | 59.97 | 120.86 | 17.80 | 15.93 | 33.73 |
| | 1996 | 132.73 | 372.09 | 504.82 | 74.88 | 74.62 | 149.50 | 23.11 | 19.52 | 42.62 |
| | 2001 | 137.67 | 396.42 | 534.09 | 86.41 | 90.44 | 176.86 | 27.11 | 23.76 | 50.87 |
| 2. Moderate population growth | 1976 | 127.98 | 200.10 | 328.08 | 27.74 | 31.48 | 59.22 | 4.51 | 9.92 | 14.42 |
| | 1981 | 142.24 | 251.27 | 393.51 | 32.40 | 39.48 | 71.88 | 12.80 | 11.37 | 24.18 |
| | 1986 | 131.63 | 302.96 | 434.59 | 40.70 | 48.33 | 89.04 | 9.68 | 13.65 | 23.33 |
| | 1991 | 95.15 | 328.90 | 424.04 | 54.33 | 58.98 | 113.32 | 16.65 | 15.85 | 32.50 |
| | 1996 | 90.87 | 344.87 | 435.74 | 62.49 | 71.31 | 133.80 | 19.52 | 19.01 | 38.53 |
| | 2001 | 82.11 | 354.00 | 436.11 | 67.80 | 83.55 | 151.35 | 21.72 | 22.40 | 44.12 |
| 3. Slow population growth | 1976 | 128.32 | 200.16 | 328.48 | 27.71 | 31.47 | 59.19 | 4.51 | 9.92 | 14.42 |
| | 1981 | 138.73 | 250.85 | 389.59 | 32.61 | 39.50 | 72.10 | 12.79 | 11.37 | 24.16 |
| | 1986 | 115.05 | 298.84 | 413.89 | 39.51 | 48.26 | 87.77 | 9.73 | 13.65 | 23.38 |
| | 1991 | 67.19 | 316.44 | 383.64 | 48.63 | 58.09 | 106.72 | 15.61 | 15.77 | 31.38 |
| | 1996 | 54.22 | 321.11 | 375.33 | 51.83 | 68.40 | 120.23 | 16.44 | 18.55 | 34.99 |
| | 2001 | 32.89 | 316.80 | 349.69 | 51.48 | 77.53 | 129.01 | 17.06 | 21.22 | 38.28 |

*Cumulative total over the five-year interval ending in year specified.

TABLE A-25 --ADDITIONAL FULL TIME EQUIVALENT TEACHERS REQUIRED WITH MODERATE ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year* | Additional primary FTE teachers required to provide for | | | Additional jr. secondary FTE teachers required to provide for | | | Additional sr. secondary FTE teachers required to provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional students | Attrition | Total | Additional students | Attrition | Total | Additional students | Attrition | Total |
| 1. Rapid population growth | 1976 | 101.42 | 195.21 | 296.62 | 18.69 | 30.30 | 48.99 | 1.52 | 9.63 | 11.14 |
| | 1981 | 114.70 | 234.18 | 348.88 | 21.55 | 35.21 | 56.76 | 8.89 | 10.32 | 19.21 |
| | 1986 | 175.93 | 281.13 | 457.06 | 28.69 | 40.82 | 69.52 | 5.55 | 11.70 | 17.26 |
| | 1991 | 159.82 | 338.99 | 498.81 | 42.45 | 48.40 | 90.85 | 11.80 | 13.01 | 24.81 |
| | 1996 | 132.73 | 372.09 | 504.82 | 51.47 | 58.16 | 109.63 | 15.17 | 15.29 | 30.45 |
| | 2001 | 137.67 | 396.42 | 534.09 | 58.34 | 68.51 | 126.85 | 17.32 | 17.94 | 35.25 |
| 2. Moderate population growth | 1976 | 101.77 | 195.27 | 297.04 | 18.66 | 30.29 | 48.96 | 1.52 | 9.63 | 11.14 |
| | 1981 | 111.23 | 233.76 | 344.99 | 21.74 | 35.22 | 56.97 | 8.87 | 10.32 | 19.19 |
| | 1986 | 157.60 | 276.91 | 434.51 | 27.64 | 40.76 | 68.39 | 5.60 | 11.70 | 17.30 |
| | 1991 | 126.40 | 324.94 | 451.34 | 37.31 | 47.60 | 84.91 | 10.88 | 12.95 | 23.83 |
| | 1996 | 90.87 | 344.87 | 435.74 | 42.16 | 55.58 | 97.74 | 12.45 | 14.89 | 27.34 |
| | 2001 | 82.11 | 354.00 | 436.11 | 44.83 | 63.29 | 108.12 | 13.45 | 16.92 | 30.36 |
| 3. Slow population growth | 1976 | 102.09 | 195.32 | 297.41 | 18.64 | 30.29 | 48.93 | 1.52 | 9.63 | 11.14 |
| | 1981 | 108.03 | 233.37 | 341.40 | 21.93 | 35.24 | 57.16 | 8.86 | 10.32 | 19.17 |
| | 1986 | 141.54 | 273.13 | 414.66 | 26.65 | 40.69 | 67.34 | 5.65 | 11.70 | 17.35 |
| | 1991 | 97.64 | 312.60 | 410.24 | 32.83 | 46.89 | 79.72 | 10.05 | 12.88 | 22.93 |
| | 1996 | 54.22 | 321.11 | 375.32 | 34.16 | 53.32 | 87.48 | 10.12 | 14.53 | 24.66 |
| | 2001 | 32.89 | 316.80 | 349.69 | 32.98 | 58.74 | 91.72 | 10.11 | 16.02 | 26.13 |

*Cumulative total over the five-year interval ending in year specified.

TABLE A-26 --ADDITIONAL FULL TIME EQUIVALENT TEACHERS REQUIRED WITH SLOW ENROLLMENT EXPANSION POLICY
(in thousands)

| Projection | Year* | Additional primary FTE teachers required to provide for | | | Additional jr. secondary FTE teachers required to provide for | | | Additional sr. secondary FTE teachers required to provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional students | Attrition | Total | Additional students | Attrition | Total | Additional students | Attrition | Total |
| 1. Rapid population growth | 1976 | 75.41 | 190.41 | 265.82 | 11.81 | 29.40 | 41.20 | 0.34 | 9.51 | 9.85 |
| | 1981 | 83.58 | 216.75 | 300.33 | 13.49 | 31.98 | 45.48 | 7.34 | 9.90 | 17.24 |
| | 1986 | 133.25 | 249.32 | 382.57 | 18.62 | 35.07 | 53.68 | 3.95 | 10.94 | 14.89 |
| | 1991 | 161.04 | 293.96 | 455.00 | 28.48 | 39.62 | 68.10 | 9.43 | 11.86 | 21.30 |
| | 1996 | 181.15 | 341.05 | 522.20 | 33.72 | 45.68 | 79.39 | 12.04 | 13.62 | 25.66 |
| | 2001 | 187.84 | 387.03 | 574.87 | 37.05 | 51.88 | 88.93 | 13.46 | 15.64 | 29.10 |
| 2. Moderate population growth | 1976 | 75.74 | 190.47 | 266.21 | 11.78 | 29.40 | 41.18 | 0.34 | 9.51 | 9.85 |
| | 1981 | 80.44 | 216.37 | 296.81 | 13.67 | 32.00 | 45.66 | 7.32 | 9.90 | 17.22 |
| | 1986 | 117.44 | 245.60 | 363.04 | 17.73 | 35.01 | 52.74 | 3.99 | 10.94 | 14.93 |
| | 1991 | 130.70 | 281.76 | 412.46 | 24.40 | 38.98 | 63.38 | 8.61 | 11.80 | 20.41 |
| | 1996 | 138.01 | 316.04 | 454.06 | 26.75 | 43.66 | 70.41 | 9.67 | 13.27 | 22.94 |
| | 2001 | 127.65 | 345.55 | 473.20 | 27.41 | 47.94 | 75.35 | 10.19 | 14.75 | 24.94 |
| 3. Slow population growth | 1976 | 76.04 | 190.52 | 266.56 | 11.76 | 29.39 | 41.15 | 0.34 | 9.51 | 9.85 |
| | 1981 | 77.54 | 216.01 | 293.55 | 13.83 | 32.01 | 45.84 | 7.31 | 9.90 | 17.21 |
| | 1986 | 103.60 | 242.26 | 345.86 | 16.90 | 34.96 | 51.86 | 4.03 | 10.94 | 14.97 |
| | 1991 | 104.57 | 271.05 | 375.62 | 20.86 | 38.39 | 59.25 | 7.86 | 11.75 | 19.61 |
| | 1996 | 100.26 | 294.21 | 394.47 | 20.76 | 41.89 | 62.65 | 7.64 | 12.95 | 20.59 |
| | 2001 | 74.39 | 309.17 | 383.56 | 18.96 | 44.49 | 63.45 | 7.37 | 13.97 | 21.34 |

*Cumulative total over the five-year interval ending in year specified.

TABLE A-27 -- ADDITIONAL CLASSROOMS REQUIRED WITH RAPID ENROLLMENT EXPANSION POLICY (in thousands)

| Projection | Year* | Additional Primary Classrooms Required to Provide for | | | Additional Junior Secondary Classrooms Required to Provide for | | | Additional Senior Secondary Classrooms Required to Provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total |
| 1. Rapid Population Growth | 1976 | 163.05 | 179.20 | 342.25 | 14.65 | 16.61 | 31.26 | 2.55 | 7.78 | 10.33 |
| | 1981 | 186.60 | 226.10 | 412.70 | 16.98 | 20.82 | 37.80 | 7.25 | 8.78 | 16.03 |
| | 1986 | 192.39 | 277.06 | 469.46 | 22.15 | 25.54 | 47.69 | 5.44 | 10.36 | 15.80 |
| | 1991 | 163.12 | 310.08 | 473.19 | 32.12 | 31.64 | 63.77 | 10.06 | 11.87 | 21.93 |
| | 1996 | 169.60 | 337.56 | 507.16 | 39.51 | 39.37 | 78.87 | 13.06 | 14.24 | 27.31 |
| | 2001 | 175.91 | 361.16 | 537.07 | 45.59 | 47.72 | 93.31 | 15.33 | 16.95 | 32.28 |
| 2. Moderate Population Growth | 1976 | 163.53 | 179.25 | 342.78 | 14.64 | 16.61 | 31.24 | 2.55 | 7.78 | 10.33 |
| | 1981 | 181.75 | 225.70 | 407.44 | 17.09 | 20.83 | 37.92 | 7.24 | 8.78 | 16.02 |
| | 1986 | 168.20 | 272.93 | 441.12 | 21.48 | 25.50 | 46.98 | 5.47 | 10.36 | 15.83 |
| | 1991 | 121.57 | 297.27 | 418.84 | 28.67 | 31.12 | 59.78 | 9.42 | 11.81 | 21.22 |
| | 1996 | 116.12 | 312.87 | 428.98 | 32.97 | 37.62 | 70.59 | 11.04 | 13.87 | 24.91 |
| | 2001 | 104.92 | 322.51 | 427.43 | 35.77 | 44.08 | 79.85 | 12.28 | 15.98 | 28.26 |
| 3. Slow Population Growth | 1976 | 163.96 | 179.31 | 343.27 | 14.62 | 16.61 | 31.23 | 2.55 | 7.78 | 10.33 |
| | 1981 | 177.27 | 225.32 | 402.59 | 17.20 | 20.84 | 38.04 | 7.23 | 8.78 | 16.01 |
| | 1986 | 147.01 | 269.22 | 416.22 | 20.84 | 25.46 | 46.30 | 5.50 | 10.36 | 15.86 |
| | 1991 | 85.86 | 286.01 | 371.87 | 25.65 | 30.65 | 56.30 | 8.80 | 11.75 | 20.57 |
| | 1996 | 69.28 | 291.31 | 360.59 | 27.34 | 36.09 | 63.43 | 9.29 | 13.54 | 22.83 |
| | 2001 | 42.02 | 288.62 | 330.64 | 27.16 | 40.91 | 68.06 | 9.65 | 15.14 | 24.79 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-28 -- ADDITIONAL CLASSROOMS REQUIRED WITH MODERATE ENROLLMENT EXPANSION POLICY (in thousands)

| Projection | Year* | Additional Primary Classrooms Required to Provide for | | | Additional Junior Secondary Classrooms Required to Provide for | | | Additional Senior Secondary Classrooms Required to Provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total |
| 1. Rapid Population Growth | 1976 | 129.59 | 174.87 | 304.46 | 9.86 | 15.98 | 25.84 | 0.86 | 7.55 | 8.41 |
| | 1981 | 146.56 | 210.34 | 356.90 | 11.37 | 18.58 | 29.95 | 5.03 | 7.97 | 12.99 |
| | 1986 | 224.80 | 253.26 | 478.06 | 15.14 | 21.54 | 36.88 | 3.14 | 8.89 | 12.03 |
| | 1991 | 204.21 | 306.40 | 510.61 | 22.40 | 25.53 | 47.93 | 6.67 | 9.70 | 16.36 |
| | 1996 | 169.60 | 337.56 | 507.16 | 27.15 | 30.68 | 57.84 | 8.57 | 11.16 | 19.73 |
| | 2001 | 175.91 | 361.16 | 537.07 | 30.78 | 36.15 | 66.92 | 9.79 | 12.80 | 22.59 |
| 2. Moderate Population Growth | 1976 | 130.04 | 174.92 | 304.96 | 9.85 | 15.98 | 24.83 | 0.86 | 7.55 | 8.41 |
| | 1981 | 142.13 | 209.96 | 352.09 | 11.47 | 18.58 | 30.06 | 5.02 | 7.97 | 12.98 |
| | 1986 | 201.38 | 249.46 | 450.84 | 14.58 | 21.50 | 36.08 | 3.17 | 8.89 | 12.05 |
| | 1991 | 161.50 | 293.70 | 455.20 | 19.68 | 25.11 | 44.80 | 6.15 | 9.65 | 15.80 |
| | 1996 | 116.12 | 312.87 | 428.99 | 22.24 | 29.32 | 51.57 | 7.04 | 10.87 | 17.91 |
| | 2001 | 104.91 | 322.51 | 427.42 | 23.65 | 33.39 | 57.04 | 7.60 | 12.07 | 19.67 |
| 3 Slow Population Growth | 1976 | 130.45 | 174.97 | 305.42 | 9.83 | 15.98 | 25.81 | 0.86 | 7.55 | 8.41 |
| | 1981 | 138.04 | 209.61 | 347.65 | 11.57 | 18.59 | 30.16 | 5.01 | 7.97 | 12.97 |
| | 1986 | 180.85 | 246.05 | 426.90 | 14.06 | 21.47 | 35.33 | 3.19 | 8.89 | 12.08 |
| | 1991 | 124.76 | 282.54 | 407.30 | 17.32 | 24.74 | 42.06 | 5.68 | 9.60 | 15.28 |
| | 1996 | 69.28 | 291.31 | 360.58 | 18.02 | 28.13 | 46.15 | 5.72 | 10.61 | 16.33 |
| | 2001 | 42.02 | 288.62 | 330.64 | 17.40 | 30.99 | 48.39 | 5.71 | 11.43 | 17.15 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-29 -- ADDITIONAL CLASSROOMS REQUIRED WITH SLOW ENROLLMENT EXPANSION POLICY (in thousands)

| Projection | Year* | Additional Primary Classrooms Required to Provide for | | | Additional Junior Secondary Classrooms Required to Provide for | | | Additional Senior Secondary Classrooms Required to Provide for | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total |
| 1. Rapid Population Growth | 1976 | 96.35 | 170.57 | 266.92 | 6.23 | 15.51 | 21.74 | 0.19 | 7.46 | 7.65 |
| | 1981 | 106.80 | 194.68 | 301.48 | 7.12 | 16.87 | 23.99 | 4.15 | 7.65 | 11.80 |
| | 1986 | 170.26 | 224.61 | 394.87 | 9.82 | 18.50 | 28.32 | 2.23 | 8.30 | 10.54 |
| | 1991 | 205.78 | 265.69 | 471.47 | 15.02 | 20.90 | 35.93 | 5.23 | 8.84 | 14.17 |
| | 1996 | 231.47 | 309.41 | 540.88 | 17.79 | 24.10 | 41.89 | 6.81 | 9.94 | 16.75 |
| | 2001 | 240.02 | 352.62 | 592.64 | 19.55 | 27.37 | 46.92 | 7.61 | 11.16 | 18.77 |
| 2. Moderate Population Growth | 1976 | 96.78 | 170.62 | 267.40 | 6.21 | 15.51 | 21.72 | 0.19 | 7.46 | 7.65 |
| | 1981 | 102.78 | 194.34 | 297.12 | 7.21 | 16.88 | 24.09 | 4.14 | 7.65 | 11.79 |
| | 1986 | 150.06 | 221.25 | 371.31 | 9.35 | 18.47 | 27.83 | 2,26 | 8.31 | 10.56 |
| | 1991 | 167.00 | 254.67 | 421.67 | 12.87 | 20.56 | 33.44 | 4.87 | 8.79 | 13.66 |
| | 1996 | 176.35 | 286.72 | 463.07 | 14.11 | 23.03 | 37.15 | 5.47 | 9.68 | 15.15 |
| | 2001 | 163.11 | 314.82 | 477.93 | 14.46 | 25.29 | 39.75 | 5.76 | 10.53 | 16.29 |
| 3. Slow Population Growth | 1976 | 97.16 | 170.67 | 267.83 | 6.20 | 15.51 | 21.71 | 0.19 | 7.46 | 7.65 |
| | 1981 | 99.08 | 194.02 | 293.10 | 7.29 | 16.89 | 24.18 | 4.13 | 7.64 | 11.78 |
| | 1986 | 132.37 | 218.24 | 350.61 | 8.92 | 18.44 | 27.36 | 2.28 | 8.31 | 10.59 |
| | 1991 | 133.62 | 244.98 | 378.60 | 11.00 | 20.26 | 31.26 | 4.44 | 8.75 | 13.20 |
| | 1996 | 128.11 | 266.91 | 395.02 | 10.95 | 22.10 | 33.05 | 4.32 | 9.45 | 13.77 |
| | 2001 | 95.06 | 281.67 | 376.73 | 10.00 | 23.47 | 33.47 | 4.17 | 9.97 | 14.14 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-30 — RECURRENT COSTS BY EDUCATION LEVEL WITH RAPID ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Recurrent Costs | | Junior Secondary Recurrent Costs | | Senior Secondary Recurrent Costs | | Total Recurrent Costs |
|---|---|---|---|---|---|---|---|---|
| | | Total | of Which Salaries | Total | of Which Salaries | Total | of Which Salaries | |
| 1. Rapid Population Growth | 1976 | 330.3 | 303.9 | 100.4 | 86.3 | 72.8 | 61.9 | 503.5 |
| | 1981 | 665.3 | 612.1 | 182.4 | 156.9 | 123.1 | 104.6 | 970.8 |
| | 1986 | 888.2 | 889.1 | 243.9 | 209.8 | 154.5 | 131.3 | 1,286.7 |
| | 1991 | 1,038.7 | 1,039.6 | 321.3 | 276.3 | 190.4 | 161.8 | 1,550.4 |
| | 1996 | 1,196.1 | 1,100.4 | 422.6 | 363.4 | 242.7 | 206.3 | 1,861.3 |
| | 2001 | 1,359.6 | 1,250.8 | 542.4 | 466.5 | 306.4 | 260.4 | 2,208.4 |
| 2. Moderate Population Growth | 1976 | 330.5 | 304.1 | 100.4 | 86.3 | 72.8 | 61.9 | 503.7 |
| | 1981 | 663.2 | 610.1 | 182.5 | 157.0 | 123.1 | 104.6 | 968.8 |
| | 1986 | 870.8 | 801.1 | 243.2 | 209.2 | 154.6 | 131.3 | 1,268.6 |
| | 1991 | 989.1 | 910.0 | 314.3 | 270.3 | 188.9 | 160.6 | 1,492.3 |
| | 1996 | 1,100.7 | 1,012.6 | 401.1 | 344.9 | 234.8 | 199.6 | 1,736.6 |
| | 2001 | 1,204.0 | 1,107.7 | 497.4 | 427.8 | 287.0 | 244.0 | 1,988.4 |
| 3. Slow Population Growth | 1976 | 330.6 | 304.2 | 100.4 | 86.3 | 72.8 | 61.9 | 503.8 |
| | 1981 | 661.2 | 608.3 | 182.7 | 157.1 | 123.1 | 104.6 | 967.0 |
| | 1986 | 855.3 | 786.9 | 242.1 | 208.5 | 154.6 | 131.3 | 1,252.4 |
| | 1991 | 945.6 | 869.9 | 308.1 | 265.0 | 187.5 | 159.4 | 1,441.2 |
| | 1996 | 1,017.3 | 935.9 | 382.3 | 328.8 | 227.9 | 193.7 | 1,627.5 |
| | 2001 | 1,067.4 | 982.0 | 458.2 | 394.1 | 270.0 | 229.5 | 1,795.6 |

* Cumulative total over the five-year interval ending in year specified.



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TABLE A-31-- RECURRENT COSTS BY EDUCATION LEVEL WITH MODERATE ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Recurrent Costs | | Junior Secondary Recurrent Costs | | Senior Secondary Recurrent Costs | | Total Recurrent Costs |
|---|---|---|---|---|---|---|---|---|
| | | Total | of Which Salaries | Total | of Which Salaries | Total | of Which Salaries | |
| 1. Rapid Population Growth | 1976 | 318.0 | 292.6 | 94.6 | 81.4 | 69.4 | 59.0 | 482.0 |
| | 1981 | 613.5 | 564.4 | 160.5 | 138.0 | 110.3 | 93.8 | 884.4 |
| | 1986 | 821.2 | 755.5 | 203.7 | 175.2 | 131.2 | 111.5 | 1,156.1 |
| | 1991 | 1,034.7 | 951.9 | 257.3 | 221.3 | 154.1 | 131.0 | 1,144.6 |
| | 1996 | 1,196.1 | 1,100.4 | 327.3 | 281.5 | 188.6 | 160.3 | 1,712.0 |
| | 2001 | 1,359.6 | 1,250.8 | 408.7 | 351.5 | 229.7 | 195.2 | 1,998.0 |
| 2. Moderate Population Growth | 1976 | 318.1 | 292.7 | 94.6 | 81.4 | 69.4 | 59.0 | 482.2 |
| | 1981 | 611.6 | 562.7 | 160.7 | 138.2 | 110.3 | 93.8 | 882.5 |
| | 1986 | 805.0 | 740.6 | 203.0 | 174.6 | 131.2 | 111.5 | 1,139.3 |
| | 1991 | 985.2 | 906.4 | 251.7 | 216.5 | 152.9 | 130.0 | 1,389.8 |
| | 1996 | 1,100.7 | 1,012.6 | 310.7 | 267.2 | 182.5 | 155.1 | 1,593.8 |
| | 2001 | 1,204.0 | 1,107.7 | 374.9 | 322.4 | 215.2 | 182.9 | 1,794.0 |
| 3. Slow Population Growth | 1976 | 318.3 | 292.8 | 94.6 | 81.4 | 69.4 | 59.0 | 482.3 |
| | 1981 | 609.8 | 561.0 | 160.8 | 138.3 | 110.2 | 93.8 | 880.9 |
| | 1986 | 790.6 | 727.4 | 202.4 | 174.1 | 131.2 | 111.5 | 1,124.3 |
| | 1991 | 941.9 | 866.5 | 246.8 | 212.2 | 151.8 | 129.0 | 1,340.4 |
| | 1996 | 1,017.3 | 935.9 | 296.1 | 254.6 | 177.1 | 150.5 | 1,490.6 |
| | 2001 | 1,067.4 | 982.0 | 345.3 | 297.0 | 212.5 | 172.1 | 1,615.2 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-32 -- RECURRENT COSTS BY EDUCATION LEVEL WITH SLOW ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Recurrent Costs | | Junior Secondary Recurrent Costs | | Senior Secondary Recurrent Costs | | Total Recurrent Costs |
|---|---|---|---|---|---|---|---|---|
| | | Total | of Which Salaries | Total | of Which Salaries | Total | of Which Salaries | |
| 1. Rapid Population Growth | 1976 | 305.7 | 281.2 | 90.2 | 77.6 | 68.0 | 57.8 | 464.0 |
| | 1981 | 562.2 | 517.2 | 144.0 | 123.8 | 105.2 | 89.4 | 811.3 |
| | 1986 | 722.7 | 664.9 | 173.1 | 148.9 | 122.0 | 103.7 | 1,017.8 |
| | 1991 | 902.7 | 830.5 | 208.8 | 179.6 | 139.8 | 118.8 | 1,251.3 |
| | 1996 | 1,111.0 | 1,022.1 | 255.0 | 219.3 | 167.3 | 142.2 | 1,533.3 |
| | 2001 | 1,340.7 | 1,233.4 | 307.4 | 264.4 | 199.5 | 169.5 | 1,847.6 |
| 2. Moderate Population Growth | 1976 | 305.9 | 281.4 | 90.2 | 77.6 | 68.0 | 57.8 | 464.2 |
| | 1981 | 560.4 | 515.6 | 144.1 | 123.9 | 105.2 | 89.4 | 809.7 |
| | 1986 | 708.5 | 651.8 | 172.6 | 148.4 | 122.0 | 103.7 | 1,003.1 |
| | 1991 | 859.4 | 790.6 | 204.3 | 175.7 | 138.7 | 117.9 | 1,202.4 |
| | 1996 | 1,022.2 | 940.4 | 242.1 | 208.2 | 161.9 | 137.6 | 1,426.2 |
| | 2001 | 1,187.1 | 1,092.1 | 281.9 | 242.4 | 186.9 | 158.9 | 1,655.9 |
| 3. Slow Population Growth | 1976 | 306.0 | 281.5 | 90.2 | 77.6 | 68.0 | 57.8 | 464.3 |
| | 1981 | 558.8 | 514.1 | 144.2 | 124.0 | 105.2 | 89.4 | 808.2 |
| | 1986 | 695.9 | 640.2 | 172.1 | 148.0 | 122.0 | 103.7 | 990.0 |
| | 1991 | 821.5 | 755.8 | 200.3 | 172.3 | 137.7 | 117.0 | 1,159.5 |
| | 1996 | 944.6 | 869.0 | 230.8 | 198.5 | 157.1 | 133.5 | 1,332.5 |
| | 2001 | 1,052.2 | 968.0 | 259.7 | 223.3 | 175.9 | 149.5 | 1,487.8 |

* Cumulative total over the five-year interval ending in the year specified/

TABLE A-33-- CAPITAL COSTS BY EDUCATION LEVEL WITH RAPID ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Capital Costs Required to Provide for | | | Junior Secondary Capital Costs Required to Provide for | | | Senior Secondary Capital Costs Required to Provide for | | | Total Capital Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total | |
| 1. Rapid Population Growth | 1976 | 234.7 | 266.6 | 501.4 | 79.3 | 66.4 | 145.7 | 15.3 | 27.6 | 42.9 | 689.9 |
| | 1981 | 327.6 | 430.6 | 758.2 | 112.2 | 106.6 | 218.8 | 53.4 | 40.1 | 93.5 | 1,070.5 |
| | 1986 | 345.6 | 568.8 | 914.6 | 149.8 | 141.0 | 290.8 | 41.0 | 51.0 | 92.0 | 1,297.4 |
| | 1991 | 293.1 | 673.0 | 966.1 | 217.3 | 184.8 | 402.1 | 75.8 | 61.8 | 137.6 | 1,505.8 |
| | 1996 | 304.8 | 777.3 | 1,082.1 | 267.2 | 243.9 | 511.1 | 98.5 | 78.6 | 177.1 | 1,770.4 |
| | 2001 | 316.1 | 885.6 | 1,201.8 | 308.4 | 314.8 | 623.2 | 115.5 | 99.7 | 215.2 | 2,040.2 |
| 2. Moderate Population Growth | 1976 | 235.4 | 266.7 | 502.1 | 79.2 | 66.4 | 145.6 | 15.3 | 27.6 | 42.9 | 690.6 |
| | 1981 | 319.1 | 429.8 | 748.9 | 113.0 | 106.6 | 219.6 | 53.3 | 40.1 | 93.4 | 1,061.9 |
| | 1986 | 302.3 | 560.3 | 862.5 | 145.3 | 140.8 | 286.1 | 41.3 | 51.0 | 92.2 | 1,240.8 |
| | 1991 | 218.5 | 645.1 | 863.6 | 193.9 | 181.7 | 375.6 | 71.0 | 61.4 | 132.4 | 1,371.6 |
| | 1996 | 208.7 | 720.3 | 929.0 | 223.0 | 233.0 | 456.1 | 83.2 | 76.6 | 160.0 | 1,544.8 |
| | 2001 | 188.5 | 790.7 | 979.2 | 242.0 | 290.7 | 532.7 | 92.6 | 94.0 | 186.5 | 1,698.5 |
| 3. Slow Population Growth | 1976 | 236.1 | 266.8 | 502.8 | 79.1 | 66.4 | 145.5 | 15.3 | 27.6 | 42.9 | 691.3 |
| | 1981 | 311.2 | 429.0 | 740.2 | 113.7 | 106.7 | 220.4 | 53.3 | 40.1 | 93.3 | 1,054.0 |
| | 1986 | 264.2 | 552.6 | 816.8 | 141.0 | 140.6 | 281.6 | 41.5 | 51.0 | 92.4 | 1,190.8 |
| | 1991 | 154.3 | 620.6 | 774.9 | 173.5 | 178.9 | 352.5 | 66.5 | 61.1 | 127.6 | 1,255.0 |
| | 1996 | 124.5 | 670.6 | 795.1 | 185.0 | 223.5 | 408.5 | 70.0 | 74.7 | 144.8 | 1,348.3 |
| | 2001 | 75.5 | 707.4 | 782.9 | 183.7 | 269.8 | 453.5 | 72.7 | 89.0 | 161.7 | 1,398.1 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-34 -- CAPITAL COSTS BY EDUCATION LEVEL WITH MODERATE ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Capital Costs Required to Provide for | | | Junior Secondary Capital Costs Required to Provide for | | | Senior Secondary Capital Costs Required to Provide for | | | Total Capital Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total | |
| 1. Rapid Population Growth | 1976 | 186.5 | 259.8 | 446.4 | 53.3 | 63.7 | 117.1 | 5.2 | 26.8 | 31.9 | 595.4 |
| | 1981 | 257.3 | 400.4 | 657.7 | 75.1 | 95.0 | 170.2 | 37.0 | 36.3 | 73.4 | 901.2 |
| | 1986 | 404.0 | 520.1 | 924.0 | 102.4 | 118.9 | 221.3 | 23.7 | 43.7 | 67.4 | 1,212.7 |
| | 1991 | 367.0 | 665.2 | 1,032.2 | 151.5 | 149.1 | 300.6 | 50.3 | 50.4 | 100.7 | 1,433.5 |
| | 1996 | 304.8 | 777.3 | 1,082.1 | 183.7 | 190.1 | 373.8 | 64.6 | 61.6 | 126.2 | 1,582.1 |
| | 2001 | 316.1 | 885.6 | 1,201.8 | 208.2 | 238.4 | 446.6 | 73.8 | 75.2 | 149.0 | 1,797.4 |
| 2. Moderate Population Growth | 1976 | 187.2 | 259.9 | 447.1 | 53.3 | 63.7 | 117.0 | 5.2 | 26.8 | 31.9 | 596.0 |
| | 1981 | 249.5 | 399.6 | 649.1 | 75.8 | 95.1 | 170.9 | 36.9 | 36.3 | 73.3 | 893.3 |
| | 1986 | 361.9 | 512.2 | 874.1 | 98.6 | 118.7 | 217.3 | 23.9 | 43.7 | 67.6 | 1,159.0 |
| | 1991 | 290.2 | 637.5 | 927.7 | 133.2 | 146.6 | 279.8 | 46.4 | 50.2 | 96.6 | 1,304.1 |
| | 1996 | 208.7 | 720.3 | 929.0 | 150.5 | 181.6 | 332.1 | 53.1 | 60.0 | 113.1 | 1,374.1 |
| | 2001 | 188.5 | 790.7 | 979.2 | 160.0 | 220.2 | 380.2 | 57.3 | 70.9 | 128.2 | 1,487.7 |
| 3. Slow Population Growth | 1976 | 187.8 | 260.0 | 447.8 | 53.2 | 63.7 | 116.9 | 5.2 | 26.8 | 31.9 | 596.6 |
| | 1981 | 242.3 | 398.9 | 641.3 | 76.4 | 95.1 | 171.5 | 36.9 | 36.3 | 73.2 | 886.0 |
| | 1986 | 325.0 | 505.1 | 830.2 | 95.1 | 118.5 | 213.6 | 24.1 | 43.7 | 67.8 | 1,111.5 |
| | 1991 | 224.2 | 613.2 | 837.4 | 117.2 | 144.4 | 261.6 | 42.8 | 49.9 | 92.8 | 1,191.7 |
| | 1996 | 124.5 | 670.6 | 795.1 | 121.9 | 174.2 | 296.1 | 43.1 | 58.5 | 101.7 | 1,192.9 |
| | 2001 | 75.5 | 707.4 | 782.9 | 117.7 | 204.3 | 322.1 | 43.1 | 67.2 | 110.3 | 1,215.3 |

* Cumulative total over the five-year interval ending in year specified.

TABLE A-35 — CAPITAL COSTS BY EDUCATION LEVEL WITH SLOW ENROLLMENT EXPANSION POLICY
(billions of Rupiah)

| Projection | Year* | Primary Capital Costs Required to Provide for | | | Junior Secondary Capital Costs Required to Provide for | | | Senior Secondary Capital Costs Required to Provide for | | | Total Capital Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Additional Students | Attrition | Total | Additional Students | Attrition | Total | Additional Students | Attrition | Total | |
| 1. Rapid Population Growth | 1976 | 138.7 | 253.1 | 391.7 | 33.7 | 61.7 | 95.4 | 1.2 | 26.4 | 27.6 | 514.7 |
| | 1981 | 187.5 | 370.4 | 557.8 | 47.0 | 86.3 | 133.3 | 30.6 | 34.9 | 65.4 | 756.6 |
| | 1986 | 306.0 | 461.1 | 767.1 | 66.4 | 102.1 | 168.5 | 16.8 | 40.8 | 57.7 | 993.3 |
| | 1991 | 369.8 | 576.9 | 946.7 | 101.6 | 122.0 | 223.7 | 40.2 | 46.0 | 86.2 | 1,256.5 |
| | 1996 | 416.0 | 712.7 | 1,128.7 | 120.3 | 149.2 | 269.6 | 51.3 | 54.9 | 106.2 | 1,504.4 |
| | 2001 | 431.3 | 865.0 | 1,296.3 | 132.2 | 180.5 | 312.8 | 57.4 | 65.6 | 123.0 | 1,732.0 |
| 2. Moderate Population Growth | 1976 | 139.3 | 253.2 | 392.4 | 33.6 | 61.7 | 95.3 | 1.2 | 26.4 | 27.6 | 515.4 |
| | 1981 | 180.4 | 369.7 | 550.1 | 47.6 | 86.3 | 133.9 | 30.5 | 34.9 | 65.3 | 749.4 |
| | 1986 | 269.7 | 454.2 | 723.9 | 63.3 | 101.9 | 165.2 | 17.0 | 40.8 | 57.9 | 946.9 |
| | 1991 | 300.1 | 552.8 | 852.9 | 87.1 | 120.0 | 207.1 | 36.7 | 45.7 | 82.4 | 1,142.5 |
| | 1996 | 316.9 | 660.3 | 977.3 | 95.5 | 142.6 | 238.1 | 41.2 | 53.4 | 94.7 | 1,310.0 |
| | 2001 | 293.1 | 772.1 | 1,065.2 | 97.8 | 166.8 | 264.6 | 43.4 | 61.9 | 105.3 | 1,435.1 |
| 3. Slow Population Growth | 1976 | 139.8 | 253.2 | 393.1 | 33.5 | 61.7 | 95.3 | 1.2 | 26.4 | 27.6 | 515.9 |
| | 1981 | 173.9 | 369.0 | 543.0 | 48.2 | 86.3 | 134.5 | 30.4 | 34.9 | 65.3 | 742.8 |
| | 1986 | 237.9 | 448.0 | 685.9 | 60.3 | 101.8 | 162.1 | 17.2 | 40.8 | 58.0 | 906.0 |
| | 1991 | 240.1 | 531.7 | 771.9 | 74.4 | 118.2 | 192.6 | 33.5 | 45.5 | 79.0 | 1,043.5 |
| | 1996 | 230.2 | 614.6 | 844.8 | 74.1 | 136.8 | 210.9 | 32.5 | 52.2 | 84.7 | 1,140.4 |
| | 2001 | 170.8 | 690.6 | 861.4 | 67.7 | 154.8 | 222.4 | 31.4 | 58.6 | 90.0 | 1,173.8 |

* Cumulative total over the five-year interval ending in the year specified.

TABLE A-36 -- EDUCATIONAL PROGRAM COSTS[1/] EXPLAINED BY CHANGES IN ENROLLMENT RATIOS
(in billion Rupiahs)

| | Year | Total Education Program Costs with Constant Enrollment Ratio | Additional Education Program Costs Due to Enrollment Ratio Increase: Spread of Educational Opportunity | | | Total Education Program Costs with Increasing Enrollment Ratios: Spread of Educational Opportunity | | |
|---|---|---|---|---|---|---|---|---|
| | | | Slow | Moderate | Rapid | Slow | Moderate | Rapid |
| Projection 1: | | | | | | | | |
| Slowly | 1976 | 859.9 | 118.9 | 217.5 | 333.6 | 978.8 | 1,077.4 | 1,193.5 |
| declining | 1981 | 1,303.2 | 264.7 | 482.4 | 738.1 | 1,567.9 | 1,785.6 | 2,041.3 |
| fertility -- | 1986 | 1,571.7 | 439.5 | 797.1 | 1,012.3 | 2,011.2 | 2,368.8 | 2,584.0 |
| Rapid Population | 1991 | 1,850.5 | 657.3 | 1,029.1 | 1,205.7 | 2,507.8 | 2,879.6 | 3,056.2 |
| growth | 1996 | 2,120.3 | 917.4 | 1,173.7 | 1,511,4 | 3,037.7 | 3,294.0 | 3,631.7 |
| | 2001 | 2,393.7 | 1,185.9 | 1,401.7 | 1,854.8 | 3,579.6 | 3,795.4 | 4,248.5 |
| Projection 2: | | | | | | | | |
| Moderately | 1976 | 860.6 | 118.9 | 217.5 | 337.7 | 979.5 | 1,078.1 | 1,194.3 |
| declining | 1981 | 1,295.7 | 263.4 | 480.1 | 735.0 | 1,559.1 | 1,775.8 | 2,030.7 |
| fertility -- | 1986 | 1,523.5 | 426.5 | 774.7 | 985.9 | 1,950.0 | 2,298.2 | 2,509.4 |
| Moderate Population | 1991 | 1,729.6 | 615.3 | 964.3 | 1,134.2 | 2,344.9 | 2,693.9 | 2,863.8 |
| growth | 1996 | 1,908.9 | 827.3 | 1,059.0 | 1,372.5 | 2,736.2 | 2,967.9 | 3,281.4 |
| | 2001 | 2,066.8 | 1,024.1 | 1,214.9 | 1,620.0 | 3,090.9 | 3,281.7 | 3,686.8 |
| Projection 3: | | | | | | | | |
| Rapidly | 1976 | 861.3 | 118.9 | 217.6 | 333.8 | 980.2 | 1,078.9 | 1,195.1 |
| declining | 1981 | 1,288.7 | 262.0 | 478.2 | 732.2 | 1,550.9 | 1,766.9 | 2,020.9 |
| fertility -- | 1986 | 1,480.8 | 415.1 | 755.0 | 962.4 | 1,895.9 | 2,235.8 | 2,443.2 |
| Slow Population | 1991 | 1,624.3 | 578.7 | 907.9 | 1,071.9 | 2,203.0 | 2,532.2 | 2,696.2 |
| growth | 1996 | 1,724.4 | 748.5 | 959.0 | 1,251.4 | 2,472.9 | 2,683.4 | 2,975.8 |
| | 2001 | 1,779.7 | 882.0 | 1,050.7 | 1,414.0 | 2,661.7 | 2,830.4 | 3,193.7 |

1/ Cumulative five-year totals.

TABLE A-37 -- PROPORTION OF EDUCATIONAL PROGRAM COSTS[1/] EXPLAINED BY CHANGES IN ENROLLMENT RATIOS

| Year | Proportion of Total Education Program Costs Due to Enrollment Ratio Increases | | |
|---|---|---|---|
| | Slow Expansion Policy | Moderate Expansion Policy | Rapid Expansion Policy |
| 1976 | .12 | .20 | .28 |
| 1981 | .17 | .27 | .36 |
| 1986 | .22 | .34 | .39 |
| 1991 | .26 | .36 | .39 |
| 1996 | .30 | .36 | .42 |
| 2001 | .33 | .37 | .44 |

1/ Cumulative totals over the five-year period ending in year specified.

# APPENDIX B: Overview of Long-Range Planning Models

## OVERVIEW OF LONG-RANGE PLANNING MODELS

The Socio-Economic Analysis Staff, International Statistical Programs Center, U.S.Bureau of the Census, has developed a series of socio-economic interaction models, called the Long-Range Planning Models (LRPM).[1/] The primary purpose for developing LRPM was to assist developing countries in the quantification of their national perspective plans. Particular emphasis was placed on the development of a system capable of simulating the implications of different demographic variable assumptions on economic development and on requirements for social services such as education, health, and housing. The model allows for separate sectoral analysis by rural and urban areas and may be adapted to other regional breakdowns. The present LRPM2 constitutes an important revision of an earlier LRPM model, incorporating new refinements and options and providing for indedenpent operation of all submodels.

LRPM2 is more flexible than any of the earlier models of its type[2/] not only conceptually but also in terms of the number of optional features offered. For example, rather than being restricted to a single built-in economic model, the user of LRPM2 can opt to construct his own country-specific model, thus tailoring the economic simulation exercise not only to unique features of the economy under consideration, but also to unique data availability conditions. The economic model can be disaggregated to consider several economic subsectors. LRPM2 may be neoclassical if the user specifies a production function in the economic part of the model. The demographic submodels project total population growth and also simulate rural-urban migration providing useful information for sectoral planning. LRPM2 also includes social service submodels capable of projecting trends in education, health, and housing requirements and costs. If desired, these social service projections can be made separately for rural and urban sectors. In this sense, LRPM2 covers a much wider

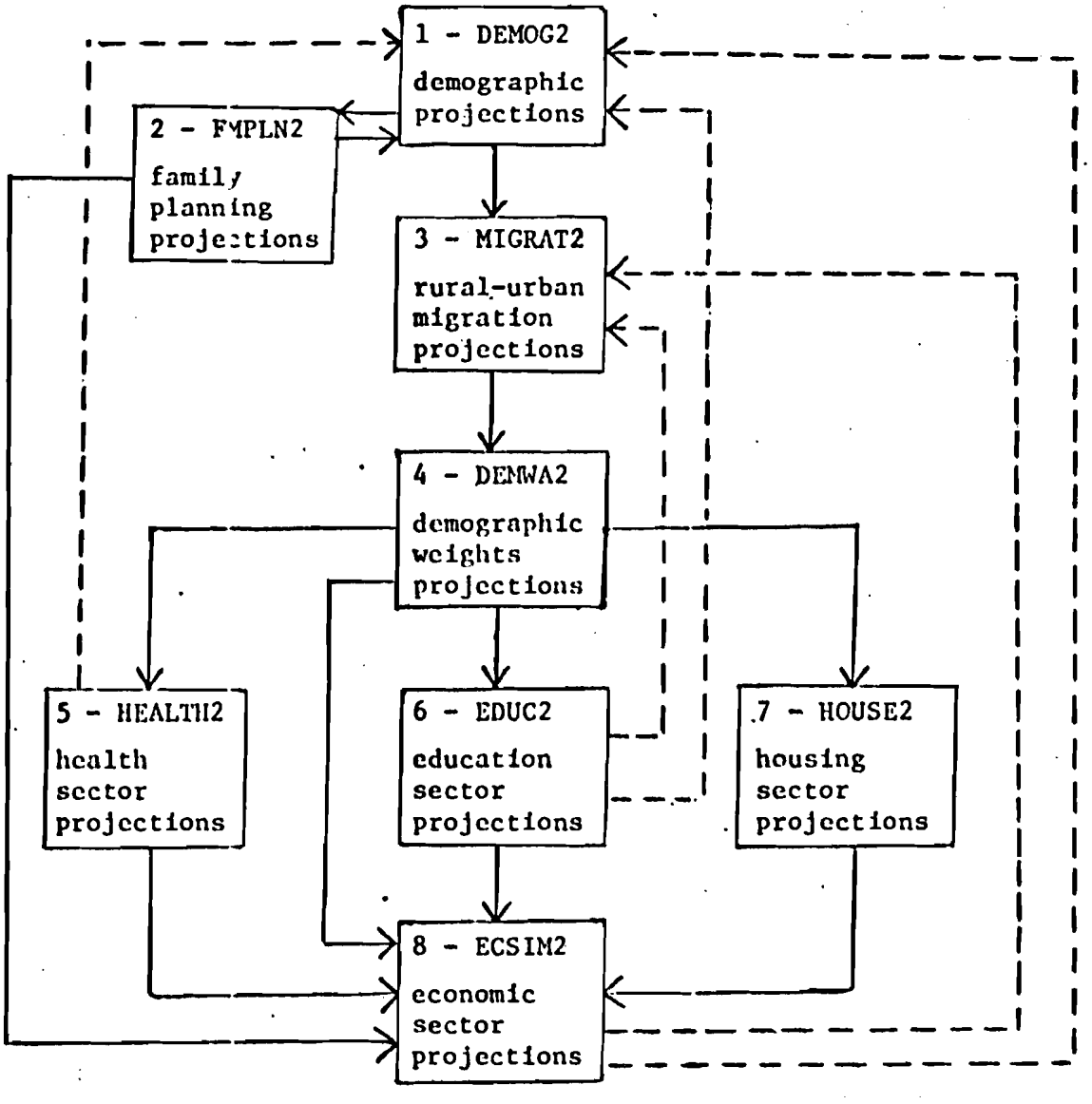
range of demographic, social, and economic interrelationships and policy issues than was the case in the earlier macro-models. The LRPM2 may also be adapted to regional or provincial as well as national-level planning. One final, essentially technical, but nevertheless important innovation is the fact that LRPM2 has been tightly programmed for use on the smaller[3/] computers available in developing countries. It is thus readily accessible to users with limited programming and processing capabilities.

We now turn to an examination of the methodology of the model itself. The key features of the LRPM2 system will be described briefly; for more detailed information on the mathematical construction of the submodels, data input requirements and results, the reader should consult the LRPM2 operational manuals. There are eight submodels to LRPM2 which can be viewed as successive stages in an information processing system, with the output of one stage serving as input to the next stage in line. If the user wishes, however, individual submodels may be operated independently. The sequence of the submodels is illustrated in Figure B-1 below.

DEMOG2 -- A primary goal of LRPM2 is to demonstrate the impact of demographic trends upon economic and social development. The first submodel, DEMOG2, projects total population by age and sex at five-year intervals over a specified period (up to 50 years). Input to DEMOG2 consists of (1) the initial year population data, broken down by five-year age groups and by sex; (2) the ratio of males to females at birth; (3) age-specific birth rates; (4) age- and sex-specific survival rates; (5) optional data on net international migration; and (6) optional data on births averted by a family planning program.

Given the initial population by age and sex and the survival and birth rates relevant during the next five years, the DEMOG2 program computes the population size and age-sex composition at the end of the five-year interval. This computation is repeated

FIGURE B-1 -- LRPM INFORMATION FLOWCHART 1/




1/ Solid lines refer to the impact of demographic factors on socio-economic variables.

Dotted lines refer to feedback impact of socio-economic variables on demographic factors.

again and again, projecting the population for any number of five-year intervals. The survival and birth rates used can be adjusted from interval to interval to reflect expected future changes.

The user of DEMOG2 has three alternative ways of specifying age-specific birth rates. He may simply specify a number of exogenously determined sets of age-specific rates, indicating the length of time during the projection period each set is to be in force. Or if the user is unable or unwilling to enter age-specific rates directly he may have the program compute age-specific birth rates by supplying a number of total fertility rates, indicating the projection intervals to which they apply, and standard UN fertility age patterns.[4/] These first two methods require the user to anticipate, somewhat arbitrarily, changes in birth rates over the projection period. However, the third method for computing age-specific birth rates makes them a function of various socio-economic variables. This method employs regression analysis in which age-specific birth rates are determined by changes in independent variables such as per capita income, percent of women married, percent of women literate, infant mortality, age at marriage, proportion of women in labor force employed in non-agricultural occupations.[5/]

Similarly, the user has three alternative ways for specifying survival rates for the projection period. He has the choice of (1) simply providing exogenously determined age/sex-specific survival rates; (2) providing empirical age/sex-specific death rates and specifying an appropriate Coale-Demeny regional model life table;[6/] or (3) providing female life expectancy at birth values and specifying a regional model life table.[7/] In the last two options, the program calculates the required age/sex-specific survival rates from the information provided by the user.

If international migration is important, the user has the option of correcting population projections by supplying exogenous data on net international migration, broken down by age and sex,

expected over the projection period. If the user wishes to incorporate the effects of a family planning program on the population projections, he uses the family planning option (FMPLN2) described below. The sum of births averted as calculated in FMPLN2 is subtracted, for any year of the projection, from the total number of births originally estimated by DEMOG2.

FMPLN2 -- It is the function of the FMPLN2 submodel to adjust the basic population projections of DEMOG2 for the birth-reducing effects of a given family planning program, and to provide statistics on the operation of the family planning program itself, such as required clinic supplies, doctors, costs, etc. Essentially, the program calculates the desired data for the projection period by the user submitting to it the following types of information for various types of contraceptive methods: the number of new clients by age, continuation rates, rates of demand for services, unit costs of services, and initial number of active clients.

MIGRAT2 -- MIGRAT2 breaks down the projected population into urban and rural subgroups, a distinction useful for the operation of the remaining submodels. By simulating rural-urban migration, MIGRAT2 provides disaggregation that can facilitate sectoral planning. MIGRAT2 calculates for the projection period a) net rural-urban migration; b) the urban population by age and sex; and c) the rural population by age and sex.

MIGRAT2 offers the user four alternative methods for making these urban-rural calculations. All methods require the specification of the initial percent of the population in urban areas. The first option, the logistic method, assumes that the urban population will gradually approach, but never attain, a certain maximum proportion of the total population, reflecting a stabilization of rural and urban growth rates and rural-urban migration. This method requires specification of the percent of the population that will

be urban in the terminal year of the projection and in some mid-projection year and specification of the ratio of the percent urban in the terminal year to the percent urban at the asymptote. The second option, the UN method, assumes an exogenously given difference between rural and urban growth rates. The third option, the GE-TEMPO method,[8/] is based upon the assumption of a constant rate of rural out-migration. These first three methods all require some simplifying, essentially arbitrary, assumption about the nature of rural-urban growth differentials. The fourth method, the simulation equation method,[9/] employs regression analysis in which rural-urban migration is considered a function of selected socio-economic variables such as urban-rural wage differentials, urban-rural unemployment rates, rate of agricultural mechanization, and relative urban-rural rates of social service expenditures. The user supplies the regression equation parameters and values for the independent variables over the projection period, and the program calculates the required migration rates and sectoral population totals.

Once the total urban and rural population projections are determined, MIGRAT2 then calculates the age and sex composition for each sector over the projection period by using one of two alternative methods. The first method assumes that the age and sex distributions of both the rural and urban populations are the same as that of the total population for the given year. The second method uses the UN difference elimination procedure to calculate these distributions.[10/] This method requires as input an initial age and sex distribution for both urban and rural populations. The purpose of the difference elimination method is to fill in future sex/age compositions of the urban and rural population which are plausible and consistent with the projected sex/age composition of the total population and initial rural-urban age distribution differentials. Compared with the rural, the urban population pyramid usually has a narrower base, because of lower urban fertility, and bulges about the ages at which most migrants

arrive in the city. The difference elimination method preserves the specific peculiarities of the urban and rural population sex/age structure which existed in the initial period.[11/]

DEMWA2 -- The population projections calculated in DEMOG2 and distributed between rural and urban sectors in MIGRAT2 are basic inputs to all the other submodels of LRPM2 -- the social service and economic submodels. However, various operations need to be performed on these demographic data in order to convert them to useful forms required in the other LRPM2 submodels. The function of the DEMWA2 submodel is to make such calculations, providing as output (1) the relevant population for education and health services, i.e., that segment of the population which creates a demand for the social service; (2) the work-age population and the labor force; and (3) equivalent economic consumers.

It will be seen below that the education submodel, EDUC2, requires as input the "relevant population" for each level of schooling in its calculations of the total demand for education services over the projection period. For example, for primary education, the relevant population consists of primary school-age children. The user simply specifies the age grouping for each educational level and DEMWA2 provides the relevant population figures in the form of sex and sector (rural-urban) specific school-age population projections.

Similarly, the health submodel, HEALTH2, requires as input a measure of "equivalent health consumers" over the projection period. Unlike education services which are directed towards specific age groups, health services are generally directed towards the entire population. However, some age/sex groups, such as the very young, the aged, or women of childbearing ages, may require more health care than others. Thus, DEMWA2 enables the user to specify weights to be applied to the various age, sex, and sector (rural-urban) specific population segments in order to compute "equivalent health consumers".

In the economic submodel, ECSIM2, to be described below, a measure of 'equivalent economic consumers' is required. As in the calculation of 'equivalent health consumers', a weighting system is used. Basically, the projected population totals are converted to an equivalent consumer population figure which reflects the different consumption patterns of different age groups. For example, consumption requirements for ages 0 to 14 and ages 64 and over may be less than those for adults of working ages 15 to 64.

DEMWA2 also calculates sex-specific labor force projections for the rural and urban sectors. Labor force data are a major input to the ECSIM2 model, since the labor force variable is an important component in the determination of economic output. To obtain the required labor force figures, the user supplies age/sex/sector specific labor force participation rates, and the program applies these to the projected population data. The user has the option of changing the labor force participation rates over the projection period.

Finally DEMWA2 provides the user with the option of obtaining these projections annually as well as at five-year intervals.

HEALTH2 -- Demographic trends influence the ability and speed with which a government can attain objectives such as increasing the proportion of the population receiving social services and also of increasing the per capita quality of these services. The LRPM2 social service submodels, HEALTH2, EDUC2, and HOUSE2 enable the user to consider the implications of population growth and composition for the magnitude of future social service requirements, in terms of the number of physicians, clinics, teachers, classrooms, public low cost housing, etc., and for the public social service expenditures necessary.

The HEALTH2 submodel calculates the number of health service units required and the investment, operating and total program costs of a specified health program over the projection period.

A basic input into the HEALTH2 submodel is the projection of the relevant or potential user population -- the "equivalent health consumers" calculated in DEMWA2. To further distinguish the potential users of the health program from that proportion actually using the health services, a participation rate can be applied to the "potential user population" to calculate the "actual health service users". A number of participation rates can be specified over the projection period to reflect government efforts to increase the percent of the population receiving medical care under the health program.

Once projections of the actual health service users have been determined, the program calculates the future requirements for health service units by type, such as the number of physicians, nurses, medical assistants, hospital beds, clinics, etc., (up to ten service types). For these calculations, the user must supply for each health service type (a) service ratios, i.e., the number of units to be provided per 1,000 user population; and (b) attrition rates, i.e., replacement or depreciation rates.[12/] The service ratios and attrition rates can be adjusted over the projection period to reflect changes in service quality and average service life. If costs are to be calculated, further information is needed by service type regarding unit investment, operating, administrative and other costs. With regard to medical personnel, investment costs are the cost of medical training and operating costs are average annual salaries. For physical hospital or clinic facilities, investment costs are costs of construction plus capital equipment and operating costs are maintenance and supplies costs.

HEALTH2 can be applied to the sectoral level to provide projections of health service requirements and costs separately for rural or urban sectors.

EDUC2 -- Similar in concept to HEALTH2, EDUC2 projects the number of education service units required and the investment, operating and total costs of the education program.

EDUC2 requires as input, projections of the school-age population at various education levels. This data was calculated in DEMWA2. For example, the relevant or potential user population for primary, junior secondary, and senior secondary education levels might be those population groups aged 6 to 12, 13 to 15, and 16 to 18.[13/] However, in developing countries school attendance is usually less than universal. To find the number of children actually attending school, the relevant school-age population is multiplied by an enrollment rate for each education level. Enrollment rates may be adjusted over the projection period to reflect government efforts to increase participation in education.

Once projections of students at the various education levels have been determined, the requirements for education service units, such as number of teachers or classroom units,[14/] can be calculated for each education level. For these calculations, the user must supply for each type of education service at each level the following information: (a) service ratios, i.e., the number of units to be provided per 1,000 students; and (b) attrition rates, i.e., replacement or depreciation rates. These rates can be varied over the projection period if desired to reflect changing teacher/pupil ratios, and increased average service life. To calculate education costs, information should be given concerning the investment and operating costs per service unit at each education level; for example, the cost of training a primary school teacher, the average salary of a primary school teacher, etc.

These calculations for EDUC2 can be made separately for rural or urban areas.

HOUSE2 -- Similar in concept to the health and education submodels, HOUSE2 is a social service submodel which projects the number of housing units required and the investment, operating and total costs of a specified public housing program.

The user of HOUSE2 may specify as to the relevant population for the public housing program, either the rural, urban, or total population. To further distinguish that proportion of the relevant population requiring public housing, a demand rate may be specified. Depending upon the aims of the government program, the actual user population requiring public housing may be defined as the proportion of the population with incomes below a specific amount or some other criterion.

The total requirements for different types of public housing units (such as two-room apartments, single family dwellings, etc. -- up to five types) are calculated by applying user-specified service ratios, i.e., the number of housing units of each type to be provided per 1,000 population requiring public housing.

New housing units required over the projection period are represented in the HOUSE2 submodel as the sum of three components (1) Additional construction is required to meet the current housing deficit. For example, the government may want to replace substandard squatter settlements with low-cost public housing. A construction schedule enables the HOUSE2 user to specify the number of new dwellings to be constructed to meet the current housing deficit. (2) The second component of new housing unit requirements are those needed for the replacement of existing public housing because of depreciation. These can be calculated from a user-specified attrition rate, or directly entered in a replacement schedule which indicates the number of new dwellings needed for replacement purposes. (3) The third component is the new housing units that will be generated by additions to the user population serviced by the public housing program. This third component is strongly influenced by demographic trends such as rates of population growth and internal migration.

To calculate the costs of a public housing program, the user of HOUSE2 may specify unit construction, operating, and overhead costs.

ECSIM2 -- The ECSIM2 is the economic simulation submodel of the LRPM2 system. The current ECSIM2 program is written to preserve flexibility: many different economic models can be programmed into ECSIM2. Thus, the user can construct a set of equations to represent a specific country situation.

Figure B-2 below represents the major interactions of a generalized, illustrative economic model.

To predict level of output (income) over the projection period, the illustrative ECSIM2 economic model uses Cobb-Douglas production functions for two major economic sectors; agriculture and non-agriculture. For each sector, the production function is of the form:

$$Y_t = A(1 + \lambda)^t K_{t-1}^{\alpha} N_t^{\beta} \qquad t = 1, \ldots, n$$

where:

$Y$ = output;

$A$ = efficiency parameter;

$\lambda$ = rate of technological change;

$K$ = employed capital stock at end of time t-1;

$N$ = employed labor;

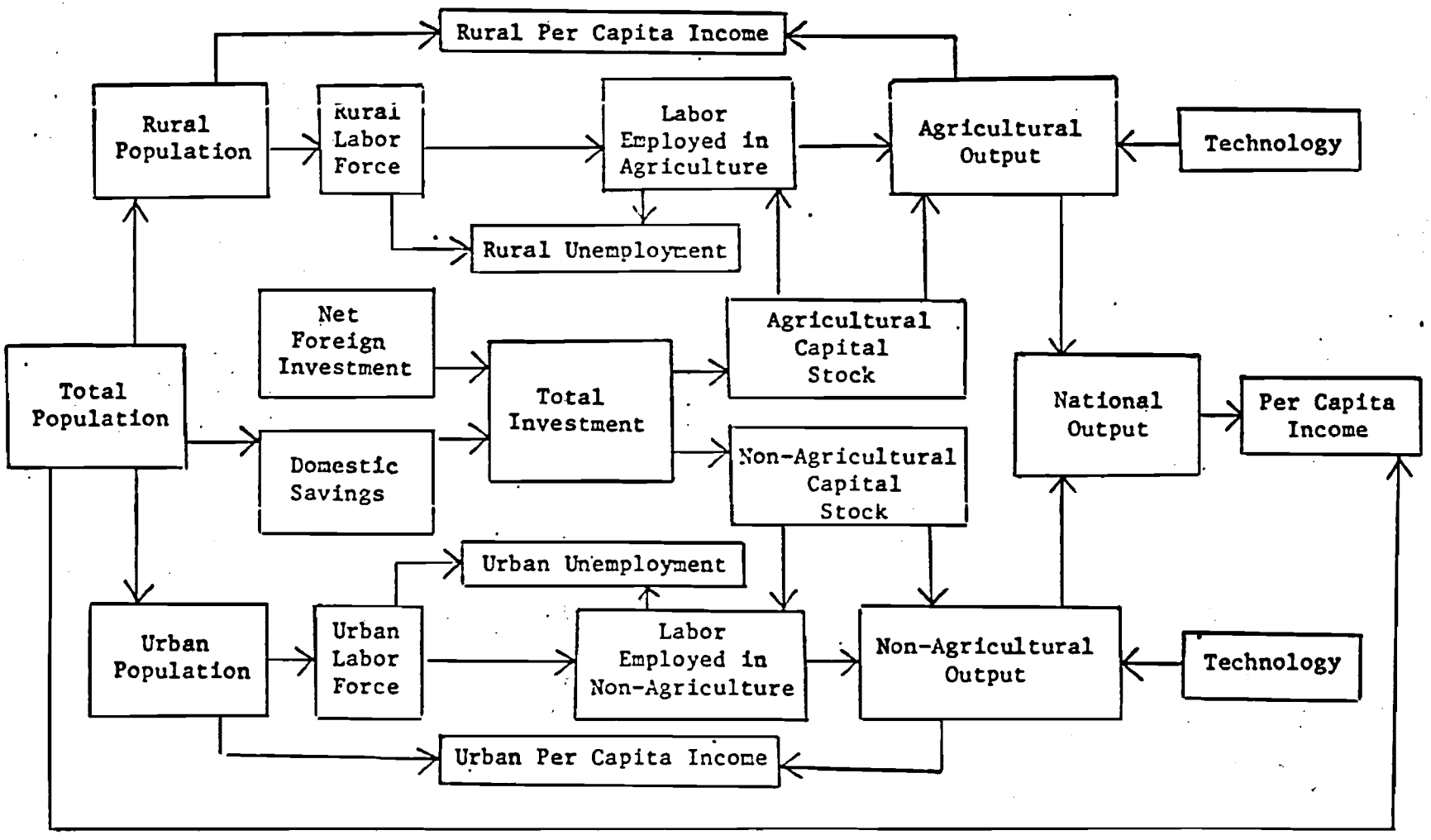
$\alpha$ = elasticity of output with respect to capital;

$\beta$ = elasticity of output with respect to labor;

$n$ = length of projection period.

Estimates of the function parameters $A$, $\alpha$, $\beta$, and $\lambda$ are entered exogenously, determined either by using regression analysis or by using extraneous information regarding the values of these parameters.[15/] The elasticities $\alpha$ and $\beta$ give the percentage increase in production that will result from a one percent increase in employed capital or labor, respectively. If the sum of $\alpha$ plus $\beta$ is greater than, equal to, or less than unity, this implies increasing, constant, or decreasing returns to scale, respectively.[16/]

FIGURE B-2 -- STRUCTURE OF ECONOMIC INTERACTIONS



Projections of employed labor, $N_t$, for each of the two economic subsectors can be determined in the model in two ways. The first option is to assume that the rural labor force is fully employed in the agricultural sector and that the urban labor force is fully employed in the non-agricultural sector. The rural and urban labor force projections are output of the DEMWA2 submodel. The second option assumes that there is sectoral unemployment. Initial sectoral unemployment levels are exogenously specified. Thereafter, sectoral employment and unemployment are generated internally by the economic submodel. Employment in each sector is calculated from an employment function which relates the rate of growth of employment proportionally to the rate of growth of capital stock. This employment/capital elasticity, g, is in turn proportionally related to the relative change in the unemployment rate since the first period of the simulation.

For each economic sector:

$$N_t = 1 + g_t \frac{K_t - K_{t-1}}{K_{t-1}} N_{t-1}$$

where:

$$g_t = h \frac{L_{t-1} - N_{t-1} \; / \; L_{t-1}}{L_0 - N_0 \; / \; L_0}$$

where N is employed labor, K is capital stock, L is the labor force, and h is a parameter reflecting the initial relationship between the growth rates of the capital stock and employed labor. Initially, in $t = 0$, $g = h$. Thus, if over time, unemployment rises, g will rise. The rapidity with which g rises will be affected by the initial size of $g_0(=h)$. The theoretical underpinnings of the employment function rest on the assumption that rising (falling) unemployment puts downward (upward) pressures on wages, which in turn encourages the adoption of more (less) labor intensive techniques of production.[17/]

Determination of the capital stock, $K_t$, used as input in the production functions of each economic subsector is based upon the following steps. The savings function, $S = aY - bP$, assumes that domestic savings vary directly with income and inversely with population, weighted into "equivalent consumers" by DEMWA2. It is assumed that total investment, or gross fixed capital formation, is equal to the sum of domestic savings and exogenously specified net foreign investment. Allocation of total investment between the two economic subsectors is determined either by (a) the relative marginal productivity of capital in the two subsectors, or (b) by exogenous specification.

The above discussion of the illustrative economic model has only touched upon some of the major concepts.[18/] The ECSIM2 results include projections of major economic variables, such as sectoral output, per capita income, consumption, savings, investment, capital stock, employment and unemployment, government revenue and expenditures, to mention a few.

Model Development -- The current LRPM2 is one stage of a continuing process of advancing the Long-Range Planning Model system. A third generation of the LRPM system is currently being developed. The DEMOG3 submodel enables the user to project rural and urban population based upon sector-specific fertility and survival rates. DEMOG3 projects population at one-year intervals and by single-year cohorts (rather than five-year as in DEMOG2). Another important development in LRPM3 is the incorporation of a flow system that enables the user to identify the impact of an education program upon the skill levels of the labor force (subroutine ELF). The disaggregated labor force, grouped according to skill level, are then entered separately into the ECSIM3 production functions to distinguish their different productivity. In the current illustration of LRPM2, socio-economic regression analysis options in DEMOG2 and MIGRAT2 require exogenous predictions of key variables such as per capita income, education, etc.

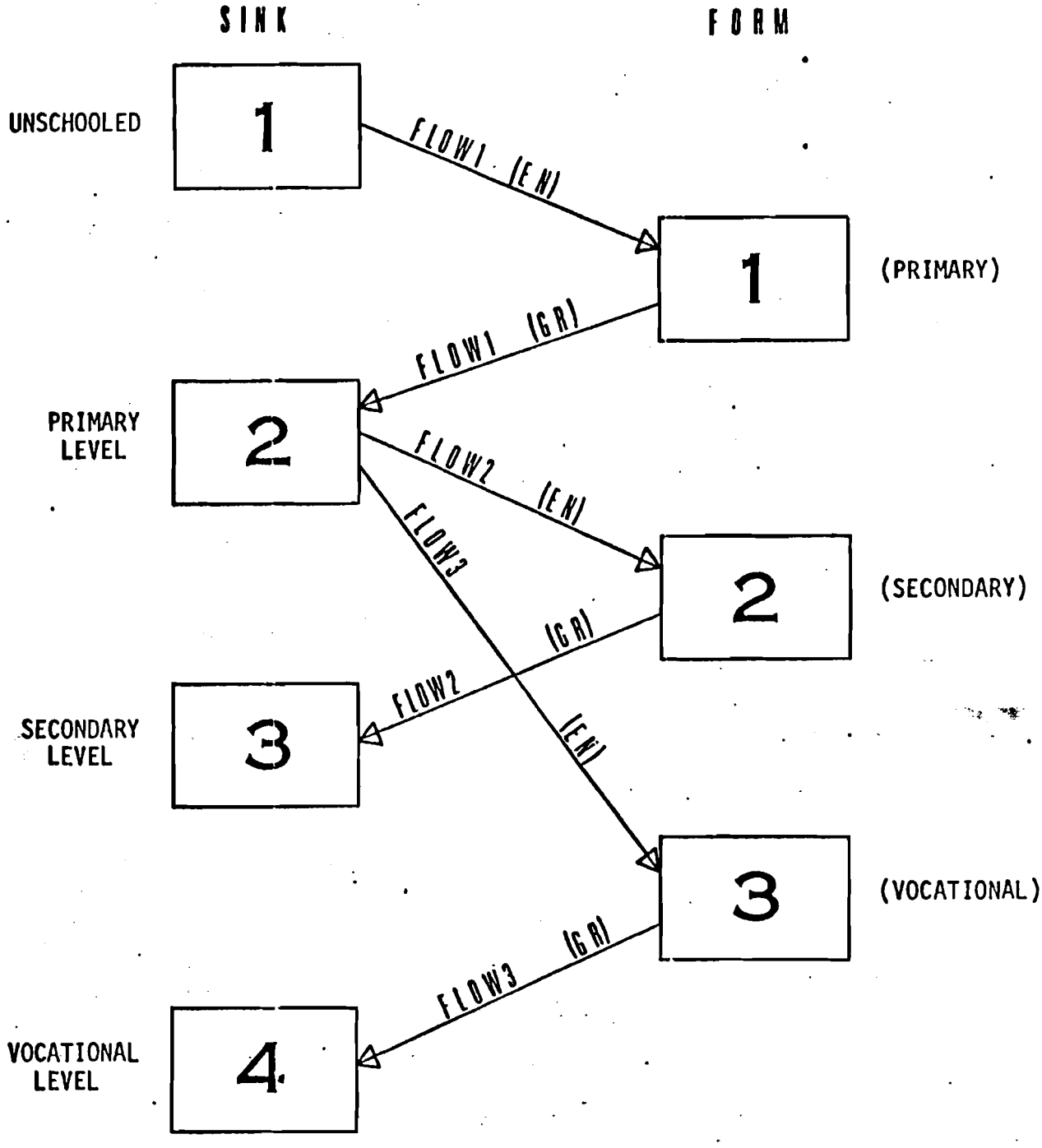
Yet these same variables are also endogenously determined as output of other submodels. LRPM3 will facilitate the correction of this inconsistency by establishing feedback mechanisms such that yearly projections of per capita income, education, etc., made in other submodels will be available for use in the DEMOG3 and MIGRAT3 regression options instead of exogenously specified values. Improvements in ECSIM3 include the determination of production by using multi-sectoral production functions or interindustry input-output flows. The economic model will be more sophisticated, enabling greater disaggregation and including more information relevant to policy analysis.

ELF Subroutine of DEMOG3 -- EDUC2 is primarily useful in projecting educational input requirements, such as needed teachers, classrooms, etc., and their costs; it has nothing to say about the output or benefits of the educational system. The Education and Labor Force Flow Model, ELF, is designed to relate education system inputs to outputs (i.e., costs and benefits). ELF is a flow model; a tracking device which enrolls students in schools and graduates them, keeping record of the educational attainments of the population being moved through the system.

The output of the ELF model shows the impact of a given education program upon the educational attainments of the population and the labor force. In conjunction with economic models relating educational levels to labor productivity and economic growth, this model output provides a means of measuring the economic benefits of a given educational program.

The ELF model can be conceptualized as a series of 'sinks' and 'forms', connected by flows. (See Figure B-3) "Sinks' represent levels of educational achievement into which the population is divided, such as the uneducated,[19/] graduates of primary school, graduates of secondary school, etc. Thus, the population is now disaggregated not only by age, sex, and rural-urban sector (achieved by DEMOG3) but also by sink, i.e., education level attained.

FIGURE B-3 — SAMPLE EDUCATION SYSTEM STUDENT FLOW DIAGRAM



"Forms" represent the different types of education offered in the education system; for example, primary, secondary, vocational, higher, etc.[20/] Although everyone in the population is in a sink, only a proportion are enrolled in schools and thus are also in a form, at any one time. Movement between sinks is possible only after being in a form and then graduating to a higher sink level. The flow from a sink to a form is represented by enrollment rates; the flow from a form to a sink is represented by graduation rates.[21/]

Similar to the concept of applying enrollment rates to sinks to find the number of students in different types of schools, labor force participation rates are applied to sinks to calculate the size and educational attainment structure of the labor force. Thus, a certain percentage of the population in each sink is in the labor force and another percentage is enrolled in a form. Of those enrolled, a percentage will graduate to another, higher sink.

It is assumed that mortality, fertility, and migration is not education-level specific. This enables the projection of sink populations by assuming that the same mortality, fertility, and migration rates hold for the population in each sink as for the population as a whole.

## FOOTNOTES FOR APPENDIX B

## OVERVIEW OF LONG-RANGE PLANNING MODELS

1/ H. Albert Green, LRPM2: A System of Perspective Planning Submodels, Staff Paper No. 72-3, Socio-Economic Analysis Staff, International Statistical Programs Center, May 1972. For operational manuals of the submodels, see staff papers No. 72-4 through No. 72-11. (The initial LRPM model was developed in May 1971.)

2/ The predecessors of the LRPM type demographic-economic model include: Ansley J. Coale and Edgar M. Hoover, Population Growth and Economic Development in Low Income Countries, Princeton: Princeton University Press, 1958, Chapter XVII. For non-technical summary see A. J. Coale, "Population and Economic Development", in The Population Dilemma, ed., by Philip M. Hauser, New Jersey: Englewood Cliffs, 1963, pp. 46-69. Edgar M. Hoover and Mark Perlman, "Measuring the Effects of Population Control on Economic Developments: Pakistan as a Case Study", Pakistan Development Review, Vol. 6, No. 4, 1966, pp. 545-566; Paul Demeny, "Investment Allocation and Population Growth", Demography, Vol. 2, 1965, pp. 203-233. Stephen Enke, Raising Per Capita Income Through Fewer Births, Santa Barbara: TEMPO, General Electric Company, March 1967; Description of the Economic Demographic Model, Santa Barbara: TEMPO, General Electric Company, June, 1971; P. Newman and R. H. Allen, Population Growth Rates and Economic Development in Nicaragua, Washington, D. C.: Robert R. Nathan Associates, Inc., November, 1967; P. J. Lloyd, "A Growth Model with Population and Technological Change as Endogenous Variables", unpublished paper, 1968; T. K. Ruprecht, "The Two-Sector Demographic Model", unpublished paper, 1968.

3/ Core storage of at least 64K bytes.

4/ A fertility age pattern indicates the relative contribution to total fertility of women in each age group, i.e., the percent distribution of age-specific birth rates. For more information on UN fertility patterns see, Population Bulletin of the United Nations, UN publication No. 7, 1963, pp. 101-121.

5/ See Maria Davidson, "SIMFER: A Fertility Projection Model", Socio-Economic Analysis Staff Paper No. 72-4.1, March, 1972.

6/ Ansley J. Coale and Paul Demeny, Regional Model Life Tables and Stable Population, Princeton University Press, 1966.

7/ Op.cit.

8/ Description of the Economic-Demographic Model, op.cit.

9/ For more information on this method, see Michael Fuchs-Carsch, "On Reasons and Methods for Estimating Rural-Urban Migration from Incomplete Data", Operation Manual for MIGRAT2, Socio-Economic Analysis Staff Paper No. 72-6, Addendum 1, May 1972.

10/ UN Population Division, Department of Economic and Social Affairs, Some Simple Methods for Urban and Rural Population Forecasts, United Nations publication, ESA/P/W.P. 41, September 1971, pp. 88-107.

11/ Implicit in the method are the assumptions that the urban-rural fertility difference and the size and composition of rural-urban migration will remain unchanged over the projection period.

12/ If the average service life of a service type is $s$, then its rate of attrition, $a$, is $1/s$.

13/ Up to five education levels may be specified.

14/ Up to two types of education services.

15/ For example, the elasticities $\alpha$ and $\beta$ may be alternatively interpreted as the respective shares of capital and labor in output -- frequently it is possible to obtain rough estimates of what these shares are.

16/ LRPM2 is capable of handling many different production functions. Specification depends on the needs of the user.

17/ Implicit in these relationships are the assumptions that the factor markets are competitive and that there is technical substitutability between factors of production.

18/ For a detailed description of the equations of this illustrative economic model, see the ECSIM2 Operational Manual, Socio-Economic Analysis Staff, Paper No. 72-11.

19/ The uneducated sink acts as a residual; those persons who have not graduated from any form (school level) are in the uneducated sink.

20/ ELF is designed to be sufficiently flexible to describe a number of different types of educational systems.

21/ These rates are age, sex, sector, and sink-form specific.

# APPENDIX C: Preliminary Socio-Economic Profiles: Demographic

## PRELIMINARY DEMOGRAPHIC PROJECTIONS

This section projects the future size, age/sex structure and rural-urban movement of the population of Indonesia for the period 1971-2001. The demographic projections are based upon the Long-Range Planning Model (2) developed by the Socio-Economic Analysis Staff, U.S. Bureau of the Census.[1/] First, estimates of the model's data input requirements are presented, followed by the demographic projection results.

Base Year Population Estimates: The 1971 population is estimated to be 126.692 million, adjusting for a net understatement in the Indonesian Census data of about 7 percent.[2/] (Table C-1)

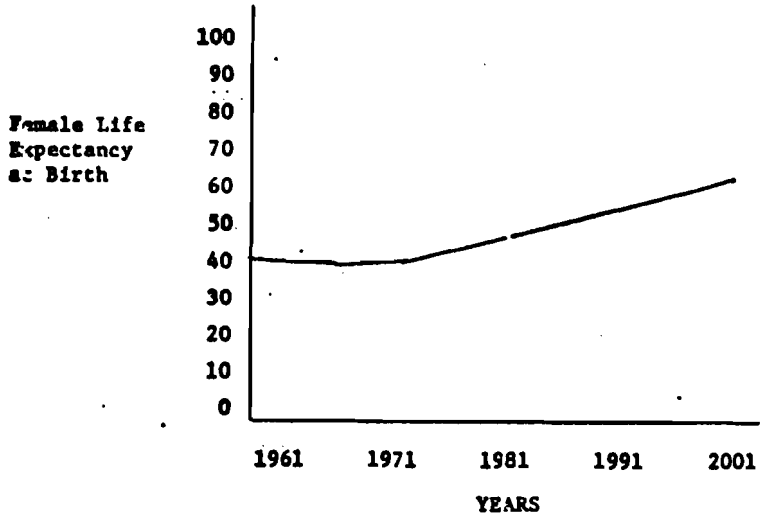
TABLE C-1 — ADJUSTED POPULATION OF INDONESIA BY AGE AND SEX, 1971
(in thousands)

| Age Group | Males | Females |
|---|---|---|
| 0-4 | 10,852 | 10,722 |
| 5-9 | 9,332 | 9,319 |
| 10-14 | 8,062 | 8,061 |
| 15-19 | 7,561 | 7,604 |
| 20-24 | 4,408 | 4,634 |
| 25-29 | 4,335 | 4,569 |
| 30-34 | 3,870 | 4,084 |
| 35-39 | 3,455 | 3,662 |
| 40-44 | 3,021 | 3,308 |
| 45-49 | 2,487 | 2,725 |
| 50-54 | 1,905 | 2,068 |
| 55-59 | 1,317 | 1,402 |
| 60-64 | 858 | 932 |
| 65-69 | 542 | 606 |
| 70+ | 460 | 531 |
| Totals | 62,465 | 64,227 |

Mortality and Fertility Estimates: The future size and age/sex structure of the population projections depend upon the levels and trends assumed for mortality and fertility. Three alternative population projections are made for Indonesia, representing a rapidly, moderately, and slowly growing population. Each projection assumes a different rate of fertility decline while all other factors such as base population, survival rates, and internal migration remain the same in all projections.

Slowly increasing survival rates are assumed in the three projections. Female life expectancy at birth increases linearly over the projection period from about 43 years in 1971 to 60 years in 2001, at an average annual rate of increase of about 1 percent.[3/] (See Figure C-1 and Table C-2) This assumes that life expectancy in

FIGURE C-1 — ESTIMATED TRENDS IN LIFE EXPECTANCY FOR INDONESIA




the next thirty years will increase more rapidly than recent trends; during 1961-1971 life expectancy at birth increased at an annual rate of only .5 percent.[4/] The recent increase in Indonesia's survival rates has been slow and erratic for a number of reasons including a) a late start in public health and sanitation programs; b) precarious and fluctuating food production; c) rapid

rise of food prices relative to incomes; d) high cost of modern medicine relative to incomes; and e) political instability and violence. Control of inflation, increasing incomes, improvements in food supply, and health programs and greater political stability should lead to longer life expectancies in the future.

The three demographic projections differ in their assumptions regarding fertility decline. The rate of fertility decline in a country depends upon variables such as the availability of family planning services, and socio-economic conditions influencing desired family size, such as infant mortality, level of education, labor force participation of women, etc. The level of fertility in Indonesia is high, with a total fertility rate in 1971 of approximately 6.[5/] This is understandable, given the low level of knowledge of contraceptives, high infant mortality, low educational attainment, low urbanization and low participation of women in the labor force.[6/]

A slight decline in total fertility rates has been observed, of about .2 percent per annum between 1961-1971.[7/] The fertility decline will probably continue as family planning knowledge and availability increases, as infant mortality declines, as more women enter the labor force, and in general, as participation in the modern economy increases. Comparison of the present total fertility rate of 6 with the fertility survey estimate of an average ideal family size of 4, suggests that fertility rates may be decreasing in the future as parents attempt to limit their families to the desired size.[8/]

The three projections all assume that fertility will decline at a more rapid rate than the recent past trends. Demographic Projection 1 assumes a slowly declining fertility, with the total fertility rate declining linearly from 6 to 5 over the projection period at an average annual rate of .6 percent. Projection 2 assumes a moderately declining fertility at an average annual rate of about 1.4 percent, or from a total fertility rate of 6 to 4 over the projection period. The third projection assumes a total fertility

TABLE C-2 -- ESTIMATED AGE AND SEX-SPECIFIC SURVIVAL RATES FOR INDONESIA

| Age | 1971 Male | 1971 Female | 2001 Male | 2001 Female |
|---|---|---|---|---|
| Infant | .8223 | .8408 | .9028 | .9180 |
| 0-4 | .9107 | .9199 | .9708 | .9733 |
| 5-9 | .9765 | .9750 | .9915 | .9919 |
| 10-14 | .9644 | .9652 | .9889 | .9896 |
| 15-19 | .9599 | .9616 | .9833 | .9855 |
| 20-24 | .9558 | .9586 | .9798 | .9823 |
| 25-29 | .9521 | .9559 | .9780 | .9798 |
| 30-34 | .9453 | .9509 | .9741 | .9766 |
| 35-39 | .9341 | .9416 | .9674 | .9725 |
| 40-44 | .9159 | .9276 | .9570 | .9666 |
| 45-49 | .8858 | .9038 | .9407 | .9556 |
| 50-54 | .8401 | .8620 | .9166 | .9387 |
| 55-59 | .7687 | .8034 | .8803 | .9109 |
| 60-64 | .6720 | .7327 | .8277 | .8666 |
| 65-69 | .5576 | .6512 | .7527 | .7976 |
| 70+ | .3644 | .4539 | .5109 | .5421 |
| Life Expectancy at Birth | 40.14 | 42.95 | 56.54 | 60.04 |

TABLE C-3 -- ESTIMATED AGE-SPECIFIC BIRTH RATES FOR INDONESIA

| Age Group of Women | 1971 | Projection 1 2001 | Projection 2 2001 | Projection 3 2001 |
|---|---|---|---|---|
| 15-19 | .1099 | .0850 | .0680 | .0354 |
| 20-24 | .2980 | .2800 | .2240 | .2000 |
| 25-29 | .3072 | .2760 | .2208 | .1842 |
| 30-34 | .2366 | .1960 | .1568 | .1158 |
| 35-39 | .1584 | .1130 | .0904 | .0600 |
| 40-44 | .0727 | .0440 | .0352 | .0204 |
| 45-49 | .0205 | .0060 | .0048 | .0018 |
| Total Fertility Rate | 6.0165 | 5.0000 | 4.0000 | 3.0000 |

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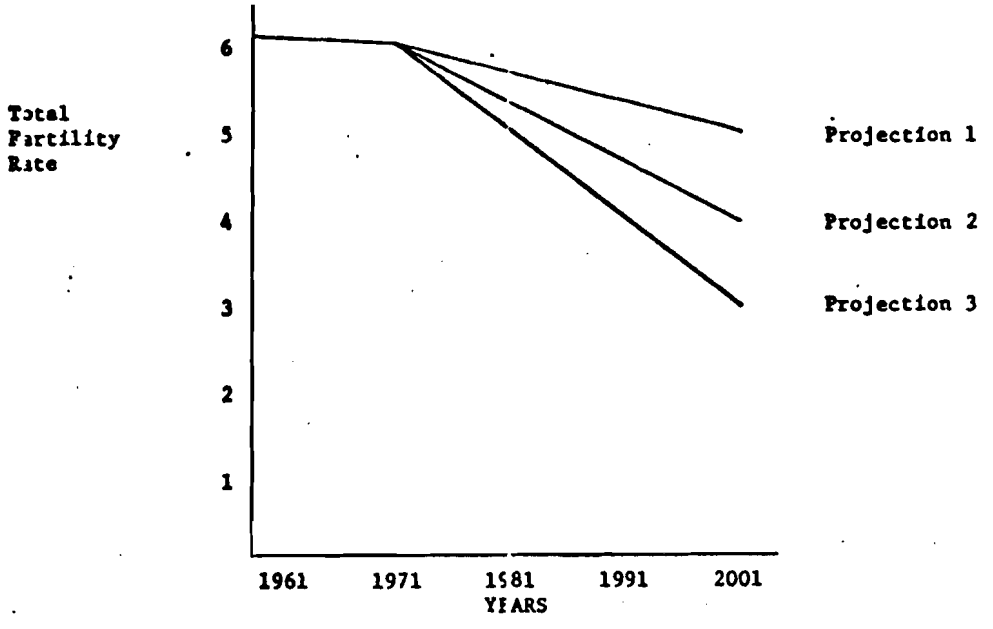
rate of 3 by 2001, which implies a rapid rate of fertility decline of about 2.4 percent per annum.[9/] (See Figure C-2 and Table C-3)

FIGURE C-2 — ESTIMATED TRENDS IN FERTILITY DECLINE FOR INDONESIA




Sex Ratio at Birth and Net International Migration Estimates: Data on the sex ratio at birth for the population of Indonesia is not available. However, the sex ratio at birth in countries with reliable birth statistics generally ranges from 1.04 to 1.07 and a ratio of 1.05 was estimated for the projections.

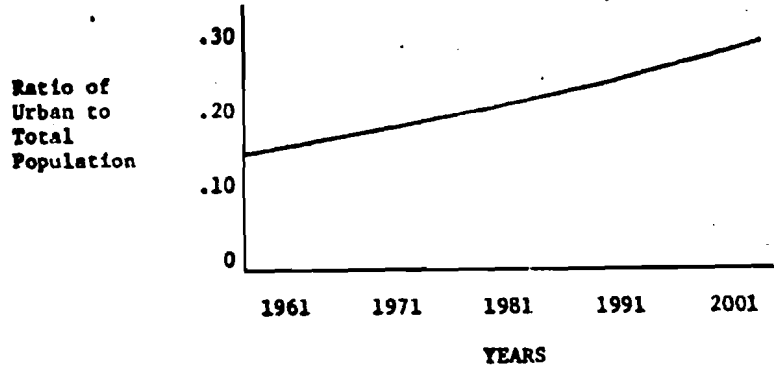
Net international out-migration is not considered in the projections since it is fairly insignificant in Indonesia.[10/]

Internal Migration Estimates: As in many developing countries, Indonesia has experienced growing urbanization. Determinants of the trend towards rural-urban migration include factors such as a widening rural-urban income gap, growing rural land density, farm mechanization, unemployment and underemployment, and greater urban amenities. In 1961 the proportion of the population living in urban areas in Indonesia was estimated to be 14.8 percent and by 1971 it reached 17.5 percent.[11/] Between 1961-1971 the rate of

population growth in rural areas was about 2.2 percent and in urban areas was about 4.2 percent. The 2 percent difference in rural-urban growth rates is the consequence of internal migration towards the cities and of any rural-urban differences in birth and survival rates.

Rural-urban population is projected using the UN growth rate difference method,[12/] assuming that the 2 percent difference between urban and rural population growth rates observed in 1961-1971 remains constant over the 1971-2001 projection period. The age and sex structure of the rural and urban populations over the projection period is assumed to retain the peculiarities existing in the base year data.[13/]

FIGURE C-3 -- ESTIMATED TREND IN PROPORTION OF POPULATION LIVING IN URBAN AREAS



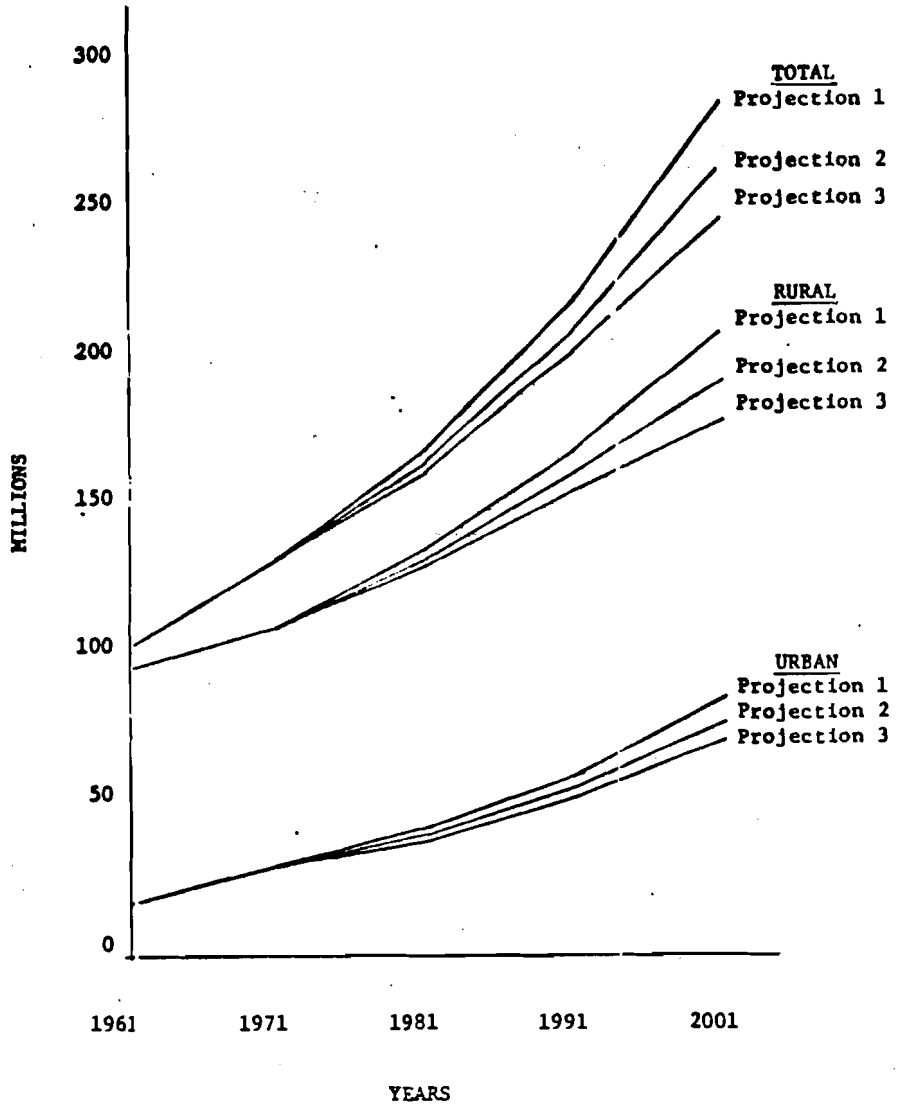

Demographic Projection Results: In 1971 the total population was estimated to be 126.7 million, of which 22.2 million are located in urban areas and 104.5 in rural areas. By the year 2001, the population sizes had grown to the following magnitudes:

| | Total Population | Rural Population | Urban Population |
|---|---|---|---|
| Projection 1 | 279.4 million | 201.5 million | 77.9 million |
| Projection 2 | 257.2 million | 185.5 million | 71.7 million |
| Projection 3 | 238.0 million | 171.7 million | 66.4 million |

The impact of rapidly declining fertility results by 2001 in a total population 41.4 million less than for slowly declining fertility, or about 15 percent less. As will be seen below, this will have significant implications for future socio-economic development requirements.

Figure C-4 below shows graphically the trends in total, rural, and urban population under alternative fertility decline assumptions. In all three projections, the percent of the population living in urban areas increases from 17.5 percent in 1971 to 27.9 percent in 2001.

FIGURE C-4 -- TOTAL, RURAL, AND URBAN POPULATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS



The implications of the alternative fertility decline assumptions for trends in births, deaths, crude birth rates, crude death rates, and gross reproduction rates are found in Table C-6. The alternative fertility assumptions also affect the age structure of the population. Whereas in the base year 44.5 percent of the population is under age fifteen, by the year 2001 the percent of the population under age fifteen is 42.5 in Projection 1, 39.0 in Projection 2, and 35.4 in Projection 3. Thus, a more slowly declining fertility implies a younger population.(See Table C-7) The age structure of a population is of significant importance to planners; it affects the size of target populations such as the school-age population, the work-age population, the female population in reproductive age groups, the elderly, etc.

During the decade 1961-1971 it has been estimated that total population grew at an average annual rate of 2.4 percent. In the 1971-2001 projections, survival rates continue to improve while fertility rates decline. The first projection, which assumes slowly declining fertility, has an average annual rate of population growth of 2.7 percent, an acceleration over past trends. This is due to increases in survival rates in excess of decline in fertility. In the second projection, the moderately declining fertility assumption, the population growth rate remains fairly constant at 2.4 percent. The final Projection 3 with rapidly declining fertility has an average annual growth rate of 2.1 percent. Due to rural-urban migration, population in urban areas grows more rapidly than in rural areas. During 1961-1971 it is estimated that urban population grew at an annual rate of 4.2 percent while the rural population grew at only 2.2 percent. The future rates of growth of rural and urban populations under the three alternative demographic projections are displayed below:

TABLE C-4 — COMPARISON OF POPULATION GROWTH RATES UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Population | 1971-1981 | 1971-2001 | 1961-1971 |
|---|---|---|---|---|
| 1. Rapid Population Growth -- Slowly Declining Fertility | Total | 2.5 | 2.7 | 2.4 |
| | Rural | 2.1 | 2.2 | 2.2 |
| | Urban | 4.2 | 4.3 | 4.2 |
| 2. Moderate Population Growth -- Moderately Declining Fertility | Total | 2.4 | 2.4 | 2.4 |
| | Rural | 2.0 | 1.9 | 2.2 |
| | Urban | 4.1 | 4.0 | 4.2 |
| 3. Slow Population Growth -- Rapidly Declining Fertility | Total | 2.3 | 2.1 | 2.4 |
| | Rural | 1.9 | 1.7 | 2.2 |
| | Urban | 4.0 | 3.7 | 4.2 |

Figures C-5 _ C-7 reveal some of the peculiarities of the population's age/sex structure. In the total population, there is little difference in the size of the 20-24 and the 25-29 age groups; this is due to historical factors; lower fertility and high infant mortality during the war years. The urban population pyramid has a 'bulge' in the 10-25 age groups, especially for males. This may be explained by a greater propensity of male youths to migrate to urban areas.

## FOOTNOTES FOR APPENDIX C

## PRELIMINARY DEMOGRAPHIC PROJECTIONS

1/ For a brief description of the LRPM2 methodology, data requirements and output, see Appendix B. For greater detail refer to the Operational Manuals, Socio-Economic Analysis Staff Papers, No. 72-3 to 72-11. For the demographic projections, submodels DEMOG2 and MIGRAT2 were used.

2/ The 1971 Indonesian Census figure for total population is 119.141 million. The adjusted population data used for the projections are preliminary estimates of the International Statistical Programs Center, U.S. Bureau of the Census.

3/ The 1971 age/sex-specific survival rates are ISPC estimates; see Larry Heligman, Level and Trends of Mortality in Indonesia 1961-1971, ISPC, U.S. Bureau of the Census, forthcoming. The Coale and Demeny West Region Model Life Table was assumed to be applicable to Indonesia in 2001. Survival rates over the projection interval were assumed to change lineraly. (See Ansley J. Coale and Paul Demeny, Regional Model Life Tables and Stable Populations, Princeton University Press, 1966.

4/ ISPC estimates life expectancy at birth in Indonesia to have increased from 39.5 years in 1961 to 41.5 years in 1971.

5/ the total fertility rate is the average number of live births per woman over the childbearing period (between 15-49 years).

6/ The Preliminary Report of the Indonesian Fertility-Mortality Survey 1973 indicates that there are almost no rural-urban differences in fertility. The mere incidence of urbanization does not automatically produce lower fertility when one considers that large numbers of urban dwellers live in squatter settlements, are underemployed in various traditional 'services', have not yet been drawn into the modern sector and have not yet changed from their traditional life style. Slight fertility differentials exist according to educational attainment. Contrary to normal expectations, in urban areas there appears to be a tendency for fertility to rise with educational levels. This may be explained by the extreme economic difficulties of the uneducated. In

rural areas, fertility is also higher among those with primary education than those without, but the better educated generally have slightly smaller families than those with only primary education. Fertility is apparently affected by the work-status of women; as more women become economically active, fertility rates will probably decrease.

7/ ISPC estimates a total fertility rate of 6.13 in 1961 and 6.02 in 1971.

8/ Indonesian Fertility-Mortality Survey 1973, op.cit., p. 17. It should be cautioned that if infant and child mortality remain high, parents will continue to have high fertility in order to ensure attainment of their moderate-desired family size.

9/ The 1971 age-specific birth rates are ISPC estimates. The age pattern of fertility for Projection 3 in 2001 is the UN low fertility, broad-peak pattern. The fertility age pattern distributions applicable in 2001 for Projections 1 and 2 are intermediate between the base year fertility pattern and the UN low fertility, broad-peak pattern. Linear interpolation is used between birth rates over the projection interval. (See Population Bulletin of the United Nations, UN Publication #7, 1963, pp. 101-121)

10/ Net out migrants were about .01% of the total population in 1970: see The Population of Indonesia, CICRED Series, p. 19.

11/ In 1961 urban areas was defined as municipalities, kabuputen capitals and other places with urban characteristics and population exceeding 20,000. The 1971 census extended the definition slightly by classifying each desa (village) other than those with municipal boundries as urban or rural on the basis of simple criteria, effectively removing the lower bound of 20,000 and probably making the census limits for all urban places coincide approximately with the limits of urbanized areas. See The Population of Indonesia, CICRED Series, p. 49.

12/ For more detail on this method see UN Population Division, Department of Economic and Social Affairs, Some Simple Methods for Urban and Rural Population Forecasts, United Nations Publications ESA/P/W.P.41, September 1971.

13/ IBID, pp. 88-107.

FIGURE C-5 -- AGE AND SEX STRUCTURE OF THE TOTAL POPULATION IN 1971 and 2001 UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

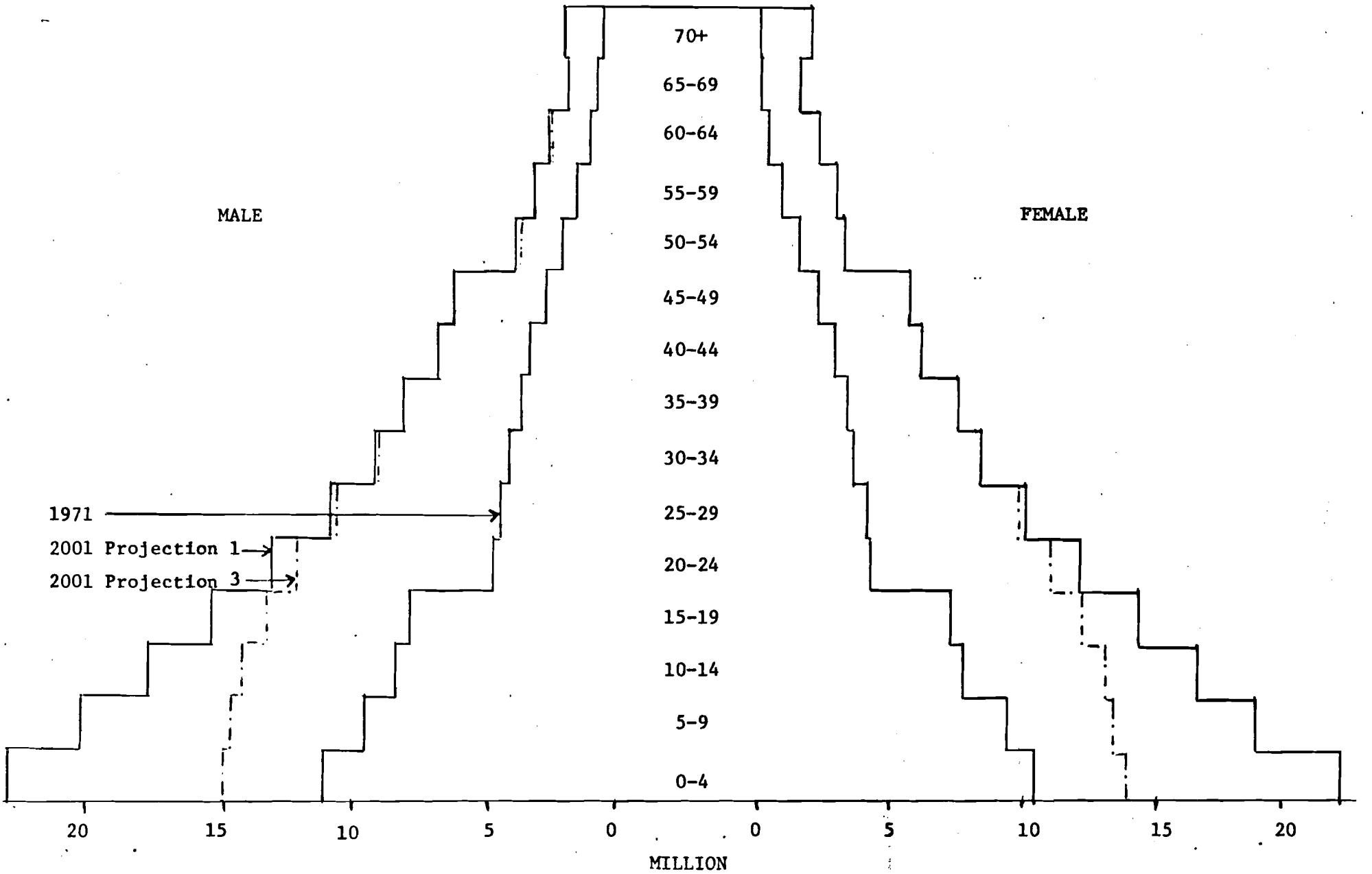


FIGURE C-6 -- AGE AND SEX STRUCTURE OF THE URBAN POPULATION IN 1971 and 2001 UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

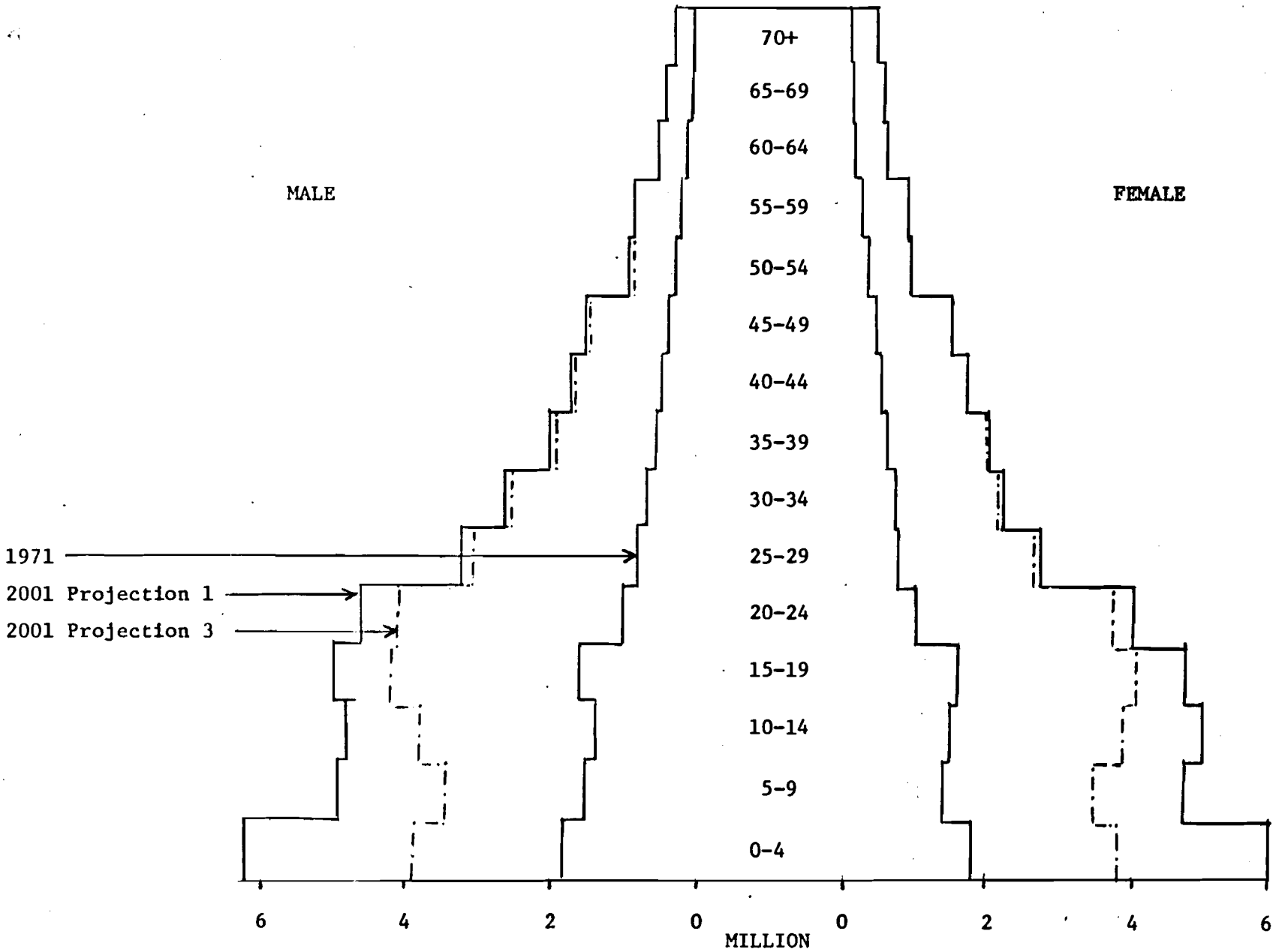


FIGURE C-7 -- AGE AND SEX STRUCTURE OF THE RURAL POPULATION IN 1971 and 2001 UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

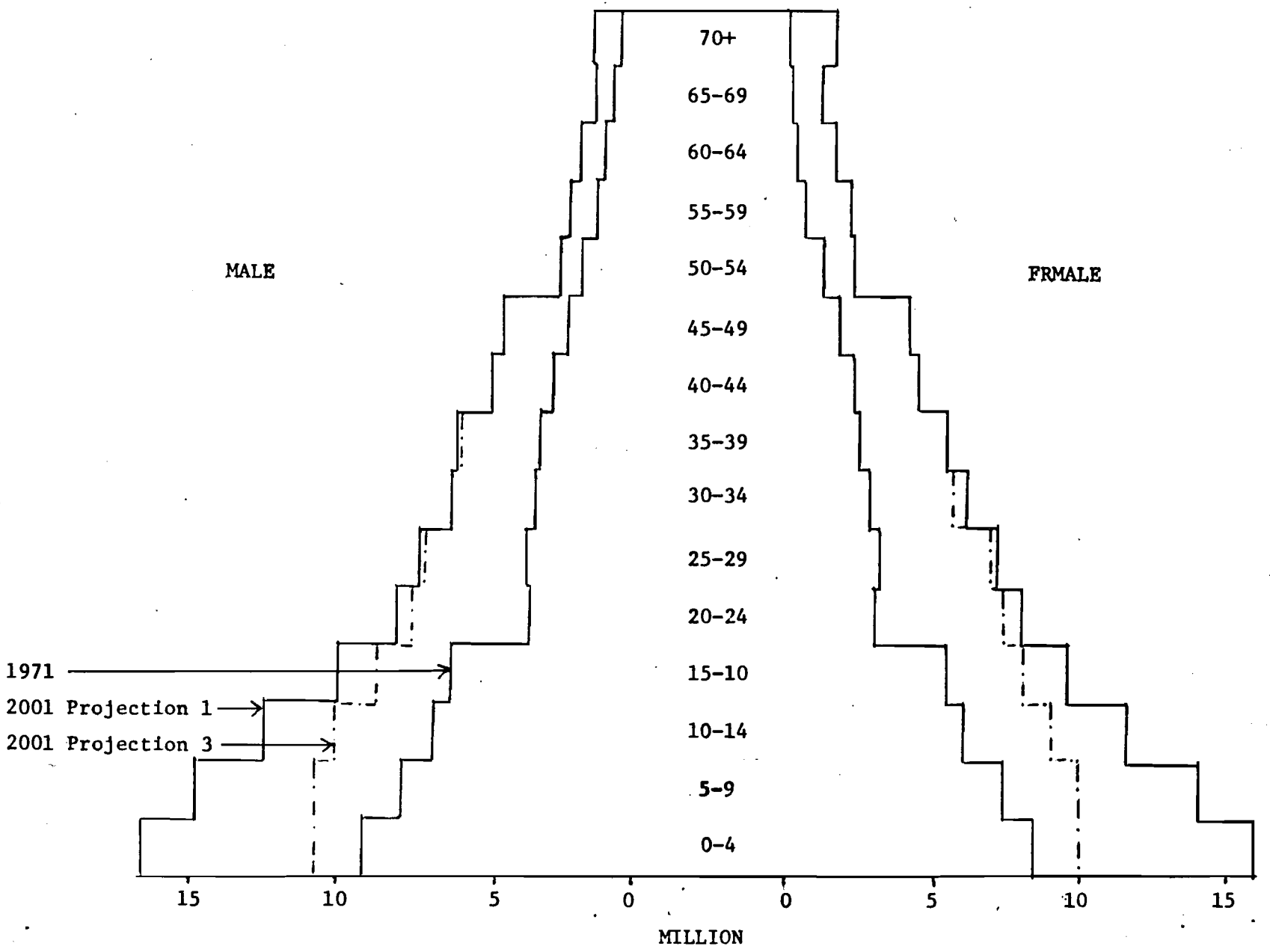


TABLE C-5 -- TOTAL POPULATION BY SEX AND LOCATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Total Population | Males | Females | Rural Population | Urban Population | Ratio of Urban to Total Population |
|---|---|---|---|---|---|---|---|
| 1. Rapid Population Growth -- Slowly Declining Fertility | 1971 | 126,692 | 62,465 | 64,227 | 104,521 | 22,171 | .1750 |
| | 1976 | 142,704 | 70,492 | 72,212 | 115,603 | 27,101 | .1899 |
| | 1981 | 162,199 | 80,309 | 81,890 | 128,823 | 11,376 | .2058 |
| | 1986 | 185,390 | 92,015 | 93,374 | 144,123 | 41,267 | .2226 |
| | 1991 | 212,332 | 105,635 | 106,697 | 161,292 | 51,040 | .2404 |
| | 1996 | 243,339 | 121,331 | 122,008 | 180,288 | 63,051 | .2591 |
| | 2001 | 279,364 | 139,586 | 139,778 | 201,487 | 77,877 | .2788 |
| 2. Moderate Population Growth -- Moderately Declining Fertility | 1971 | 126,692 | 62,465 | 64,227 | 104,521 | 22,171 | .1750 |
| | 1976 | 142,355 | 70,315 | 72,040 | 115,320 | 27,035 | .1899 |
| | 1981 | 160,628 | 79,513 | 81,115 | 127,575 | 33,053 | .2058 |
| | 1986 | 181,464 | 90,027 | 91,437 | 141,071 | 40,393 | .2226 |
| | 1991 | 204,595 | 101,716 | 102,879 | 155,415 | 49,181 | .2404 |
| | 1996 | 229,822 | 114,482 | 115,340 | 170,273 | 59,549 | .2591 |
| | 2001 | 257,229 | 128,365 | 128,864 | 185,523 | 71,706 | .2788 |
| 3. Slow Population Growth -- Rapidly Declining Fertility | 1971 | 126,692 | 62,465 | 64,227 | 104,521 | 22,171 | .1750 |
| | 1976 | 142,038 | 70,155 | 71,883 | 115,064 | 26,974 | .1899 |
| | 1981 | 159,245 | 78,813 | 80,432 | 126,477 | 32,768 | .2058 |
| | 1986 | 178,036 | 88,291 | 89,745 | 138,406 | 39,630 | .2226 |
| | 1991 | 187,831 | 98,289 | 99,542 | 150,277 | 47,554 | .2404 |
| | 1996 | 217,997 | 108,490 | 109,507 | 161,512 | 56,485 | .2591 |
| | 2001 | 238,027 | 118,631 | 119,396 | 171,674 | 66,353 | .2788 |

TABLE C-6 -- VARIOUS DEMOGRAPHIC CHARACTERISTICS UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Year | Births 1/ (in thousands) | Deaths 1/ (in thousands) | Crude Birth Rate | Crude Death Rate | Gross Reproduction Rate | Female Life Expectancy at Birth | Male Life Expectancy at Birth | Rural-Urban Migrants (in thousands) |
|---|---|---|---|---|---|---|---|---|---|
| 1. Rapid Population Growth -- Slowly Declining Fertility | 1971-1976 | 29,209 | 13,197 | .0434 | .0196 | 2.894 | 44.10 | 41.23 | 2,128 |
| | 1976-1981 | 33,156 | 13,661 | .0435 | .0179 | 2.811 | 46.52 | 43.53 | 2,573 |
| | 1981-1986 | 37,250 | 14,059 | .0429 | .0162 | 2.728 | 49.12 | 46.02 | 3,119 |
| | 1986-1991 | 41,230 | 14,288 | .0415 | .0144 | 2.646 | 51.93 | 48.71 | 3,776 |
| | 1991-1996 | 45,336 | 14,328 | .0398 | .0126 | 2,563 | 54.98 | 51.63 | 4,558 |
| | 1996-2001 | 50,208 | 14,182 | .0384 | .0109 | 2.480 | 58.28 | 54.83 | 5,491 |
| 2. Moderate Population Growth -- Moderately Declining Fertility | 1971-1976 | 28,792 | 13,129 | .0428 | .0195 | 2.853 | 44.10 | 41.23 | 2,122 |
| | 1976-1981 | 31,691 | 13,418 | .0418 | .0177 | 2.689 | 46.52 | 43.53 | 2,548 |
| | 1981-1986 | 34,430 | 13.594 | .0403 | .0159 | 2.525 | 49.12 | 46.02 | 3,053 |
| | 1986-1991 | 36,715 | 13,584 | .0380 | .0141 | 2.361 | 51.93 | 48.71 | 3,638 |
| | 1991-1996 | 38,596 | 13,369 | .0355 | .0123 | 2.197 | 54.98 | 51.63 | 4,305 |
| | 1996-2001 | 40,351 | 12,944 | .0331 | .0106 | 2.033 | 58.28 | 54.83 | 5,056 |
| 3. Slow Population Growth -- Rapidly Declining Fertility | 1971-1976 | 28,414 | 13,068 | .0423 | .0195 | 2.816 | 44.10 | 41.23 | 2,118 |
| | 1976-1981 | 30,412 | 13,205 | .0404 | .0175 | 2.578 | 46.52 | 43.53 | 2,526 |
| | 1981-1986 | 31,980 | 13,189 | .0379 | .0156 | 2.340 | 49.12 | 46.02 | 2,995 |
| | 1986-1991 | 32,764 | 12,969 | .0349 | .0138 | 2.102 | 51.93 | 48.71 | 3,518 |
| | 1991-1996 | 32,695 | 12,528 | .0315 | .0121 | 1.863 | 54.98 | 51.63 | 4,083 |
| | 1996-2001 | 31,908 | 11,878 | .0280 | .0104 | 1.625 | 58.28 | 54.83 | 4,678 |

1/ Five-year totals.

TABLE C-7 -- TOTAL POPULATION BY AGE STRUCTURE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Total Population | Population in Age Group 0-14 | 15-64 | 65+ | Ratio to Total Population 0-14 | 15-64 | 65+ | Number of "Dependents" per 100 "Work-Age" Population |
|---|---|---|---|---|---|---|---|---|---|
| 1. Rapid Population Growth -- Slowly Declining Fertility | 1971 | 126,692 | 56,348 | 68,205 | 2,139 | .445 | .538 | .017 | 85 |
| | 1976 | 142,704 | 62,546 | 77,746 | 2,412 | .438 | .545 | .017 | 82 |
| | 1981 | 162,199 | 70,410 | 88,853 | 2,936 | .434 | .548 | .018 | 82 |
| | 1986 | 185,390 | 81,031 | 100,531 | 3,828 | .437 | .542 | .021 | 85 |
| | 1991 | 212,332 | 92,799 | 114,526 | 5,008 | .437 | .539 | .024 | 85 |
| | 1996 | 243,338 | 105,172 | 131,773 | 6,393 | .432 | .542 | .026 | 85 |
| | 2001 | 279,363 | 118,734 | 152,781 | 7,848 | .425 | .547 | .028 | 82 |
| 2. Moderate Population Growth -- Moderately Declining Fertility | 1971 | 126,692 | 56,348 | 68,205 | 2,139 | .445 | .538 | .017 | 85 |
| | 1976 | 142,355 | 62,197 | 77,746 | 2,412 | .437 | .546 | .017 | 82 |
| | 1981 | 160,628 | 68,839 | 88,853 | 2,936 | .429 | .553 | .018 | 82 |
| | 1986 | 181,464 | 77,105 | 100,531 | 3,828 | .425 | .554 | .021 | 82 |
| | 1991 | 204,595 | 85,373 | 114,214 | 5,008 | .417 | .558 | .024 | 79 |
| | 1996 | 229,822 | 93,094 | 130,335 | 6,393 | .405 | .567 | .028 | 75 |
| | 2001 | 257,229 | 100,265 | 149,116 | 7,848 | .390 | .580 | .031 | 72 |
| 3. Slow Population Growth -- Rapidly Declining Fertility | 1971 | 126,692 | 56,348 | 68,205 | 2,139 | .445 | .538 | .017 | 85 |
| | 1976 | 142,038 | 61,880 | 77,746 | 2,412 | .436 | .547 | .017 | 82 |
| | 1981 | 159,245 | 67,457 | 88,852 | 2,936 | .424 | .558 | .018 | 79 |
| | 1986 | 178,036 | 73,677 | 100,531 | 3,828 | .414 | .565 | .022 | 75 |
| | 1991 | 197,831 | 78,893 | 113,931 | 5,008 | .399 | .576 | .025 | 72 |
| | 1996 | 217,997 | 82,536 | 129,068 | 6,393 | .379 | .592 | .029 | 69 |
| | 2001 | 238,027 | 84,264 | 145,915 | 7,848 | .354 | .613 | .033 | 64 |

TABLE C-8 -- POPULATION BY AGE, SEX, AND LOCATION UNDER PROJECTION 1 - RAPID POPULATION GROWTH
(in thousands)

| Age | RURAL MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 9,026 | 10,151 | 11,483 | 12,835 | 14,098 | 15,368 | 16,836 | 1,826 | 2,251 | 2,823 | 3,494 | 4,258 | 5,128 | 6,208 |
| 5-9 | 7,895 | 8,285 | 9,403 | 10,754 | 12,144 | 13,495 | 14,866 | 1,437 | 1,652 | 2,079 | 2,633 | 3,299 | 4,050 | 4,930 |
| 10-14 | 6,659 | 7,413 | 7,756 | 8,791 | 10,034 | 11,321 | 12,554 | 1,403 | 1,712 | 1,985 | 2,492 | 3,156 | 3,933 | 4,820 |
| 15-19 | 5,948 | 6,007 | 6,662 | 6,956 | 7,861 | 8,958 | 10,076 | 1,613 | 1,785 | 2,194 | 2,537 | 3,181 | 4,005 | 4,978 |
| 20-24 | 3,363 | 5,425 | 5,462 | 6,055 | 6,313 | 7,136 | 8,121 | 1,045 | 1,848 | 2,063 | 2,532 | 2,929 | 3,658 | 4,600 |
| 25-29 | 3,493 | 3,339 | 5,409 | 5,487 | 6,123 | 6,439 | 7,331 | 843 | 883 | 1,585 | 1,781 | 2,205 | 2,562 | 3,223 |
| 30-34 | 3,144 | 3,302 | 3,161 | 5,139 | 5,228 | 5,860 | 6,182 | 726 | 835 | 886 | 1,596 | 1,801 | 2,230 | 2,601 |
| 35-39 | 2,917 | 3,051 | 3,219 | 3,105 | 5,082 | 5,212 | 5,835 | 538 | 616 | 721 | 770 | 1,398 | 1,584 | 1,977 |
| 40-44 | 2,511 | 2,647 | 2,772 | 2,933 | 2,834 | 4,655 | 4,784 | 510 | 590 | 685 | 802 | 860 | 1,560 | 1,772 |
| 45-49 | 2,081 | 2,288 | 2,423 | 2,554 | 2,719 | 2,646 | 4,371 | 406 | 489 | 575 | 671 | 792 | 852 | 1,555 |
| 50-54 | 1,597 | 1,828 | 2,024 | 2,163 | 2,298 | 2,469 | 2,423 | 308 | 386 | 474 | 561 | 662 | 785 | 852 |
| 55-59 | 1,087 | 1,309 | 1,513 | 1,695 | 1,831 | 1,969 | 2,137 | 230 | 304 | 389 | 483 | 579 | 688 | 825 |
| 60-64 | 741 | 874 | 1,078 | 1,280 | 1,471 | 1,631 | 1,798 | 117 | 151 | 206 | 271 | 346 | 423 | 516 |
| 65-69 | 458 | 489 | 595 | 758 | 928 | 1,099 | 1,253 | 89 | 99 | 133 | 188 | 255 | 334 | 421 |
| 70+ | 396 | 412 | 416 | 575 | 767 | 1,015 | 1,312 | 69 | 72 | 90 | 124 | 184 | 269 | 384 |

| Age | RURAL FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 8,960 | 9,931 | 11,228 | 12,543 | 13,773 | 15,007 | 16,435 | 1,762 | 2,141 | 2,683 | 3,319 | 4,043 | 4,868 | 5,891 |
| 5-9 | 7,905 | 8,286 | 9,254 | 10,563 | 11,906 | 13,206 | 14,520 | 1,415 | 1,625 | 2,012 | 2,543 | 3,180 | 3,897 | 4,735 |
| 10-14 | 6,585 | 7,305 | 7,628 | 8,501 | 9,673 | 10,880 | 12,028 | 1,476 | 1,794 | 2,077 | 2,563 | 3,235 | 4,020 | 4,912 |
| 15-19 | 6,035 | 6,068 | 6,716 | 7,013 | 7,806 | 8,885 | 9,984 | 1,569 | 1,729 | 2,122 | 2,453 | 3,030 | 3,810 | 4,731 |
| 20-24 | 3,673 | 5,694 | 5,724 | 6,350 | 6,640 | 7,413 | 8,453 | 962 | 1,634 | 1,821 | 2,237 | 2,595 | 3,201 | 4,033 |
| 25-29 | 3,819 | 3,663 | 5,705 | 5,779 | 6,456 | 6,810 | 7,662 | 750 | 789 | 1,362 | 1,528 | 1,894 | 2,207 | 2,744 |
| 30-34 | 3,420 | 3,609 | 3,464 | 5,412 | 5,494 | 6,159 | 6,512 | 664 | 768 | 817 | 1,414 | 1,592 | 1,972 | 2,304 |
| 35-39 | 3,063 | 3,205 | 3,385 | 3,259 | 5,103 | 5,198 | 5,841 | 599 | 687 | 805 | 858 | 1,490 | 1,677 | 2,083 |
| 40-44 | 2,780 | 2,862 | 3,002 | 3,185 | 3,078 | 4,843 | 4,953 | 528 | 596 | 693 | 814 | 873 | 1,518 | 1,715 |
| 45-49 | 2,295 | 2,555 | 2,640 | 2,786 | 2,970 | 2,889 | 4,569 | 430 | 524 | 601 | 702 | 830 | 892 | 1,559 |
| 50-54 | 1,737 | 2,047 | 2,293 | 2,388 | 2,537 | 2,727 | 2,670 | 331 | 427 | 530 | 612 | 720 | 856 | 927 |
| 55-59 | 1,165 | 1,468 | 1,748 | 1,980 | 2,085 | 2,241 | 2,435 | 238 | 328 | 433 | 543 | 635 | 754 | 905 |
| 60-64 | 801 | 966 | 1,245 | 1,517 | 1,758 | 1,895 | 2,083 | 131 | 173 | 246 | 333 | 428 | 509 | 619 |
| 65-69 | 508 | 572 | 707 | 933 | 1,164 | 1,382 | 1,522 | 98 | 121 | 166 | 242 | 335 | 440 | 535 |
| 70+ | 461 | 554 | 662 | 835 | 1,120 | 1,483 | 1,896 | 70 | 93 | 123 | 171 | 255 | 373 | 527 |

TABLE C-9 -- POPULATION BY AGE, SEX, AND LOCATION UNDER PROJECTION 2 - MODERATE POPULATION GROWTH
(in thousands)

| Age | RURAL MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 9,026 | 10,007 | 10,978 | 11,868 | 12,562 | 13,091 | 13,537 | 1,826 | 2,219 | 2,696 | 3,225 | 3,785 | 4,358 | 4,983 |
| 5-9 | 7,895 | 8,285 | 9,270 | 10,283 | 11,231 | 12,024 | 12,661 | 1,437 | 1,652 | 2,048 | 2,513 | 3,043 | 3,600 | 4,191 |
| 10-14 | 6,659 | 7,413 | 7,757 | 8,669 | 9,596 | 10,470 | 11,185 | 1,403 | 1,711 | 1,984 | 2,453 | 3,011 | 3,629 | 4,287 |
| 15-19 | 5,948 | 6,007 | 6,663 | 6,960 | 7,755 | 8,568 | 9,318 | 1,613 | 1,784 | 2,193 | 2,534 | 3,131 | 3,822 | 4,596 |
| 20-24 | 3,363 | 5,425 | 5,463 | 6,058 | 6,318 | 7,040 | 7,767 | 1,045 | 1,848 | 2,061 | 2,529 | 2,924 | 3,600 | 4,392 |
| 25-29 | 3,493 | 3,339 | 5,410 | 5,489 | 6,127 | 6,443 | 7,231 | 843 | 883 | 1,584 | 1,778 | 2,201 | 2,557 | 3,173 |
| 30-34 | 3,144 | 3,302 | 3,161 | 5,141 | 5,231 | 5,864 | 6,186 | 726 | 835 | 886 | 1,594 | 1,798 | 2,227 | 2,597 |
| 35-39 | 2,917 | 3,051 | 3,270 | 3,106 | 5,085 | 5,215 | 5,887 | 538 | 616 | 720 | 769 | 1,395 | 1,581 | 1,974 |
| 40-44 | 2,511 | 2,647 | 2,772 | 2,934 | 2,836 | 4,657 | 4,786 | 510 | 590 | 684 | 801 | 858 | 1,558 | 1,770 |
| 45-49 | 2,081 | 2,288 | 2,424 | 2,555 | 2,720 | 2,647 | 4,373 | 406 | 489 | 574 | 670 | 791 | 850 | 1,553 |
| 50-54 | 1,597 | 1,828 | 2,024 | 2,164 | 2,300 | 2,470 | 2,424 | 308 | 386 | 474 | 561 | 661 | 784 | 850 |
| 55-59 | 1,087 | 1,309 | 1,514 | 1,696 | 1,832 | 1,970 | 2,138 | 230 | 304 | 389 | 482 | 578 | 687 | 824 |
| 60-64 | 741 | 874 | 1,079 | 1,280 | 1,472 | 1,632 | 1,799 | 117 | 151 | 206 | 271 | 345 | 423 | 515 |
| 65-69 | 458 | 489 | 595 | 759 | 928 | 1,099 | 1,253 | 84 | 99 | 133 | 188 | 255 | 334 | 420 |
| 70+ | 396 | 412 | 461 | 576 | 767 | 1,016 | 1,312 | 64 | 72 | 90 | 124 | 183 | 268 | 383 |

| Age | RURAL FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 8,960 | 9,790 | 10,734 | 11,508 | 12,271 | 12,783 | 13,215 | 1,762 | 2,110 | 2,563 | 3,064 | 3,594 | 4,137 | 4,728 |
| 5-9 | 7,905 | 8,286 | 9,123 | 10,100 | 11,010 | 11,766 | 12,367 | 1,415 | 1,625 | 1,982 | 2,427 | 2,934 | 3,464 | 4,026 |
| 10-14 | 6,585 | 7,306 | 7,630 | 8,383 | 9,251 | 10,062 | 10,717 | 1,476 | 1,794 | 2,075 | 2,523 | 3,087 | 3,710 | 4,368 |
| 15-19 | 6,035 | 6,068 | 6,718 | 7,016 | 7,700 | 8,498 | 9,233 | 1,569 | 1,729 | 2,120 | 2,450 | 2,981 | 3,636 | 4,367 |
| 20-24 | 3,673 | 5,694 | 5,725 | 6,353 | 6,644 | 7,313 | 8,084 | 962 | 1,633 | 1,819 | 2,234 | 2,590 | 3,150 | 3,850 |
| 25-29 | 3,819 | 3,663 | 5,706 | 5,781 | 6,460 | 6,814 | 7,556 | 750 | 788 | 1,361 | 1,525 | 1,890 | 2,203 | 2,701 |
| 30-34 | 3,420 | 3,609 | 3,465 | 5,414 | 5,497 | 6,163 | 6,515 | 664 | 768 | 817 | 1,412 | 1,589 | 1,969 | 2,301 |
| 35-39 | 3,063 | 3,205 | 3,386 | 3,260 | 5,106 | 5,200 | 5,844 | 599 | 687 | 804 | 857 | 1,468 | 1,674 | 2,080 |
| 40-44 | 2,780 | 2,862 | 3,003 | 3,186 | 3,080 | 4,846 | 4,955 | 528 | 596 | 692 | 813 | 871 | 1,515 | 1,713 |
| 45-49 | 2,295 | 2,555 | 2,641 | 2,787 | 2,972 | 2,890 | 4,571 | 430 | 524 | 600 | 701 | 829 | 890 | 1,557 |
| 50-54 | 1,737 | 2,047 | 2,293 | 2,388 | 2,538 | 2,728 | 2,671 | 331 | 427 | 530 | 611 | 720 | 855 | 925 |
| 55-59 | 1,165 | 1,468 | 1,748 | 1,981 | 2,086 | 2,243 | 2,436 | 238 | 328 | 433 | 543 | 634 | 753 | 904 |
| 60-64 | 801 | 966 | 1,245 | 1,518 | 1,759 | 1,896 | 2,084 | 131 | 173 | 246 | 332 | 427 | 508 | 618 |
| 65-69 | 508 | 572 | 707 | 934 | 1,165 | 1,382 | 1,522 | 98 | 121 | 166 | 242 | 335 | 439 | 534 |
| 70+ | 461 | 554 | 662 | 836 | 1,120 | 1,484 | 1,897 | 70 | 93 | 123 | 171 | 254 | 372 | 526 |

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TABLE C-10 -- POPULATION BY AGE, SEX, AND LOCATION UNDER PROJECTION 3 - SLOW POPULATION GROWTH
(in thousands)

| Age | RURAL MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN MALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 9,026 | 9.876 | 10.536 | 11.027 | 11.216 | 11,096 | 10,710 | 1,826 | 2.189 | 2.586 | 2,992 | 3,372 | 3,686 | 3,935 |
| 5-9 | 7,895 | 8,286 | 9,150 | 9,871 | 10,437 | 10,736 | 10,730 | 1,437 | 1,652 | 2,020 | 2,408 | 2,822 | 3,207 | 3,546 |
| 10-14 | 6,659 | 7,413 | 7,758 | 8,559 | 9,214 | 9,730 | 9,986 | 1,403 | 1,711 | 1,983 | 2,418 | 2,884 | 3,365 | 3,821 |
| 15-19 | 5,948 | 6,007 | 6,664 | 6,963 | 7,658 | 8,228 | 8,660 | 1,613 | 1,784 | 2,191 | 2,531 | 3,085 | 3,662 | 4,263 |
| 20-24 | 3,363 | 5,425 | 5,465 | 6,061 | 6,323 | 6,953 | 7,458 | 1,045 | 1,847 | 2,060 | 2,526 | 2,920 | 3,548 | 4,210 |
| 25-29 | 3,493 | 3,339 | 5,411 | 5,491 | 6,130 | 6,447 | 7,140 | 843 | 883 | 1,583 | 1,776 | 2,197 | 2,553 | 3,128 |
| 30-34 | 3,144 | 3,302 | 3,162 | 5,144 | 5,234 | 5,867 | 6,189 | 726 | 835 | 885 | 1,592 | 1,795 | 2,223 | 2,594 |
| 35-39 | 2,917 | 3,052 | 3,220 | 3,107 | 5,087 | 5,218 | 5,890 | 538 | 616 | 720 | 768 | 1,393 | 1,579 | 1,971 |
| 40-44 | 2,511 | 2,647 | 2,773 | 2,935 | 2,837 | 5,660 | 4,789 | 510 | 590 | 684 | 800 | 857 | 1,555 | 1,767 |
| 45-49 | 2,081 | 2,288 | 2,424 | 2,556 | 2,721 | 2,649 | 4,375 | 406 | 489 | 574 | 669 | 789 | 849 | 1,551 |
| 50-54 | 1,597 | 1,828 | 2,025 | 2,164 | 2,301 | 2,472 | 2,425 | 308 | 386 | 474 | 560 | 659 | 783 | 849 |
| 55-59 | 1,087 | 1,309 | 1,514 | 1,697 | 1,833 | 1,971 | 2,139 | 230 | 304 | 389 | 482 | 577 | 685 | 823 |
| 60-64 | 741 | 874 | 1,079 | 1,281 | 1,472 | 1,633 | 1,800 | 117 | 151 | 206 | 270 | 344 | 422 | 514 |
| 65-69 | 458 | 489 | 595 | 759 | 929 | 1,100 | 1,254 | 84 | 99 | 133 | 188 | 254 | 333 | 420 |
| 70+ | 396 | 412 | 461 | 576 | 767 | 1,016 | 1,313 | 64 | 72 | 90 | 124 | 183 | 268 | 382 |

| Age | RURAL FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | URBAN FEMALE 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-4 | 8,960 | 9,661 | 10,302 | 10,777 | 10,956 | 10,835 | 10,455 | 1,762 | 2,082 | 2,458 | 2,842 | 3,202 | 3,498 | 3,734 |
| 5-9 | 7,905 | 8,286 | 9,005 | 9,695 | 10,231 | 10,505 | 10,481 | 1,415 | 1,625 | 1,955 | 2,326 | 2,710 | 3,086 | 3,406 |
| 10-14 | 6,585 | 7,306 | 7,631 | 8,276 | 8,882 | 9,352 | 9,568 | 1,476 | 1,794 | 2,074 | 2,486 | 2,957 | 3,440 | 3,893 |
| 15-19 | 6,035 | 6,068 | 6,179 | 7,019 | 7,604 | 8,161 | 8,581 | 1,569 | 1,729 | 2,119 | 2,447 | 2,938 | 3,483 | 4,052 |
| 20-24 | 3,673 | 5,694 | 5,726 | 6,356 | 6,648 | 7,222 | 7,762 | 962 | 1,633 | 1,818 | 2,231 | 2,586 | 3,104 | 3,690 |
| 25-29 | 3,819 | 3,663 | 5,707 | 5,783 | 6,463 | 6,817 | 7,460 | 750 | 789 | 1,360 | 1,523 | 1,887 | 2,199 | 2,662 |
| 30-34 | 3,420 | 3,609 | 3,465 | 5,416 | 5,499 | 6,166 | 6,518 | 664 | 768 | 816 | 1,410 | 1,587 | 1,965 | 2,298 |
| 35-39 | 3,063 | 3,202 | 3,386 | 3,262 | 5,108 | 5,203 | 5,846 | 599 | 687 | 804 | 856 | 1,485 | 1,671 | 2,077 |
| 40-44 | 2,780 | 2,862 | 3,003 | 3,187 | 3,081 | 4,849 | 4,958 | 528 | 596 | 692 | 812 | 870 | 1,512 | 1,710 |
| 45-49 | 2,295 | 2,555 | 2,641 | 2,788 | 2,973 | 2,892 | 4,573 | 430 | 524 | 600 | 700 | 827 | 889 | 1,555 |
| 50-54 | 1,737 | 2,048 | 2,293 | 2,389 | 2,539 | 2,729 | 2,672 | 331 | 427 | 530 | 610 | 718 | 853 | 924 |
| 55-59 | 1,165 | 1,468 | 1,748 | 1,982 | 2,087 | 2,244 | 2,437 | 238 | 328 | 433 | 542 | 632 | 751 | 903 |
| 60-64 | 801 | 966 | 1,245 | 1,518 | 1,760 | 1,897 | 2,085 | 131 | 173 | 246 | 332 | 426 | 507 | 617 |
| 65-69 | 508 | 572 | 707 | 934 | 1,166 | 1,383 | 1,523 | 98 | 121 | 166 | 242 | 334 | 438 | 534 |
| 70+ | 461 | 554 | 662 | 836 | 1,121 | 1,485 | 1,898 | 70 | 93 | 122 | 171 | 254 | 371 | 525 |

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# APPENDIX D: Preliminary Socio-Economic Profiles: Housing

## PRELIMINARY PROJECTIONS OF HOUSING SECTOR REQUIREMENTS

Shelter is a primary need of human beings. Adequate housing for the population is not only a social objective but also an economic consideration that affects the health and productivity of labor resources.

The housing situation in Indonesia is particularly critical in the urban areas, where housing construction has not kept pace with the rapid population increases resulting from both high natural increase and rural-urban migration. Although high rates of birth in rural areas are also increasing rural housing needs, the problem is less severe than in urban areas. Besides the fact that rural population grows less rapidly, factors such as the social-philosophy in rural communities of 'gotong royong' (helping each other as part of community effort), the high incidence of home ownership (94 percent), and the cheaper construction costs lessen the rural housing problem.

Here an attempt is made to estimate future housing requirements in rural and urban areas under the three alternative demographic projections.[1/] The housing projections include requirements by type of structure; permanent, semi-permanent - 1, semi-permanent - 2, and temporary.[2/] Not only the total number of housing units by type and sector are calculated, but also the new housing units that will have to be constructed within each five-year interval to meet population growth, attrition, and the current housing shortage.

Demand Rates: The percentage distribution of housing types in urban and rural areas in the base year is displayed below:[3/]

TABLE D-1 -- PERCENTAGE DISTRIBUTION OF HOUSING BY TYPE

| Type of Housing | Percentage of Urban Housing | Percentage of Rural Housing |
|---|---|---|
| Permanent | .186 | .038 |
| Semi-Permanent - 1 | .168 | .065 |
| Semi-Permanent - 2 | .437 | .532 |
| Temporary | .209 | .365 |
| Total | 1.000 | 1.000 |

Note that in urban areas, permanent and semi-permanent - 1 housing is more prevalent than in rural areas (35.4 percent of the total urban housing stock compared to 10.3 percent of the total rural stock). For the projections, the assumption is made that this base year percentage distribution of housing types indicates the user population demand rates for the various housing types. A demand rate is that proportion of the population that will use or require a particular type of housing. For example, the proportion of the urban population demanding permanent housing is .186, the proportion demanding semi-permanent housing is .168, etc. These demand rates are assumed to remain constant over the projection period.

Service Ratios: The total number of housing units required by type over the projection period is found by multiplying the relevant user population by a service ratio. A service ratio is the number of units per user population.

In 1971 an over-crowded situation existed in urban Indonesia, with an estimated average of 8 inhabitants per housing unit (equivalent to a service ratio of .125), while an urban household is estimated to have an average of 4.9 members (equivalent to a service ratio of .204). Assuming that a long-term objective is to attain one house per family by the year 2001, the service ratio in urban areas is assumed to increase gradually over the projection period from .125 in 1971 to .204 in 2001.

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For rural areas, the average size of a household is estimated to be 4.2 members and the average number of inhabitants per housing unit is estimated to be 5.4. Thus, for rural areas the service ratio is assumed to increase over the projection period from .185 in 1971 to .238 in 2001.[4/]

Attrition Rates: An attrition or replacement rate is that proportion of the housing stock that must be replaced every year. The types of housing structures categoried here -- permanent, semi-permanent - 1, semi-permanent - 2, and temporary -- each have a different life expectancy due to differences in building strength. Table D-2 gives the estimates of the average number of years which each housing type lasts and the accompanying attrition rate.[5/]

TABLE D-2 -- HOUSING ATTRITION RATES

| Type of Housing | Average Length of Service Life in Years | Attrition Rate |
|---|---|---|
| Permanent | 40 | .025 |
| Semi-Permanent - 1 | 25 | .040 |
| Semi-Permanent - 2 | 15 | .060 |
| Temporary | 5 | .200 |

Construction Schedule to Meet the Current Housing Shortage: Presently, housing in Indonesia is overcrowded. An estimate of the housing shortage or deficit in the base year is made by finding the difference between the actual number of housing units of each type in 1971 and the 'ideal' number that would relieve the current overcrowding; i.e., allow 1 housing unit per household.

If the government wants to remove the current deficits in housing within the next, say, 15 years, they might follow an annual construction schedule such as that indicated below:

TABLE D-3 — CONSTRUCTION SCHEDULE TO REMOVE CURRENT HOUSING DEFICIT
(in thousands)

| Type of Housing | 1971 Housing Deficit | Annual Construction to Remove Deficit Within 15 Years |
|---|---|---|
| Urban: | | |
| Permanent | 325.8 | 21.7 |
| Semi-Permanent - 1 | 294.2 | 19.6 |
| Semi-Permanent - 2 | 765.4 | 51.0 |
| Temporary | 366.1 | 24.4 |
| Rural: | | |
| Permanent | 210.5 | 14.0 |
| Semi-Permanent - 1 | 360.0 | 24.0 |
| Semi-Permanent - 2 | 2,947.1 | 196.5 |
| Temporary | 2,021.9 | 134.8 |

Construction Costs: Construction costs are much cheaper in rural than in urban areas, due to the free labor often available with 'gotong royong', to the ease of obtaining building materials, and to the more temporary nature of rural structures. The Public Housing Directorate of Indonesia estimates that unit construction costs in rural areas are about one-fifth of that in urban areas. For the projections of housing costs it is estimated that an urban housing unit of minimum standard costs about 415,000 Rupiah and a rural unit cost 83,000 Rupiah.[6/] Constant 1971 prices are assumed over the projection period, with an annual increase in prices due to quality improvements of one percent per annum.

## Projection Results

Housing Requirements in the Urban Sector: For the urban sector, the total number of housing units, necessary to meet the requirements of both an increasing population and a reduction in the number of persons per housing unit, increases from approximately 2.8 million units in 1971 to approximately 15.9, 14.6, and 13.5 million units

by the year 2001 for rapid, moderate, and slow population growth assumptions, respectively. This is equivalent to an annual average growth rate of 6.0, 5.7, and 5.4 percent. (See Table D-9) The breakdown by type of structure is shown in Table D-4.

Calculations were also made of the additional units necessary to meet the needs of increasing population, the reduction of overcrowding, the replacement of old units, and reduction of the current deficit. The additional units required by type of structure for every five-year interval are calculated in Table D-6. The total number of additional units required increases from 2,803 thousand for the five-year period ending in 1976 to 9,211 thousand in the five-year period ending in 2001 in Projection 1; from 2,792 thousand to 8,268 thousand in Projection 2; and 2,783 thousand to 7,455 thousand in Projection 3.

Given the projected increases in user population, increases in the service ratio, depreciation and closing of the current housing deficit, construction costs were calculated under the unit-cost assumptions stated earlier. Urban construction costs in Projection 1 for the five-year period ending in the year 2001 is more than five times the costs in the period ending 1976 -- increasing from 1,205.1 billion rupiah to over 5,000 billion rupiah (Table D-8). The corresponding increases for Projection 2 and 3 are from approximately 1,200 to 4,555 and 1,196 to 4,106 billion Rupiah, respectively. This represents an annual average growth rate in construction costs of 6.0, 5.5, and 5.1 percent respectively for the three projections. The impact of a slow rate of urban population growth can be gauged by a comparison of the costs for the five-year period ending 2001 in Projection 1 and 3. The difference is over 500 billion Rupiah.

Housing Requirements in the Rural Sector: In the rural sector, the total number of housing units needed both to support a growing population and to reduce overcrowding increases from approximately

47.9, 44.1, and 40.9 million units by year 2001 for rapid, moderate, and slow population growth assumptions respectively. This amounts to an annual average rate of growth of 3.1, 2.8, and 2.5 percent for the three projections. (Table D-10) The breakdown by type of structure is given in Table D-5. The number of new housing units in the rural sector required to meet the needs of a growing rural population, to reduce overcrowding, to replace old houses and to reduce the current deficit were calculated for the projection period. (Table D-7) The total number of new rural housing units increase from about 18 billion units in the five-year period ending 1976 to over 30 million units in the five-year period ending 2001 for Projection 1; from 16 million to 27 million in Projection 2; and from 16 million to just under 25 million in Projection 3.

Construction costs for the rural sector were projected based upon the above calculations of additional units required and upon the unit costs estimated earlier. Projected construction costs in the rural sector is substantially less than in the urban area (Table D-8) due to the slower rate of population growth in the rural sector resulting from significant rural out-migration and to the prevalence of lower cost housing in the rural sector. Rural construction costs in Projection 1 for the five-year period ending year 2001 is more than 2 times the costs in the period ending 1976 -- increasing from 1,381 to 3,367 billion rupiah. (Table D-8) The corresponding increases for Projection 2 and 3 are from 1,375 to 3,028 and 1,370 to 2,735 billion rupiah, respectively. This represents an average annual rate of growth of 3.6, 3.2, and 2.8 percent respectively for the three projections. The impact of a slow rate of rural population growth can be gauged by a comparison of the costs for the five-year period ending 2001 in Projection 1 and 3. The difference is over 600 billion rupiah.

The Impact of Population Growth Upon Housing Requirements: As noted above, fertility declines could have some significant impact on the number of housing units and consequently the cost requirements. However, in the above analysis no attempt was made to strictly separate the effects of a growth in population from that of a growth in the service ratios and to measure their impact on growth of the housing units required. In order to accomplish this, the service ratios were held constant in all three projections and only population was allowed to increase. The results indicate that population growth accounts for a major portion of the increased requirements both in the rural and urban sectors. For example, in the rural sector the percent of housing needed to meet population increases alone is 63 percent for Projection 1 and 58 percent for Projection 3. For the urban sector it is 53 and 51 in the two projections respectively. (Tables D-9 - 10)

## FOOTNOTES FOR APPENDIX D

## PRELIMINARY PROJECTIONS OF HOUSING SECTOR REQUIREMENTS

1/ The HOUSE2 submodel is used for the projection of housing requirements.

2/ This classification, used in the 1961 Indonesian Census, is based on the average length of life of the structure.

3/ Biro Pusat Stastisik Sensus Penduduk Repuklik Indonesia 1961, February 1965, Series RT 11

4/ Demographic Institute, University of Indonesia, The Population of Indonesia, September 1973.

5/ Ibid.

6/ U.S.AID, Office of Housing, Shelter Sector Analysis for Indonesia, (unpublished) 1974.

FIGURE D-1 — TOTAL URBAN HOUSING REQUIREMENTS UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

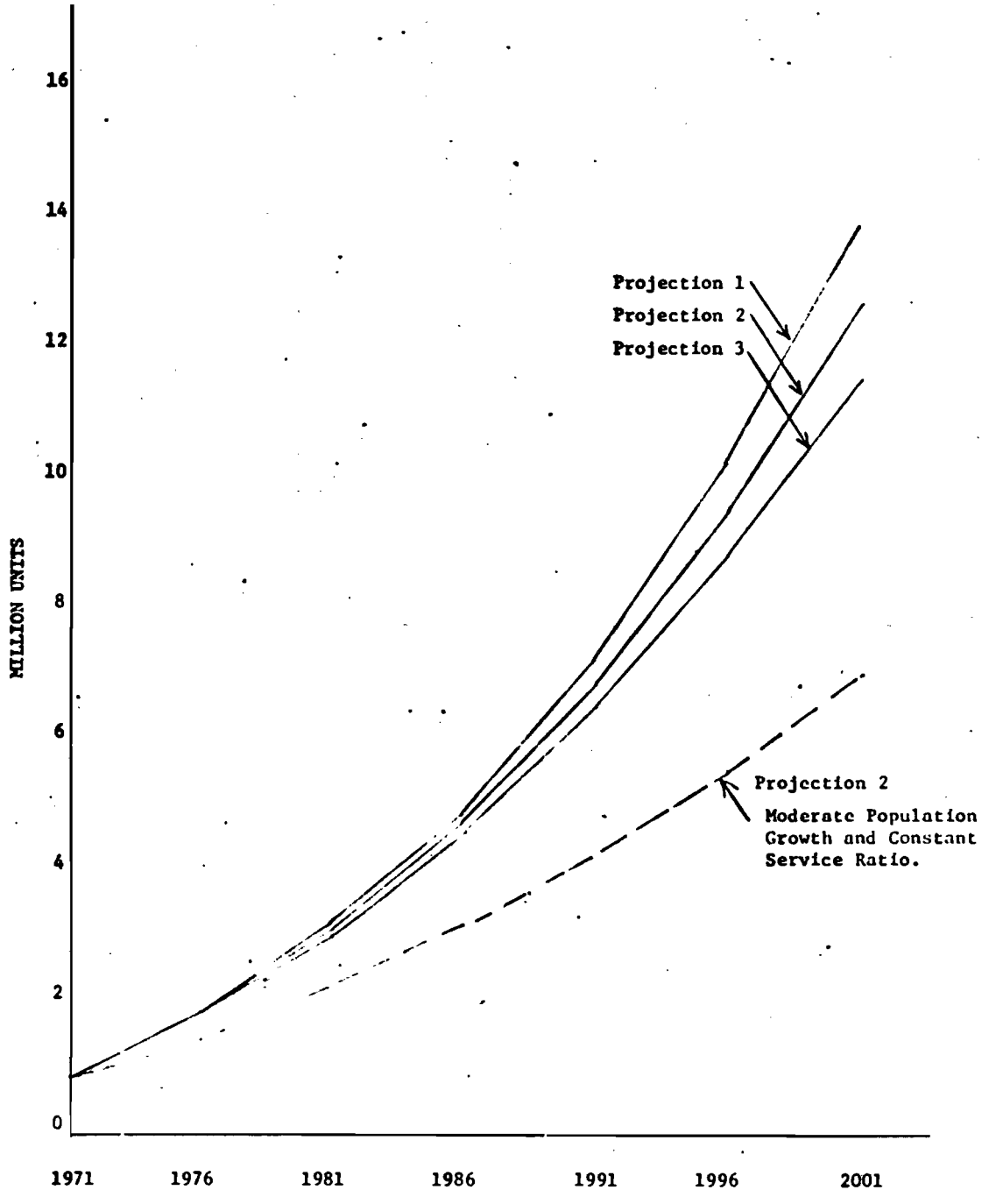


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FIGURE D-2 -- TOTAL RURAL HOUSING REQUIREMENTS UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

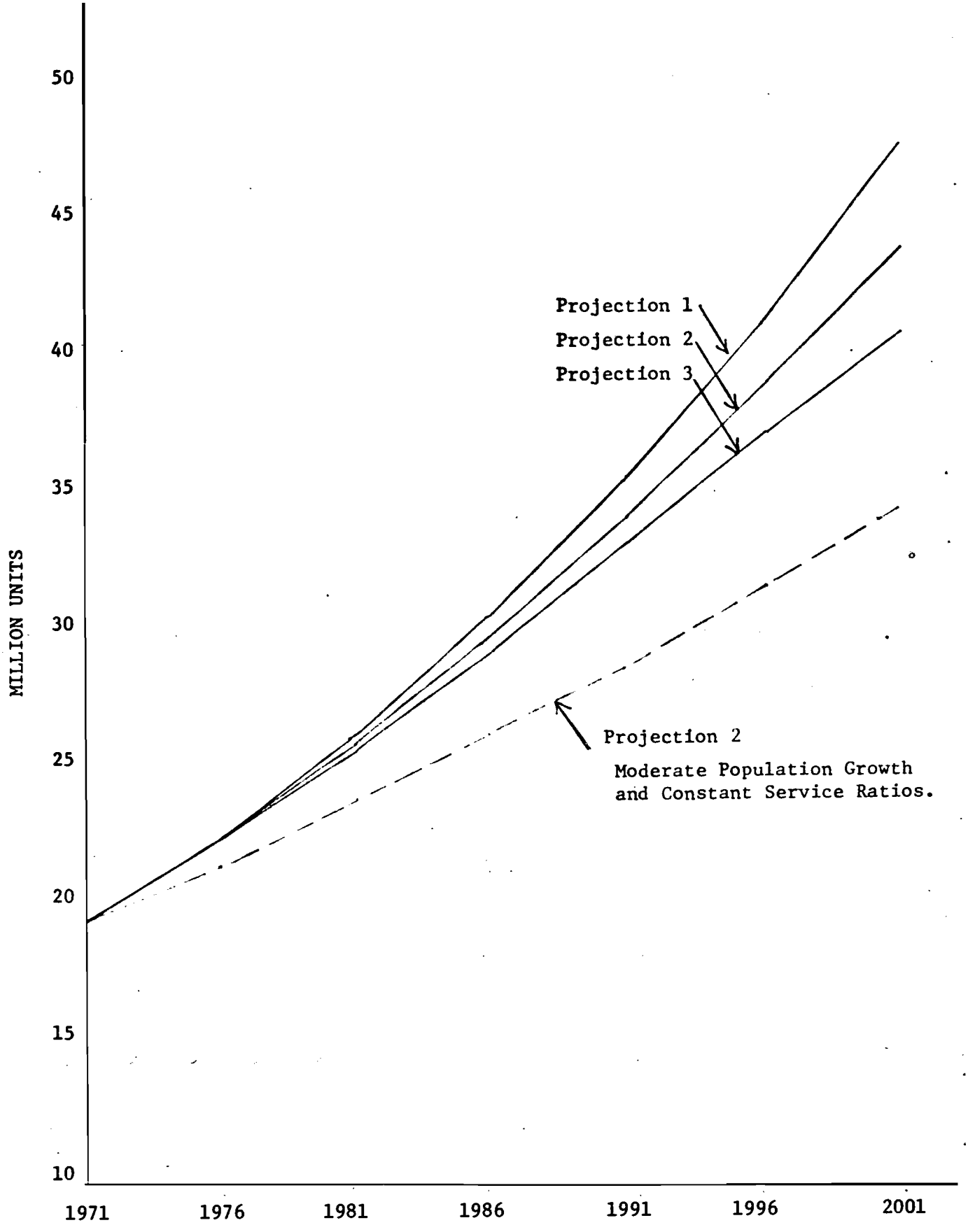

TABLE D-4 -- URBAN HOUSING REQUIREMENTS BY TYPE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Service Ratio (Number of housing units per user population) | Permanent | | | Semi-Permanent - 1 | | | Semi-Permanent - 2 | | | Temporary | | | Total Urban Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | |
| 1. Rapid Population Growth | 1971 | .125 | 4,123 | | 515 | 3,725 | | 466 | 9,689 | | 1,211 | 4,634 | | 579 | 2,771 |
| | 1976 | .138 | 5,041 | | 696 | 4,553 | | 629 | 11,843 | | 1,636 | 5,664 | | 783 | 3,744 |
| | 1981 | .151 | 6,208 | | 939 | 5,607 | | 849 | 14,585 | | 2,207 | 6,976 | | 1,056 | 5,051 |
| | 1986 | .165 | 7,676 | | 1,263 | 6,933 | | 1,140 | 18,034 | | 2,967 | 8,625 | | 1,419 | 6,789 |
| | 1991 | .178 | 9,493 | | 1,687 | 8,575 | | 1,523 | 22,304 | | 3,963 | 10,667 | | 1,895 | 9,068 |
| | 1996 | .191 | 11,727 | | 2,238 | 10,593 | | 2,021 | 27,553 | | 5,258 | 13,178 | | 2,515 | 12,032 |
| | 2001 | .204 | 14,485 | | 2,955 | 13,083 | | 2,669 | 34,032 | | 6,942 | 16,276 | | 3,320 | 15,886 |
| 2. Moderate Population Growth | 1971 | .125 | 4,124 | | 515 | 3,725 | | 466 | 9,689 | | 1,211 | 4,834 | | 579 | 2,711 |
| | 1976 | .138 | 5,028 | | 695 | 4,542 | | 628 | 11,814 | | 1,632 | 5,650 | | 781 | 3,736 |
| | 1981 | .151 | 6,148 | | 930 | 5,553 | | 840 | 14,444 | | 2,186 | 6,908 | | 1,045 | 5,001 |
| | 1986 | .165 | 7,513 | | 1,236 | 6,786 | | 1,116 | 17,652 | | 2,904 | 8,442 | | 1,389 | 6,645 |
| | 1991 | .178 | 9,148 | | 1,625 | 8,262 | | 1,468 | 21,492 | | 3,818 | 10,279 | | 1,826 | 8,737 |
| | 1996 | .191 | 11,076 | | 2,114 | 10,004 | | 1,909 | 26,023 | | 4,966 | 12,446 | | 2,375 | 11,364 |
| | 2001 | .204 | 13,337 | | 2,721 | 12,047 | | 2,458 | 31,335 | | 6,392 | 14,987 | | 3,057 | 14,628 |
| 3. Slow Population Growth | 1971 | .125 | 4,124 | | 515 | 3,725 | | 466 | 9,689 | | 1,211 | 4,634 | | 579 | 2,771 |
| | 1976 | .138 | 5,017 | | 693 | 4,537 | | 626 | 11,788 | | 1,629 | 5,638 | | 779 | 3,727 |
| | 1981 | .151 | 6,095 | | 922 | 5,505 | | 833 | 14,320 | | 2,167 | 6,848 | | 1,036 | 4,958 |
| | 1986 | .165 | 7,371 | | 1,213 | 6,658 | | 1,095 | 17,318 | | 2,849 | 8,283 | | 1,362 | 9,517 |
| | 1991 | .178 | 8,845 | | 1,571 | 7,989 | | 1,419 | 20,781 | | 3,692 | 9,939 | | 1,766 | 8,448 |
| | 1996 | .191 | 10,506 | | 2,005 | 9,489 | | 1,811 | 24,684 | | 4,711 | 11,805 | | 2,253 | 10,790 |
| | 2001 | .204 | 12,342 | | 2,518 | 11,147 | | 2,274 | 28,997 | | 5,915 | 13,868 | | 2,829 | 13,536 |

TABLE D-5 -- RURAL HOUSING REQUIREMENTS BY TYPE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Service Ratio (Number of housing units per user Population | Permanent | | | Semi-Permanent - 1 | | | Semi-Permanent - 2 | | | Temporary | | | Total Rural Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | User Population | Total Units | Housing Required | |
| 1. Rapid Population Growth | 1971 | .185 | 3,972 | | 735 | 6,794 | | 1,257 | 55,605 | | 10,287 | 38,150 | | 7,058 | 19,336 |
| | 1976 | .194 | 4,393 | | 851 | 7,514 | | 1,457 | 61,501 | | 11,921 | 42,195 | | 8,197 | 22,408 |
| | 1981 | .203 | 4,895 | | 992 | 8,373 | | 1,697 | 68,534 | | 13,890 | 47,020 | | 9,529 | 26,108 |
| | 1986 | .212 | 5,477 | | 1,158 | 9,368 | | 1,981 | 76,673 | | 16,216 | 52,605 | | 11,126 | 30,481 |
| | 1991 | .220 | 6,129 | | 1,350 | 10,484 | | 2,310 | 85,807 | | 18,906 | 58,872 | | 12,971 | 35,537 |
| | 1996 | .229 | 6,851 | | 1,570 | 11,719 | | 2,686 | 95,913 | | 21,980 | 65,805 | | 15,080 | 41,316 |
| | 2001 | .238 | 7,657 | | 1,822 | 13,097 | | 3,117 | 107,191 | | 25,511 | 73,543 | | 17,503 | 47,953 |
| 2. Moderate Population Growth | 1971 | .185 | 3,972 | | 735 | 6,794 | | 1,257 | 55,605 | | 10,287 | 38,150 | | 7,058 | 19,336 |
| | 1976 | .194 | 4,382 | | 849 | 7,496 | | 1,453 | 61,350 | | 11,892 | 42,092 | | 8,159 | 22,856 |
| | 1981 | .203 | 4,848 | | 983 | 8,292 | | 1,681 | 67,870 | | 13,755 | 46,565 | | 9,437 | 25,856 |
| | 1986 | .212 | 5,361 | | 1,134 | 9,170 | | 1,939 | 75,050 | | 15,873 | 51,491 | | 10,890 | 29,836 |
| | 1991 | .220 | 5,906 | | 1,301 | 10,102 | | 2,226 | 82,680 | | 18,217 | 56,726 | | 12,499 | 34,243 |
| | 1996 | .229 | 6,470 | | 1,483 | 11,068 | | 2,536 | 90,585 | | 20,759 | 62,150 | | 14,243 | 39,021 |
| | 2001 | .238 | 7,050 | | 1,678 | 12,059 | | 2,870 | 98,698 | | 23,490 | 67,716 | | 16,116 | 44,154 |
| 3. Slow Population Growth | 1971 | .185 | 3,972 | | 735 | 6,794 | | 1,257 | 55,605 | | 10,287 | 38,150 | | 7,058 | 19,336 |
| | 1976 | .194 | 4,372 | | 848 | 7,479 | | 1,450 | 61,214 | | 11,865 | 41,998 | | 8,141 | 22,304 |
| | 1981 | .203 | 4,806 | | 974 | 8,221 | | 1,666 | 67,287 | | 13,637 | 46,164 | | 9,356 | 25,633 |
| | 1986 | .212 | 5,259 | | 1,112 | 8,996 | | 1,903 | 73,632 | | 15,573 | 50,518 | | 10,685 | 29,273 |
| | 1991 | .220 | 5,711 | | 1,258 | 9,768 | | 2,152 | 79,947 | | 17,615 | 54,851 | | 12,086 | 33,111 |
| | 1996 | .229 | 6,137 | | 1,407 | 10,498 | | 2,406 | 85,924 | | 19,691 | 58,952 | | 13,510 | 37,014 |
| | 2001 | .238 | 6,524 | | 1,553 | 11,159 | | 2,657 | 91,331 | | 21,737 | 62,661 | | 14,913 | 40,860 |

TABLE D-6 --ADDITIONAL URBAN HOUSING UNITS REQUIRED BY TYPE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Years* | Additional urban permanent units required to provide for | | | | Additional urban semi-permanent 1 units required to provide for | | | | Additional urban semi-permanent 2 units required to provide for | | | | Additional urban temporary units required to provide for | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total |
| 1. Rapid population growth | 1976 | 181 | 73 | 109 | 352 | 163 | 106 | 98 | 367 | 425 | 412 | 255 | 1,092 | 203 | 656 | 122 | 982 |
| | 1981 | 243 | 99 | 109 | 450 | 219 | 142 | 98 | 460 | 571 | 556 | 255 | 1,382 | 273 | 886 | 122 | 1,281 |
| | 1986 | 323 | 133 | 109 | 565 | 292 | 192 | 98 | 582 | 759 | 748 | 255 | 1,762 | 363 | 1,193 | 122 | 1,678 |
| | 1991 | 424 | 178 | - | 602 | 383 | 257 | - | 640 | 996 | 1,003 | - | 1,999 | 476 | 1,599 | - | 2,076 |
| | 1996 | 551 | 237 | - | 788 | 498 | 342 | - | 840 | 1,295 | 1,336 | - | 2,631 | 620 | 2,130 | - | 2,749 |
| | 2001 | 717 | 314 | - | 1,031 | 648 | 453 | - | 1,101 | 1,684 | 1,769 | - | 3,453 | 806 | 2,820 | - | 3,626 |
| 2. Moderate population growth | 1976 | 179 | 73 | 109 | 361 | 162 | 106 | 98 | 365 | 421 | 411 | 255 | 1,087 | 202 | 656 | 122 | 979 |
| | 1981 | 236 | 98 | 109 | 442 | 213 | 142 | 98 | 452 | 554 | 553 | 255 | 1,361 | 265 | 881 | 122 | 1,268 |
| | 1986 | 306 | 131 | 109 | 546 | 276 | 189 | 98 | 563 | 718 | 737 | 255 | 1,710 | 343 | 1,176 | 122 | 1,641 |
| | 1991 | 389 | 173 | - | 562 | 352 | 250 | - | 602 | 915 | 975 | - | 1,890 | 437 | 1,555 | - | 1,992 |
| | 1996 | 488 | 226 | - | 715 | 441 | 327 | - | 768 | 1,148 | 1,277 | - | 2,424 | 549 | 2,035 | - | 2,584 |
| | 2001 | 607 | 293 | - | 900 | 548 | 424 | - | 972 | 1,426 | 1,653 | - | 3,079 | 682 | 2,635 | - | 3,317 |
| 3. Slow population growth | 1976 | 178 | 73 | 109 | 359 | 161 | 105 | 98 | 364 | 418 | 411 | 255 | 1,083 | 200 | 655 | 122 | 977 |
| | 1981 | 229 | 98 | 109 | 435 | 207 | 141 | 98 | 446 | 538 | 550 | 255 | 1,343 | 257 | 877 | 122 | 1,256 |
| | 1986 | 290 | 129 | 109 | 528 | 262 | 187 | 98 | 547 | 682 | 728 | 255 | 1,665 | 326 | 1,160 | 122 | 1,608 |
| | 1991 | 359 | 169 | - | 528 | 324 | 244 | - | 568 | 843 | 951 | - | 1,794 | 403 | 1,516 | - | 1,919 |
| | 1996 | 433 | 217 | - | 651 | 392 | 314 | - | 705 | 1,018 | 1,224 | - | 2,243 | 487 | 1,952 | - | 2,439 |
| | 2001 | 513 | 275 | - | 788 | 463 | 398 | - | 861 | 1,205 | 1,552 | - | 2,756 | 576 | 2,474 | - | 3,050 |

*Cumulative total over five-year interval ending in year specified.

TABLE D-7 --ADDITIONAL RURAL HOUSING UNITS REQUIRED BY TYPE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Years* | Additional rural permanent units required to provide for | | | | Additional rural semi-permanent 1 units required to provide for | | | | Additional rural semi-permanent 2 units required to provide for | | | | Additional rural temporary units required to provide for | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total | Population growth and reduced overcrowding | Attrition | Current deficit | Total |
| 1. Rapid population growth | 1976 | 117 | 98 | 70 | 284 | 200 | 267 | 120 | 587 | 1,634 | 3,277 | 983 | 5,893 | 1,121 | 7,494 | 674 | 9,289 |
| | 1981 | 141 | 113 | 70 | 324 | 241 | 310 | 120 | 671 | 1,969 | 3,806 | 983 | 6,757 | 1,351 | 8,704 | 674 | 10,729 |
| | 1986 | 166 | 132 | 70 | 368 | 284 | 362 | 120 | 765 | 2,327 | 4,438 | 983 | 7,748 | 1,596 | 10,150 | 674 | 12,420 |
| | 1991 | 192 | 154 | - | 346 | 329 | 422 | - | 750 | 2,690 | 5,179 | - | 7,868 | 1,845 | 11,843 | - | 13,688 |
| | 1996 | 220 | 179 | - | 399 | 376 | 491 | - | 867 | 3,074 | 6,030 | - | 9,104 | 2,109 | 13,791 | - | 15,900 |
| | 2001 | 252 | 209 | - | 461 | 431 | 571 | - | 1,002 | 3,532 | 7,006 | - | 10,537 | 2,423 | 16,022 | - | 18,445 |
| 2. Moderate population growth | 1976 | 115 | 98 | 70 | 282 | 196 | 267 | 120 | 583 | 1,605 | 3,274 | 983 | 5,861 | 1,101 | 7,487 | 674 | 9,262 |
| | 1981 | 133 | 113 | 70 | 316 | 228 | 308 | 120 | 655 | 1,863 | 3,785 | 983 | 6,631 | 1,278 | 8,657 | 674 | 10,609 |
| | 1986 | 151 | 130 | 70 | 351 | 259 | 356 | 120 | 735 | 2,118 | 4,374 | 983 | 7,475 | 1,453 | 10,003 | 674 | 12,130 |
| | 1991 | 167 | 150 | - | 317 | 286 | 410 | - | 697 | 2,344 | 5,036 | - | 7,380 | 1,608 | 11,517 | - | 13,126 |
| | 1996 | 182 | 172 | - | 353 | 311 | 469 | - | 780 | 2,542 | 5,763 | - | 8,305 | 1,744 | 13,180 | - | 14,924 |
| | 2001 | 195 | 195 | - | 390 | 334 | 533 | - | 867 | 2,731 | 6,548 | - | 9,279 | 1,874 | 14,975 | - | 16,849 |
| 3. Slow population growth | 1976 | 113 | 97 | 70 | 280 | 193 | 266 | 120 | 579 | 1,578 | 3,271 | 983 | 5,831 | 1,083 | 7,480 | 674 | 9,237 |
| | 1981 | 127 | 112 | 70 | 309 | 216 | 307 | 120 | 643 | 1,771 | 3,767 | 983 | 6,521 | 1,215 | 8,615 | 674 | 10,504 |
| | 1986 | 138 | 129 | 70 | 337 | 237 | 352 | 120 | 709 | 1,937 | 4,318 | 983 | 7,238 | 1,329 | 9,875 | 674 | 11,878 |
| | 1991 | 146 | 146 | - | 292 | 249 | 400 | - | 650 | 2,042 | 4,912 | - | 6,953 | 1,401 | 11,233 | - | 12,634 |
| | 1996 | 148 | 165 | - | 313 | 254 | 450 | - | 704 | 2,076 | 5,529 | - | 7,605 | 1,424 | 12,644 | - | 14,068 |
| | 2001 | 146 | 183 | - | 329 | 250 | 501 | - | 751 | 2,046 | 6,149 | - | 8,194 | 1,404 | 14,062 | - | 15,465 |

*Cumulative total over five-year interval ending in year specified.

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TABLE D-8 -- CONSTRUCTION COSTS OF NEW HOUSING UNITS REQUIRED
(billions of Rupiah)

| Projections | Year* | Urban | Rural | Total | Annual Growth Rates 1976-2001 Urban | Annual Growth Rates 1976-2001 Rural |
|---|---|---|---|---|---|---|
| 1. Rapid Population Growth | 1976 | 1,205.1 | 1,380.6 | 2,585.7 | 6.0 | 3.6 |
| | 1981 | 1,622.4 | 1,680.2 | 3,302.6 | | |
| | 1986 | 2,137.1 | 2,005.4 | 4,142.5 | | |
| | 1991 | 2,671.9 | 2,282.6 | 4,954.5 | | |
| | 1996 | 3,691.9 | 2,776.1 | 6,468.0 | | |
| | 2001 | 5,073.7 | 3,367.0 | 8,470.7 | | |
| 2. Moderate Population Growth | 1976 | 1,200.6 | 1,374.9 | 2,575.5 | 5.5 | 3.2 |
| | 1981 | 1,600.1 | 1,655.8 | 3,255.9 | | |
| | 1986 | 1,379.8 | 1,946.8 | 3,326.6 | | |
| | 1991 | 2,535.9 | 2,168.2 | 4,704.1 | | |
| | 1996 | 3,418.7 | 2,574.2 | 5,992.9 | | |
| | 2001 | 4,554.6 | 3,028.3 | 7,582.9 | | |
| 3. Slow Population Growth | 1976 | 1,196.5 | 1,369.7 | 2,566.2 | 5.1 | 2.8 |
| | 1981 | 1,580.4 | 1,634.3 | 3,214.7 | | |
| | 1986 | 2,022.5 | 1,895.8 | 3,918.3 | | |
| | 1991 | 2,416.6 | 2,068.2 | 4,484.8 | | |
| | 1996 | 3,179.6 | 2,397.4 | 5,577.0 | | |
| | 2001 | 4,105.9 | 2,735.5 | 6,841.4 | | |

* Cumulative total over five-year interval ending in year specified.

TABLE D-9 -- IMPACT OF POPULATION GROWTH ON URBAN HOUSING NEEDS (in thousand units)

| | Urban Housing Requirements to Provide for Growth in Population and to Reduce Over-Crowding | | | | Urban Housing Requirements to Provide for Population Growth Alone | | | | Percent of Total Requirements Needed to Provide for Population Growth |
|---|---|---|---|---|---|---|---|---|---|
| | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | |
| PROJECTION 1 - Rapid Population Growth | 2,771 | 15,886 | 13,115 | 6.0 | 2,771 | 9,934 | 6,963 | 4.3 | 53 |
| PROJECTION 2 - Moderate Population Growth | 2,771 | 14,628 | 11,857 | 5.7 | 2,771 | 8,963 | 6,172 | 4.0 | 52 |
| PROJECTION 3 - Slow Population Growth | 2,771 | 13,536 | 10,765 | 5.4 | 2,771 | 8,294 | 5,523 | 3.8 | 51 |

TABLE D-10 -- IMPACT OF POPULATION GROWTH ON RURAL HOUSING NEEDS (in thousand units)

| | Rural Housing Requirements to Provide for Growth in Population and to Reduce Over-Crowding | | | | Rural Housing Requirements to Provide for Population Growth Alone | | | | Percent of Total Requirements Needed to Provide for Population Growth |
|---|---|---|---|---|---|---|---|---|---|
| | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | |
| PROJECTION 1 - Rapid Population Growth | 19,366 | 47,953 | 28,587 | 3.1 | 19,366 | 37,274 | 17,908 | 2.2 | 63 |
| PROJECTION 2 - Moderate Population Growth | 19,366 | 44,154 | 24,788 | 2.8 | 19,366 | 34,311 | 14,945 | 1.9 | 60 |
| PROJECTION 3 - Slow Population Growth | 19,366 | 40,860 | 21,494 | 2.5 | 19,366 | 31,759 | 12,393 | 1.7 | 58 |



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TABLE D-11 — TOTAL URBAN HOUSING UNITS REQUIRED UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS WITH CONSTANT SERVICE RATIOS OVER THE PERIOD 1971-2001 (in thousands)

| Year | Total | Permanent | Semi-Permanent-1 | Semi-Permanent-2 | Temporary |
|---|---|---|---|---|---|
| PROJECTION 1 | | | | | |
| 1971 | 2,771 | 515 | 466 | 1,211 | 579 |
| 1976 | 3,387 | 630 | 560 | 1,480 | 708 |
| 1981 | 4,171 | 776 | 700 | 1,823 | 872 |
| 1986 | 5,158 | 959 | 867 | 2,254 | 1,078 |
| 1991 | 6,380 | 1,187 | 1,072 | 2,788 | 1,333 |
| 1996 | 7,881 | 1,466 | 1,324 | 3,444 | 1,647 |
| 2001 | 9,734 | 1,811 | 1,635 | 4,254 | 2,034 |
| PROJECTION 2 | | | | | |
| 1971 | 2,771 | 515 | 466 | 1,211 | 579 |
| 1976 | 3,379 | 628 | 568 | 1,477 | 706 |
| 1981 | 4,130 | 768 | 694 | 1,805 | 863 |
| 1986 | 5,048 | 939 | 848 | 2,206 | 1,055 |
| 1991 | 6,147 | 1,143 | 1,033 | 2,686 | 1,285 |
| 1996 | 7,443 | 1,384 | 1,250 | 3,253 | 1,556 |
| 2001 | 8,963 | 1,667 | 1,506 | 3,917 | 1,873 |
| PROJECTION 3 | | | | | |
| 1971 | 2,771 | 515 | 466 | 1,122 | 579 |
| 1976 | 3,371 | 627 | 566 | 1,473 | 705 |
| 1981 | 4,096 | 762 | 688 | 1,790 | 856 |
| 1986 | 4,753 | 921 | 832 | 2,165 | 1,035 |
| 1991 | 5,945 | 1,106 | 999 | 2,598 | 1,242 |
| 1996 | 7,060 | 1,313 | 1,186 | 3,085 | 1,476 |
| 2001 | 8,794 | 1,543 | 1,393 | 3,625 | 1,733 |

TABLE D-12 -- TOTAL RURAL HOUSING UNITS REQUIRED UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS WITH CONSTANT SERVICE RATIOS OVER THE PERIOD 1971-2001 (in thousands)

| Year | Total | Permanent | Semi-Permanent-1 | Semi-Permanent-2 | Temporary |
|---|---|---|---|---|---|
| PROJECTION 1 | | | | | |
| 1971 | 19,336 | 735 | 1,257 | 10,286 | 7,058 |
| 1976 | 21,387 | 813 | 1,390 | 11,378 | 7,806 |
| 1981 | 23,833 | 906 | 1,549 | 12,679 | 8,609 |
| 1986 | 26,662 | 1,013 | 1,733 | 14,184 | 9,732 |
| 1991 | 29,838 | 1,134 | 1,939 | 15,874 | 10,891 |
| 1996 | 33,353 | 1,267 | 2,168 | 17,744 | 12,174 |
| 2001 | 37,274 | 1,416 | 2,423 | 19,830 | 13,605 |
| PROJECTION 2 | | | | | |
| 1971 | 19,336 | 735 | 1,257 | 10,286 | 7,058 |
| 1976 | 21,335 | 811 | 1,387 | 11,350 | 7,787 |
| 1981 | 23,601 | 897 | 1,534 | 12,556 | 8,614 |
| 1986 | 26,098 | 992 | 1,696 | 13,884 | 9,526 |
| 1991 | 28,752 | 1,093 | 1,869 | 15,296 | 10,494 |
| 1996 | 31,501 | 1,197 | 2,048 | 16,758 | 11,598 |
| 2001 | 34,311 | 1,304 | 2,231 | 18,259 | 12,527 |
| PROJECTION 3 | | | | | |
| 1971 | 19,336 | 735 | 1,257 | 10,286 | 7,058 |
| 1976 | 21,288 | 809 | 1,384 | 11,325 | 7,770 |
| 1981 | 23,398 | 887 | 1,521 | 12,448 | 8,540 |
| 1986 | 25,605 | 973 | 1,664 | 13,622 | 9,346 |
| 1991 | 27,800 | 1,056 | 1,807 | 14,790 | 10,147 |
| 1996 | 29,879 | 1,135 | 1,942 | 15,896 | 10,906 |
| 2001 | 31,759 | 1,207 | 2,064 | 16,896 | 11,592 |

# APPENDIX E: Preliminary Socio-Economic Profiles: Nutrition

## PRELIMINARY PROJEC[illegible]S OF NUTRITION/FOOD REQUIREMENTS

A major problem of [illegible]n resource development is providing an adequate food supply for [illegible] population. The health and efficiency of the present and future [illegible]or force depends heavily upon the provision of nutritional die[illegible]

Data on public heal[illegible]n Indonesia show that nutritional problems are second only to [illegible]unicable diseases as health problems. Protein and caloric malnut[illegible]ion is widespread and has particularly severe consequences in vul[illegible]able groups such as pregnant mothers and children. For example [illegible]hild mortality is extremely high, accounting for about 40 t[illegible] percent of all deaths. The composition of the food supply and c[illegible]ption also indicates the inadequacy of diets; about 60 percent [illegible]e calorie and protein consumption comes from cereals alone.

Indonesia's future [illegible] requirements will depend upon two major factors: increase[illegible] the population and increases in per capita incomes that will [illegible]le people to improve their presently inadequate diets. Here [illegible] preliminary estimates are made of future food production re[illegible]ements if Indonesia is to attain the objectives of an adequat[illegible]ed population and self-sufficiency in food.

Equivalent Adult Consu[illegible]AC): The food requirement estimates are based upon the thre[illegible]rnative demographic projections described earlier. The po[illegible]on figures were first converted into equivalent adult consu[illegible] reflect the different food consumption requirements of va[illegible]ge groups. The estimated EAC weights and the projections of [illegible]lent adult consumers under the alternative demographic projec[illegible]s are displayed in Tables E-1 and E-2 Note that the rapidly de[illegible]ng fertility Projection 3 has the largest ratio of equivalen[illegible] consumers to the total population in

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2001. This is as expected, given the consequent older age structure and the EAC weights.

TABLE E-1 — EQUIVALENT ADULT CONSUMER WEIGHTS

| Age | Weight |
|---|---|
| 0-4 | .50 |
| 5-14 | .75 |
| 15-64 | 1.00 |
| 65+ | .75 |

TABLE E-2 — EQUIVALENT ADULT CONSUMERS UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Year | Number | Ratio to Total Population |
|---|---|---|---|
| PROJECTION 1 — Rapid Population Growth | 1971 | 126,692 | 1.0000 |
| | 1976 | 142,926 | 1.0016 |
| | 1981 | 162,477 | 1.0017 |
| | 1986 | 185,421 | 1.0002 |
| | 1991 | 212,392 | 1.0003 |
| | 1996 | 243,884 | 1.0022 |
| | 2001 | 280,725 | 1.0049 |
| PROJECTION 2 — Moderate Population Growth | 1971 | 126,692 | 1.0000 |
| | 1976 | 142,719 | 1.0026 |
| | 1981 | 161,448 | 1.0051 |
| | 1986 | 182,648 | 1.0065 |
| | 1991 | 206,584 | 1.0097 |
| | 1996 | 233,200 | 1.0147 |
| | 2001 | 262,566 | 1.0207 |
| PROJECTION 3 — Slow Population Growth | 1971 | 126,692 | 1.0000 |
| | 1976 | 142,530 | 1.0035 |
| | 1981 | 160,539 | 1.0081 |
| | 1986 | 180,223 | 1.0123 |
| | 1991 | 201,504 | 1.0186 |
| | 1996 | 223,851 | 1.0269 |
| | 2001 | 246,778 | 1.0368 |

Daily Calorie Consumption per EAC: It has been estimated that the 1964-1966 average daily calorie intake per consumer was about 1,800,[1/] distributed among major food types (Table E-3). For the purpose of estimating food requirements over the projection period, it was assumed that there was little change between this 1964-1966 average

and the daily intake in the 1971 base year. Furthermore, as a first approximation, it was assumed that the pattern (cereals, starchy crops, etc.) of diets will remain the same while the total calorie intake will increase by an average of one percent per annum over the projected period. Thus, by year 2001 the EAC target diet is projected to be 2,400 calories per day.

TABLE E-3 — ESTIMATED CALORIES PER EQUIVALENT ADULT CONSUMER PER DAY

| Calories Per Adult Per Day | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|
| TOTAL | 1,800 | 1,892 | 1,988 | 2,090 | 2,196 | 2,308 | 2,400 |
| a) cereals | 1,123 | 1,173 | 1,232 | 1,296 | 1,362 | 1,431 | 1,488 |
| b) starchy crops | 338 | 355 | 373 | 392 | 412 | 433 | 451 |
| c) sugar | 72 | 76 | 79 | 84 | 88 | 92 | 96 |
| d) pulses, nuts, seed | 122 | 128 | 135 | 142 | 149 | 156 | 163 |
| e) vegetables, fruits | 30 | 31 | 33 | 35 | 37 | 38 | 40 |
| f) meat, eggs, fish, milk | 44 | 46 | 49 | 51 | 55 | 56 | 59 |
| g) fats, oils | 71 | 75 | 78 | 82 | 87 | 91 | 95 |

Food Projection Results: The combined effect of increased calorie intake and varying population growth assumptions increases total calorie requirements in 2001 by approximately 200, 176, and 160 percent respectively for rapid, moderate, and slow population growth projections. (Table E-4)

Total calories required were converted to equivalent units of food classified by type.[2/] (Table E-5) Food requirements, necessary to support increasing population while at the same time provide for a small increment in the per EAC daily intake, increase from 39.2 million metric tons in 1971 to 115.8, 108.4, and 101.9 million metric tons in 2001 for rapid, moderate, and slow population growth.

The alternative rates of population growth imply that food production must grow at an average annual rate of 3.7, 3.4, and 3.2 percent for rapid, moderate, and slow projections respectively

in order to meet the daily target intake of 2,400 calories per person by 2001.

The separate effects of population growth alone (exclusive of any growth in EAC daily calorie intake) over the projection, was established in order to gauge the impact of population growth. Assuming a constant average daily intake of 1,800 calories per person, the level of food production necessary to support population by year 2001 is approximately 87, 81, and 76 million metric tons for rapid, moderate, and slow population growth. This suggests that under conditions of a constant calorie intake the average annual rates of growth in food production would be approximately one percent less for all three population growth assumptions as compared to the requirements allowing for a slight increase in daily per person intake. In addition, it should be noted that when both increases in population and per person daily intake are projected, approximately 60 percent of the increases will be needed to meet the population growth alone. (Table E-6)

## FOOTNOTES FOR APPENDIX E

## PRELIMINARY PROJECTIONS OF NUTRITION/FOOD REQUIREMENTS

1/ Food and Agricultural Organization of the UN, Agricultural Commodity Projections, Rome 1971.

2/ For the conversion factors (calories/metric tons) used for each food type, see FAO, op.cit.

FIGURE E-1 -- TOTAL CALORIE REQUIREMENTS PER YEAR UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS AND GROWTH IN EAC DAILY INTAKE

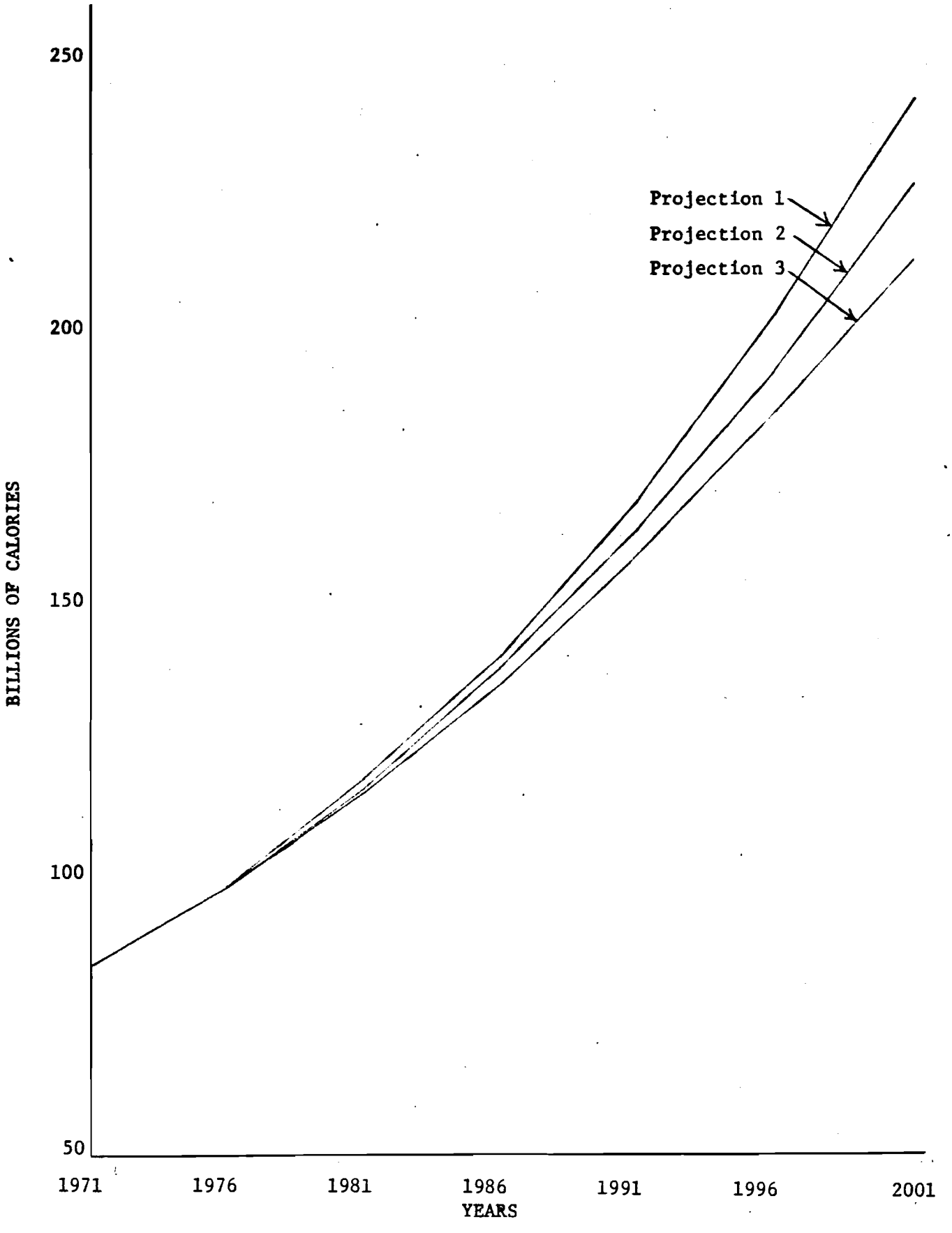

FIGURE E-2 -- TOTAL FOOD PRODUCTION REQUIREMENTS PER YEAR UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS AND GROWTH IN EAC DAILY INTAKE

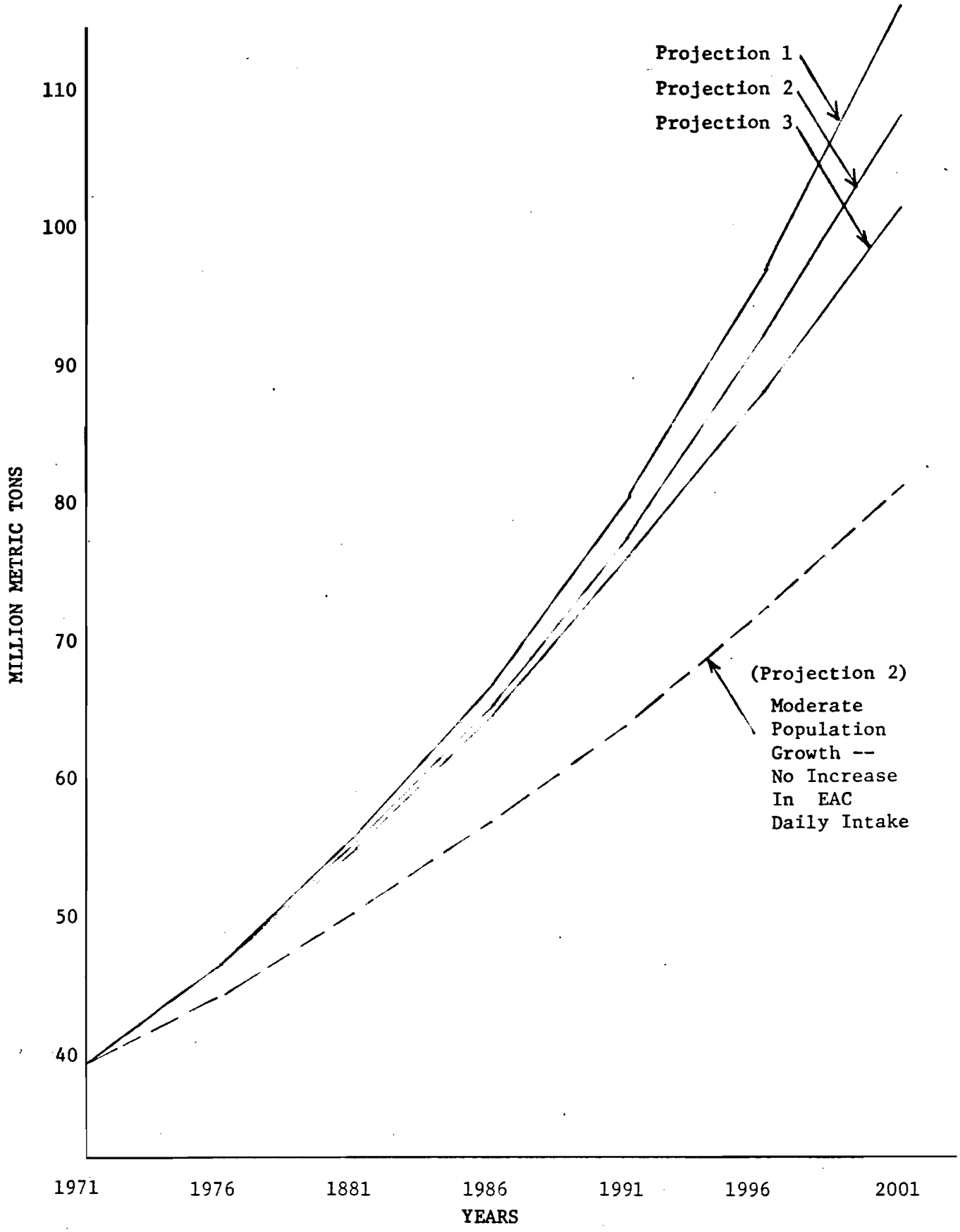

TABLE E-4 -- TOTAL CALORIC REQUIREMENTS PER YEAR UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Total Calories Required Per Year (in billions) | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|
| PROJECTION 1 - Rapid Population Growth | TOTAL | 83,242 | 98,601 | 117,975 | 141,460 | 170,132 | 205,364 | 245,893 |
| | a) cereals | 51,947 | 61,161 | 73,125 | 87,694 | 105,563 | 127,316 | 152,420 |
| | b) starchy crops | 15,584 | 18,434 | 22,100 | 26,512 | 31,860 | 38,536 | 46,315 |
| | c) sugar | 3,294 | 4,001 | 4,712 | 5,747 | 6,797 | 8,049 | 9,824 |
| | d) pulses, nuts, seed | 5,575 | 6,716 | 7,962 | 9,641 | 11,470 | 13,902 | 16,561 |
| | e) vegetables, fruits | 1,394 | 1,572 | 1,950 | 2,410 | 2,974 | 3,415 | 4,210 |
| | f) meat, eggs, fish, milk | 2,027 | 2,429 | 2,925 | 3,523 | 4,248 | 4,878 | 5,895 |
| | g) fats, oils | 3,294 | 3,858 | 4,550 | 5,562 | 6,797 | 8,049 | 9,824 |
| PROJECTION 2 - Moderate Population Growth | TOTAL | 83,242 | 98,476 | 117,176 | 139,324 | 165,487 | 196,354 | 230,038 |
| | a) cereals | 51,947 | 61,084 | 72,630 | 86,370 | 102,680 | 121,730 | 142,592 |
| | b) starchy crops | 15,584 | 18,411 | 21,950 | 26,112 | 30,990 | 36,846 | 43,329 |
| | c) sugar | 3,294 | 3,996 | 4,681 | 5,661 | 6,611 | 7,696 | 9,191 |
| | d) pulses, nuts, seed | 5,575 | 6,708 | 7,909 | 9,495 | 11,156 | 13,292 | 15,493 |
| | e) vegetables, fruits | 1,394 | 1,570 | 1,937 | 2,374 | 2,892 | 3,265 | 3,939 |
| | f) meat, eggs, fish, milk | 2,027 | 2,426 | 2,905 | 3,469 | 4,132 | 4,664 | 5,515 |
| | g) fats, oils | 3,294 | 3,853 | 4,519 | 5,478 | 6,611 | 7,696 | 9,191 |
| PROJECTION 3 - Slow Population Growth | TOTAL | 83,242 | 98,325 | 116,523 | 137,493 | 161,401 | 188,940 | 216,197 |
| | a) cereals | 51,947 | 60,990 | 72,225 | 85,235 | 100,145 | 116,824 | 134,012 |
| | b) starchy crops | 15,584 | 18,382 | 21,828 | 25,769 | 30,225 | 35,360 | 40,722 |
| | c) sugar | 3,294 | 3,990 | 4,654 | 5,586 | 6,448 | 7,385 | 8,638 |
| | d) pulses, nuts, seed | 5,575 | 6,697 | 7,864 | 9,370 | 10,881 | 12,757 | 14,501 |
| | e) vegetables, fruits | 1,394 | 1,567 | 1,926 | 2,343 | 2,821 | 3,133 | 3,702 |
| | f) meats, eggs, fish, milk | 2,027 | 2,422 | 2,889 | 3,424 | 4,030 | 4,476 | 5,183 |
| | g) fats, oils | 3,294 | 3,847 | 4,494 | 5,406 | 6,448 | 7,385 | 8,638 |

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TABLE E-5 -- FOOD PRODUCTION REQUIREMENTS PER YEAR UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

| Projection | Production Required ('000 metric tons) | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|
| PROJECTION 1 - Rapid Population Growth | TOTAL | 39,224 | 46,461 | 55,590 | 66,656 | 80,166 | 96,767 | 115,865 |
| | a) cereals | 14,436 | 16,997 | 20,322 | 24,371 | 29,337 | 35,382 | 42,259 |
| | b) starchy crops | 14,944 | 17,677 | 21,192 | 25,424 | 30,552 | 36,954 | 44,414 |
| | c) sugar | 840 | 1,020 | 1,201 | 1,465 | 1,733 | 2,052 | 2,504 |
| | d) pulses, nuts, seeds | 2,016 | 2,428 | 2.879 | 3,486 | 4,147 | 5,026 | 5,988 |
| | e) vegetables, fruits | 4,444 | 5,011 | 6,216 | 7,682 | 9,480 | 10,886 | 13,420 |
| | f) meat, eggs, fish, milk | 2,045 | 2,450 | 2,951 | 3,554 | 4,285 | 5,921 | 5,947 |
| | g) fats, oils | 368 | 432 | 509 | 622 | 761 | 901 | 1,099 |
| PROJECTION 2 - Moderate Population Growth | TOTAL | 39,224 | 46,402 | 55,213 | 65,649 | 77,977 | 92,522 | 108,394 |
| | a) cereals | 14,436 | 16,975 | 20,184 | 24,002 | 28,535 | 33,829 | 39,626 |
| | b) starchy crops | 14,943 | 17,654 | 21,048 | 25,039 | 29,716 | 35,332 | 41,548 |
| | c) sugar | 840 | 1,018 | 1,193 | 1,443 | 1,685 | 1,962 | 2,343 |
| | d) pulses, nuts, seeds | 2,106 | 2,425 | 2,859 | 3,432 | 4,033 | 4,805 | 5,601 |
| | e) vegetables, fruits | ,4,444 | 5,005 | 6,174 | 7,567 | 9,219 | 10,408 | 12,556 |
| | f) meat, eggs, fish, milk | 2,045 | 2,447 | 2,930 | 3,499 | 4,168 | 4,704 | 5,563 |
| | g) fats, oils | 368 | 431 | 506 | 613 | 740 | 861 | 1,028 |
| PROJECTION 3 - Slow Population Growth | TOTAL | 39,224 | 46,331 | 54,906 | 64,787 | 76,052 | 88,440 | 101,872 |
| | a) cereals | 14,436 | 16,949 | 20,071 | 23,687 | 27,830 | 32,465 | 37,242 |
| | b) starchy crops | 14,943 | 17,626 | 20,931 | 24,710 | 28,982 | 33,907 | 39,048 |
| | c) sugar | 804 | 1,017 | 1,186 | 1,424 | 1,693 | 1,882 | 2,202 |
| | d) pulses, nuts, seeds | 2,016 | 2,421 | 2,842 | 3,387 | 3,933 | 4,612 | 5,264 |
| | e) vegetables, fruits | 4,444 | 4,995 | 6,139 | 7,469 | 8,992 | 9,987 | 11,223 |
| | f) meat, eggs, fish, milk | 2,045 | 2,443 | 2,914 | 3,454 | 4,065 | 4,515 | 5,228 |
| | g) fats, oils | 368 | 430 | 503 | 605 | 721 | 826 | 966 |

TABLE E-6 -- IMPACT OF POPULATION GROWTH FOR TOTAL FOOD REQUIREMENTS
(in thousand metric tons)

| Projection | Production Required to Provide for Growth in Population and Per Person Intake | | | | Production Required to Provide for Growth in Population Alone | | | | Percent of Total Production Increase Required to Provide for Population Growth Alone |
|---|---|---|---|---|---|---|---|---|---|
| | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | Total 1971 | Total 2001 | Difference 1971-2001 | Average Annual Rate of Growth 1971-2001 | |
| 1. Rapid Population Growth | 39,224 | 115,865 | 76,641 | 3.7 | 39,224 | 87,000 | 47,776 | 2.7 | 62 |
| 2. Moderate Population Growth | 39,224 | 108,394 | 69,170 | 3.4 | 39,224 | 81,300 | 42,076 | 2.5 | 61 |
| 3. Slow Population Growth | 39,224 | 101,872 | 62,648 | 3.2 | 39,224 | 76,416 | 37,192 | 2.2 | 59 |

# APPENDIX F: Preliminary Socio-Economic Profiles: Labor Force, Employment, and Density

## PRELIMINARY LABOR FORCE AND EMPLOYMENT PROJECTIONS

A major concern of human resource planning is the problem of adequate employment opportunities. In this report some preliminary calculations were made of labor force and employment growth from 1971 to 2001.[1/] For the labor force, the projections were disaggregated by location and sex and for employment. The breakdown is by location and type of economic activity.

Labor Force Participation Rates: The labor force participation rates of the base year are estimated from the 1971 Indonesian Census data. It is assumed that as Indonesia develops the labor force participation rates will alter, growing more similar to the structure of present rates in developed countries. For example, it is assumed that labor force participation rates in the very young and old age groups will decline over the projection period, due to expansion of education and earlier retirement. Male and particularly female labor force participation rates are assumed to increase in most of the other age groups. (See Table F-1)

TABLE F-1 — LABOR FORCE PARTICIPATION RATES FOR INDONESIA

| | 1971 | | | | 2001 | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | Urban | | Rural | | Urban | |
| Age | Male | Female | Male | Female | Male | Female | Male | Female |
| 10-14 | .204 | .159 | .086 | .077 | .102 | .079 | .043 | .038 |
| 15-19 | .534 | .316 | .329 | .174 | .566 | .513 | .361 | .371 |
| 20-24 | .795 | .340 | .670 | .236 | .855 | .688 | .757 | .584 |
| 25-29 | .909 | .359 | .887 | .251 | .941 | .533 | .919 | .425 |
| 30-34 | .918 | .397 | .942 | .281 | .948 | .510 | .972 | .394 |
| 35-39 | .936 | .423 | .949 | .306 | .956 | .544 | .969 | .427 |
| 40-44 | .929 | .441 | .931 | .346 | .959 | .568 | .961 | .475 |
| 45-49 | .922 | .464 | .889 | .326 | .961 | .564 | .928 | .426 |
| 50-54 | .890 | .445 | .834 | .313 | .948 | .527 | .892 | .395 |
| 55-59 | .871 | .418 | .710 | .302 | .915 | .479 | .754 | .363 |
| 60-64 | .810 | .346 | .582 | .238 | .847 | .406 | .619 | .298 |
| 65+ | .639 | .244 | .410 | .145 | .591 | .227 | .362 | .128 |

Employment by Location and Economic Sector: The base year employment by rural-urban location and by economic sector, such as agriculture, mining, manufacturing, etc., is taken from the 1971 Indonesian Census. Growth in employment over the projection period in these initial calculations were assumed to maintain the average annual growth rate that existed between 1961-1971. (See Table F-2)

## PROJECTION RESULTS

Total Labor Force and Employment: The rate of population growth has a long-term effect upon the growth of the labor force. In Projection 1 the size of the labor force increases from 42.7 million in 1971 to over 108 million in 2001. (Table F-4) In Projection 2 and 3 the increase is less rapid, reaching about 106 and 104 million respectively. The corresponding rate of growth is slightly over 3 percent in all projections (Table F-3). It should be noted that the size of the labor force in the three projections differs much more in the latter years of the projection period than in the first 20 years. This is largely due to the lagged effect of fertility decline upon the size of the work-age population.

The potential size of the labor force depends on factors such as the growth of the work-age population, educational opportunity for youth, age of retirement, and employment opportunities especially for women. The projected labor force as a percent of the work-age population increases from 62 in 1971 to slightly over 70 percent in 2001 for all those projections. Over the projection period the level of total employment increases to about three times its 1971 level at an annual rate of 3.3 percent in all three projections.[2/] Given the labor force projections, if the projected levels of labor demand can be maintained, unemployment could fall to extremely low levels by year 2001 (Table F-5).

TABLE F-2 -- EMPLOYMENT BY SECTOR AND LOCATION (in thousands)

| Employment | Average Annual Growth (%) | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 |
|---|---|---|---|---|---|---|---|---|
| TOTAL RURAL EMPLOYMENT | 3.0 | 33,414 | 36,747 | 41,110 | 46,946 | 54,912 | 65,981 | 81,621 |
| a) agriculture, hunting, forestry, and fishing | .5 | 24,172 | 24,782 | 25,408 | 26,049 | 26,707 | 27,382 | 28,073 |
| b) mining and quarrying | .3 | 46 | 47 | 47 | 48 | 49 | 50 | 50 |
| c) manufacturing | 4.7 | 2,270 | 2,856 | 3,593 | 4,521 | 5,688 | 7,156 | 9,004 |
| d) electricity, gas, and water | -2.9 | 11 | 10 | 8 | 7 | 6 | 5 | 5 |
| e) construction | 2.4 | 448 | 504 | 568 | 639 | 720 | 811 | 913 |
| f) trade, restaurants, and hotels | 6.5 | 2,660 | 3,644 | 4,993 | 6,841 | 9,373 | 12,842 | 17,594 |
| g) transport, storage, and communications | 2.9 | 402 | 464 | 535 | 617 | 712 | 821 | 948 |
| h) financing, insurance, real estate, and business services | 6.5 | 10 | 14 | 19 | 26 | 35 | 48 | 66 |
| i) community, social, and personal services | 2.4 | 2,067 | 2,327 | 2,620 | 2,950 | 3,322 | 3,740 | 4,210 |
| j) activities not adequately defined | 9.6 | 1,327 | 2,099 | 3,319 | 5,248 | 8,300 | 13,126 | 20,758 |
| TOTAL URBAN EMPLOYMENT | 4.1 | 5,796 | 7,053 | 8,698 | 10,871 | 13,793 | 17,816 | 23,301 |
| a) agriculture, hunting, forestry, and fishing | .5 | 600 | 615 | 631 | 647 | 663 | 680 | 697 |
| b) mining and quarrying | .3 | 44 | 45 | 45 | 48 | 47 | 47 | 48 |
| c) manufacturing | 4.7 | 661 | 832 | 1,046 | 1,298 | 1,625 | 2,084 | 2,622 |
| d) electricity, gas, and water | -2.9 | 27 | 23 | 20 | 18 | 15 | 13 | 11 |
| e) construction | 2.4 | 289 | 325 | 366 | 412 | 464 | 523 | 589 |
| f) trade, restaurants, and hotels | 6.5 | 1,453 | 1,991 | 2,727 | 3,737 | 5,120 | 7,015 | 9,611 |
| g) transport, storage, and communications | 2.9 | 514 | 593 | 684 | 789 | 910 | 1,050 | 1,212 |
| h) financing, insurance, real estate, and business services | 6.5 | 86 | 118 | 161 | 221 | 303 | 415 | 569 |
| i) community, social, and personal services | 2.4 | 1,856 | 2,090 | 2,353 | 2,649 | 2,982 | 3,358 | 3,781 |
| j) activities not adequately defined | 9.6 | 266 | 421 | 665 | 1,052 | 1,664 | 2,631 | 4,161 |
| TOTAL EMPLOYMENT | 3.3 | 39,210 | 43,800 | 49,808 | 57,817 | 68,705 | 83,797 | 104,922 |

Rural Labor Force and Employment: The rural labor force increases from approximately 36 million in 1971 to 80 million by 2001 in Projection 1 and to about 78 million and 77 million respectively in Projections 2 and 3. This represents an average annual rate of growth of about 2.6 percent in the three projections. (Table F-3)

The implications of the growth in the rural labor force for rural unemployment depends upon the ability of the rural economy to absorb this labor supply. The projected demand for labor was based on the trend values for 1961-1971 (Table F-2). Under these assumptions rural employment increased at an annual rate of 3.9 percent for all three projections,[3/] rising from approximately 33 million to 82 million. (Table F-5)

The rate of growth of the rural labor supply and demand imply some labor shortages by 1999 amounting to approximately 1, 3, and 4 million respectively for the three projections. (Figure F-1)

Urban Labor Force and Employment: The urban labor force is projected to increase from its 1971 level of approximately 6 million to 28 million in Projection 1, 27 million in Projection 2, and 26 million in Projection 3. This corresponds to an annual average rate of growth of about 5.0 percent (Table F-3). The higher rate of growth in the urban sector stems both from natural population increases and rural-urban migration.

In order to project the demand for urban labor employment by economic activity, the 1961-1971 trend rates were used (Table F-2). The projected level of urban employment increased from 5.8 million in 1971 to 23.3 million in 2001, for all three projections.[4/] This implies an annual average growth rate of 4.8 percent. Whereas in the rural sector the unemployment rate is projected to fall to zero by about 1999, in the urban sector, unemployment is expected to remain fairly high, thus resulting in considerable labor surpluses. (Figure F-2)

TABLE F-3 — ANNUAL AVERAGE GROWTH RATES OF LABOR FORCE AND EMPLOYMENT (1971-2001)

| | Projection 1 | Projection 2 | Projection 3 |
|---|---|---|---|
| **Labor Force** | | | |
| Total | 3.2 | 3.1 | 3.0 |
| Rural | 2.7 | 2.6 | 2.6 |
| Urban | 5.0 | 5.0 | 5.0 |
| **Employment** | | | |
| Total | 3.3 | 3.3 | 3.3 |
| Rural | 3.6 | 3.6 | 3.6 |
| Urban | 4.8 | 4.8 | 4.8 |

Unemployment and Underemployment: The reported unemployment rate in developing countries is generally low. Being openly unemployed is a luxury only few can afford; many must seek an existence in low productivity, traditional service jobs. Thus, perhaps a better indicator of the future employment problems in Indonesia is the swelling of the service sectors. Whereas in 1971 the service sectors accounted for about 30 percent of national income, by 2001 it increases to 74 percent. The rapid growth of the service sectors probably represents a lack of employment opportunities in other sectors and a type of underemployment in a residual sector that absorbs surplus labor at low productivity. (See Figures F-1 and F-2)

## FOOTNOTES FOR APPENDIX F

## LABOR FORCE AND EMPLOYMENT

1/ A later report will look at the impact of alternative education programs upon the education attainment levels of the labor force. Also, an analysis will be made of employment requirements of various economic sectors by skill level, and its implications for coordination of manpower and education policies.

2/ Ibid.

3/ Since employment was assumed to be solely a function of labor demand and not population, the level and growth over the time period is incorrect for the three projections.

4/ Ibid.

FIGURE F-1 — RURAL EMPLOYMENT AND LABOR FORCE UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

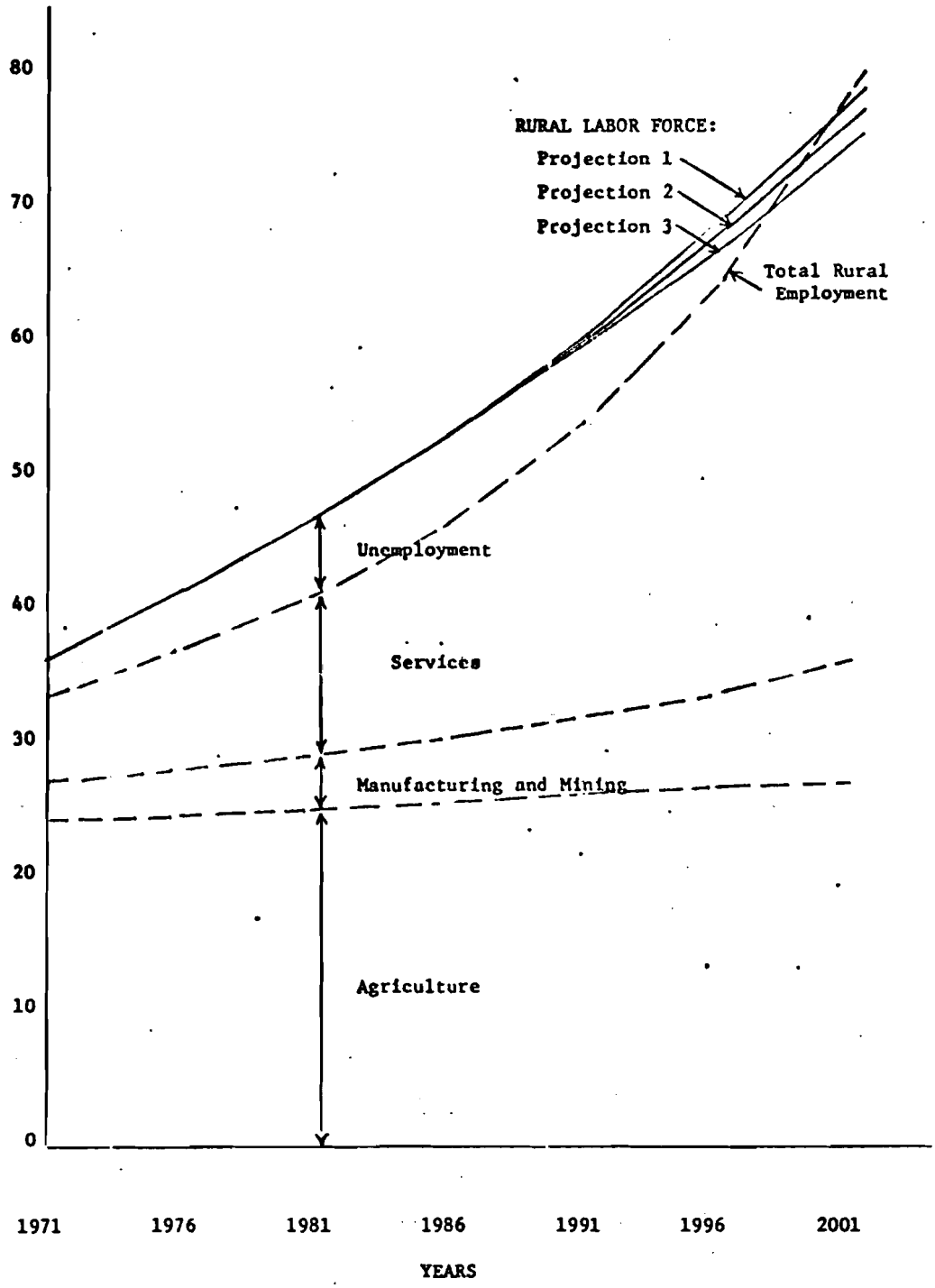


FIGURE F-2 -- URBAN EMPLOYMENT AND LABOR FORCE UNDER THE ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS

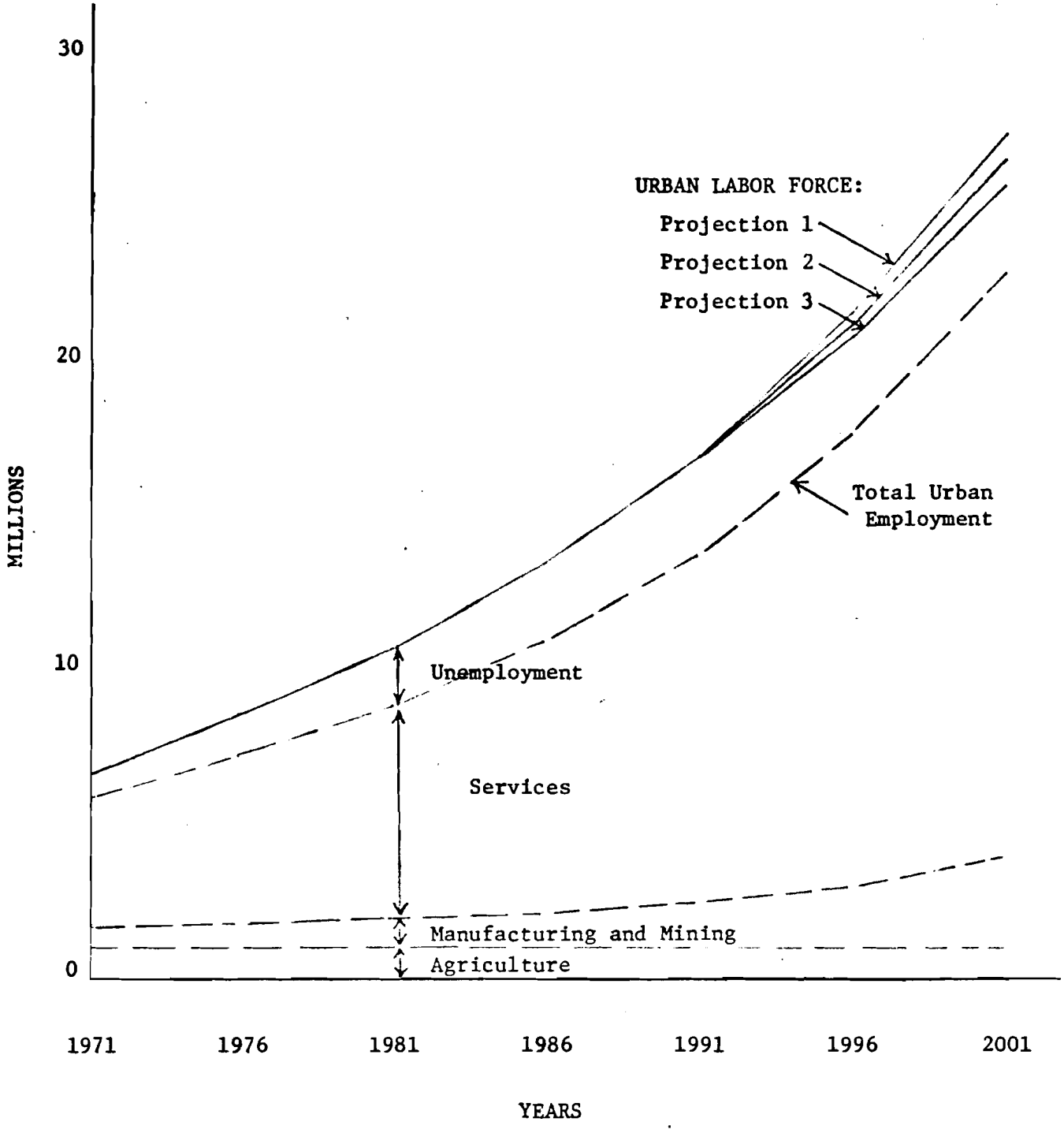


TABLE F-4 -- LABOR FORCE BY SEX AND LOCATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | Total Labor Force | Ratio of Labor Force to Population | Ratio of Labor Force to Work-Age Population 15-54 | Rural Labor Force | | Urban Labor Force | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Male | Female | Male | Female |
| 1. Rapid Population Growth | 1971 | 42,460 | .3351 | .6225 | 23,765 | 12,291 | 4,678 | 1,725 |
| | 1976 | 49,361 | .3459 | .6349 | 26,632 | 14,523 | 5,854 | 2,353 |
| | 1981 | 57,462 | .3543 | .6467 | 29,935 | 17,031 | 7,345 | 3,151 |
| | 1986 | 66,779 | .3602 | .6643 | 33,529 | 19,864 | 9,206 | 4,181 |
| | 1991 | 77,861 | .3667 | .6799 | 37,732 | 23,171 | 11,432 | 5,525 |
| | 1996 | 91,504 | .3760 | .6944 | 42,622 | 27,120 | 14,329 | 7,343 |
| | 2001 | 108,224 | .3874 | .7084 | 48,391 | 32,054 | 18,029 | 9,750 |
| 2. Moderate Population Growth | 1971 | 42,460 | .3351 | .6225 | 23,765 | 12,291 | 4,678 | 1,725 |
| | 1976 | 49,362 | .3468 | .6349 | 26,633 | 14,523 | 5,853 | 2,353 |
| | 1981 | 57,463 | .3577 | .6467 | 29,940 | 17,034 | 7,340 | 3,149 |
| | 1986 | 66,745 | .3678 | .6639 | 33,524 | 19,857 | 9,191 | 4,173 |
| | 1991 | 77,605 | .3793 | .6795 | 37,632 | 23,090 | 11,388 | 5,495 |
| | 1996 | 90,559 | .3940 | .6948 | 42,239 | 26,895 | 14,189 | 7,236 |
| | 2001 | 105,818 | .4114 | .7096 | 47,438 | 31,263 | 17,652 | 9,464 |
| 3. Slow Population Growth | 1971 | 42,460 | .3351 | .6225 | 23,765 | 12,291 | 4,678 | 1,725 |
| | 1976 | 49,362 | .3475 | .6349 | 26,633 | 14,524 | 5,852 | 2,353 |
| | 1981 | 57,465 | .3609 | .6467 | 29,945 | 17,037 | 7,336 | 3,147 |
| | 1986 | 66,714 | .3747 | .6636 | 33,520 | 19,852 | 9,177 | 4,166 |
| | 1991 | 77,377 | .3911 | .6792 | 37,545 | 23,018 | 11,348 | 5,467 |
| | 1996 | 89,728 | .4116 | .6952 | 41,904 | 26,619 | 14,064 | 7,141 |
| | 2001 | 103,714 | .4357 | .7108 | 46,607 | 30,573 | 17,320 | 9,213 |

TABLE F-5 -- LABOR FORCE, EMPLOYMENT AND UNEMPLOYMENT BY LOCATION UNDER ALTERNATIVE FERTILITY DECLINE ASSUMPTIONS
(in thousands)

| Projection | Year | RURAL | | | URBAN | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Labor Force | Employment | Unemployment Rate | Labor Force | Employment | Unemployment Rate | Labor Force | Employment | Unemployment Rate |
| PROJECTION 1 -- | | | | | | | | | | |
| Rapid Population Growth | 1971 | 36,056 | 33,414 | .073 | 6,403 | 5,796 | .095 | 42,459 | 39,210 | .077 |
| | 1976 | 41,155 | 36,747 | .107 | 8,207 | 7,053 | .141 | 49,362 | 43,800 | .113 |
| | 1981 | 46,966 | 41,110 | .125 | 10,496 | 8,698 | .171 | 57,462 | 49,808 | .133 |
| | 1986 | 53,393 | 46,946 | .121 | 13,387 | 10,871 | .188 | 66,780 | 57,817 | .134 |
| | 1991 | 60,903 | 54,912 | .098 | 16,957 | 13,793 | .187 | 77,860 | 68,705 | .118 |
| | 1996 | 69,832 | 65,981 | .055 | 21,672 | 17,816 | .178 | 91,504 | 83,797 | .084 |
| | 2001 | 80,445 | 81,621 | - | 27,779 | 23,301 | .161 | 108,224 | 104,922 | .031 |
| PROJECTION 2 -- | | | | | | | | | | |
| Moderate Population Growth | 1971 | 36,056 | 33,414 | .073 | 6,403 | 5,796 | .095 | 42,459 | 39,210 | .077 |
| | 1976 | 41,156 | 36,747 | .107 | 8,206 | 7,053 | .141 | 49,362 | 43,800 | .113 |
| | 1981 | 46,974 | 41,110 | .125 | 10,489 | 8,698 | .171 | 57,463 | 49,808 | .133 |
| | 1986 | 53,381 | 46,946 | .121 | 13,364 | 10,871 | .187 | 66,745 | 57,817 | .134 |
| | 1991 | 60,722 | 54,912 | .096 | 16,883 | 13,793 | .183 | 77,605 | 68,705 | .145 |
| | 1996 | 69,134 | 65,981 | .046 | 21,425 | 17,816 | .168 | 90,559 | 83,797 | .075 |
| | 2001 | 78,701 | 81,621 | - | 27,116 | 23,301 | .141 | 105,817 | 104,922 | .008 |
| PROJECTION 3 -- | | | | | | | | | | |
| Slow Population Growth | 1971 | 36,056 | 33,414 | .073 | 6,403 | 5,796 | .095 | 42,459 | 39,210 | .077 |
| | 1976 | 41,157 | 36,747 | .107 | 8,205 | 7,053 | .141 | 49,362 | 43,800 | .113 |
| | 1981 | 46,982 | 41,110 | .125 | 10,483 | 8,698 | .171 | 57,465 | 49,808 | .133 |
| | 1986 | 53,372 | 46,946 | .120 | 13,343 | 10,871 | .185 | 66,715 | 57,817 | .133 |
| | 1991 | 60,563 | 54,912 | .093 | 16,815 | 13,793 | .180 | 77,378 | 68,705 | .112 |
| | 1996 | 68,523 | 65,981 | .037 | 21,205 | 17,816 | .160 | 89,728 | 83,797 | .066 |
| | 2001 | 77,180 | 81,621 | - | 26,533 | 23,301 | .122 | 103,713 | 104,922 | - |

## IMPLICATIONS OF POPULATION GROWTH ON DENSITIES

Land as a factor of production is in relatively fixed supply. While technology can improve its productivity and in some cases bring about small increases in supply, i.e., by reclamation, multiple level structures, etc. -- in most instances, supply cannot be increased. Given this relative fixed supply, increased demand caused by population expansion, i.e., for housing, recreation, roads, crop production, watershed protection, etc., can have serious effects on the availability of land and this severely constrains economic development.

The relative scarcity of land and the degree of overcrowding can be judged by the population density. The population per square kilometer of land in Indonesia was calculated for the projection period in order to get some idea of the relationship between population and land. These magnitudes may somewhat obscure the critical nature of the overcrowding problem which varies considerably over Indonesia,[1/] and should only be interpreted as indicative of the trend which the projections suggest.

In 1971 the number of people per kilometer was estimated to be about 66. Under the three population growth assumptions, density is projected to increase to 147, 135, and 125 persons per kilometer for the three projections respectively. (Table F-6)

Some indication of the extent of population pressures on agricultural land can also be observed from Table F-6. In 1971 the rural labor force per kilometer was estimated to be 658. This is projected to increase to 1,269, 1,168, and 1,081 by year 2001 for Projection 1, 2, and 3, respectively. This suggests that while in 1971 there was approximately 1 rural worker to 2 acres of arable land, by year 2001 because of population growth there is likely to be over 1 rural worker per acre. Given the extent of overcrowding in the agricultural sector, high rates of rural outmigration may continue to exist.

TABLE F-6 — ESTIMATED POPULATION DENSITY FOR INDONESIA

| Projection | Year | Population per Square Kilometer of Land | Rural Labor Force per Square Kilometer of Arable Land | Rural Labor Force per Acre of Arable Land |
|---|---|---|---|---|
| 1. Rapid Population Growth | 1971 | 66 | 658 | .51 |
| | 1976 | 75 | 728 | .58 |
| | 1981 | 85 | 811 | .66 |
| | 1986 | 97 | 908 | .76 |
| | 1991 | 111 | 1,016 | .86 |
| | 1996 | 128 | 1,135 | .99 |
| | 2001 | 147 | 1,269 | 1.14 |
| 2. Moderate Population Growth | 1971 | 66 | 658 | .51 |
| | 1976 | 75 | 726 | .58 |
| | 1981 | 84 | 803 | .66 |
| | 1986 | 95 | 888 | .76 |
| | 1991 | 107 | 979 | .86 |
| | 1996 | 121 | 1,072 | .98 |
| | 2001 | 135 | 1,168 | 1.11 |
| 3. Slow Population Growth | 1971 | 66 | 658 | .51 |
| | 1976 | 74 | 725 | .58 |
| | 1981 | 84 | 796 | .66 |
| | 1986 | 93 | 871 | .76 |
| | 1991 | 104 | 947 | .86 |
| | 1996 | 114 | 1,017 | .97 |
| | 2001 | 125 | 1,081 | 1.09 |

FIGURE F-3 — POPULATION PER SQUARE KILOMETER OF LAND

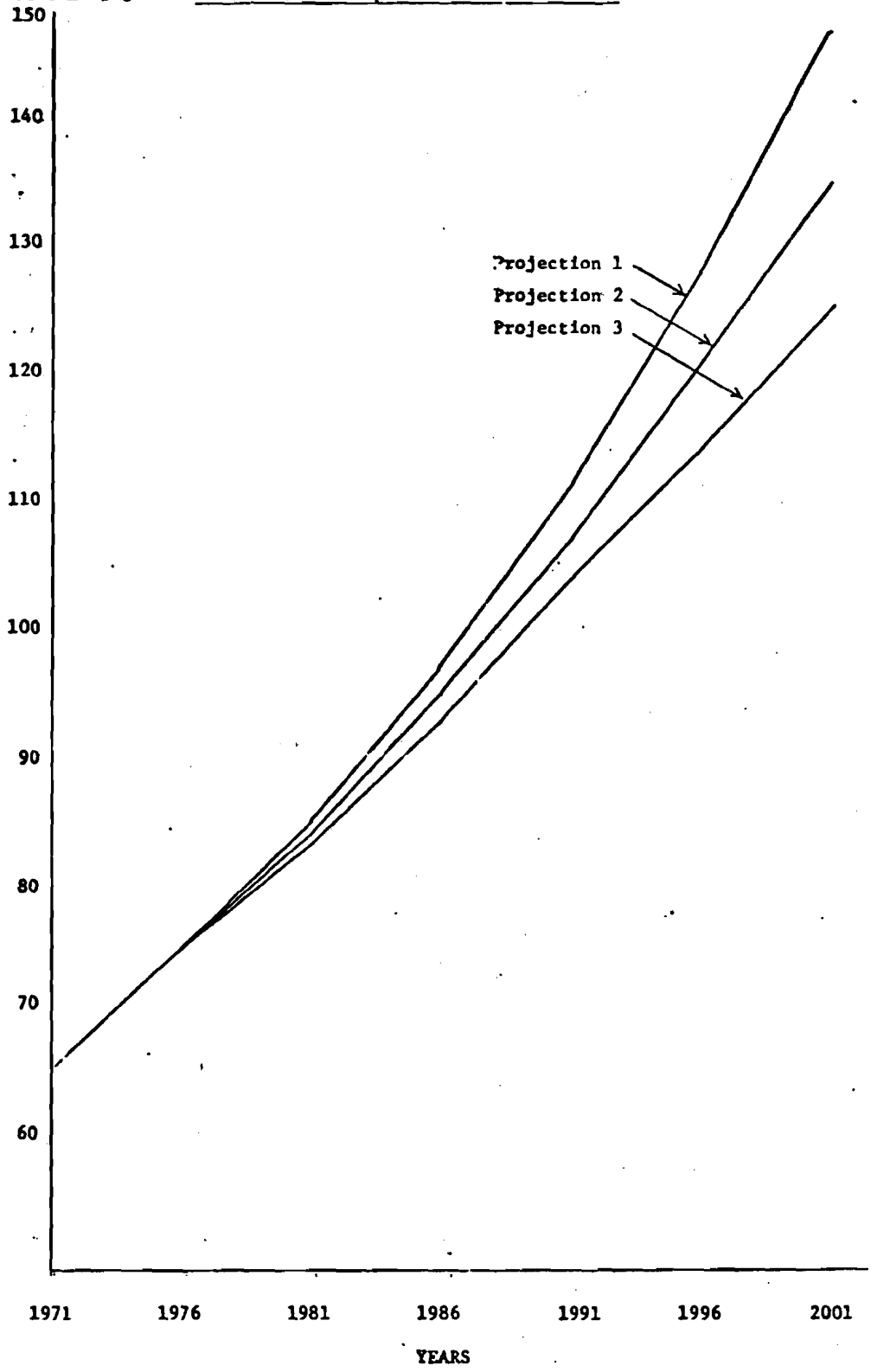
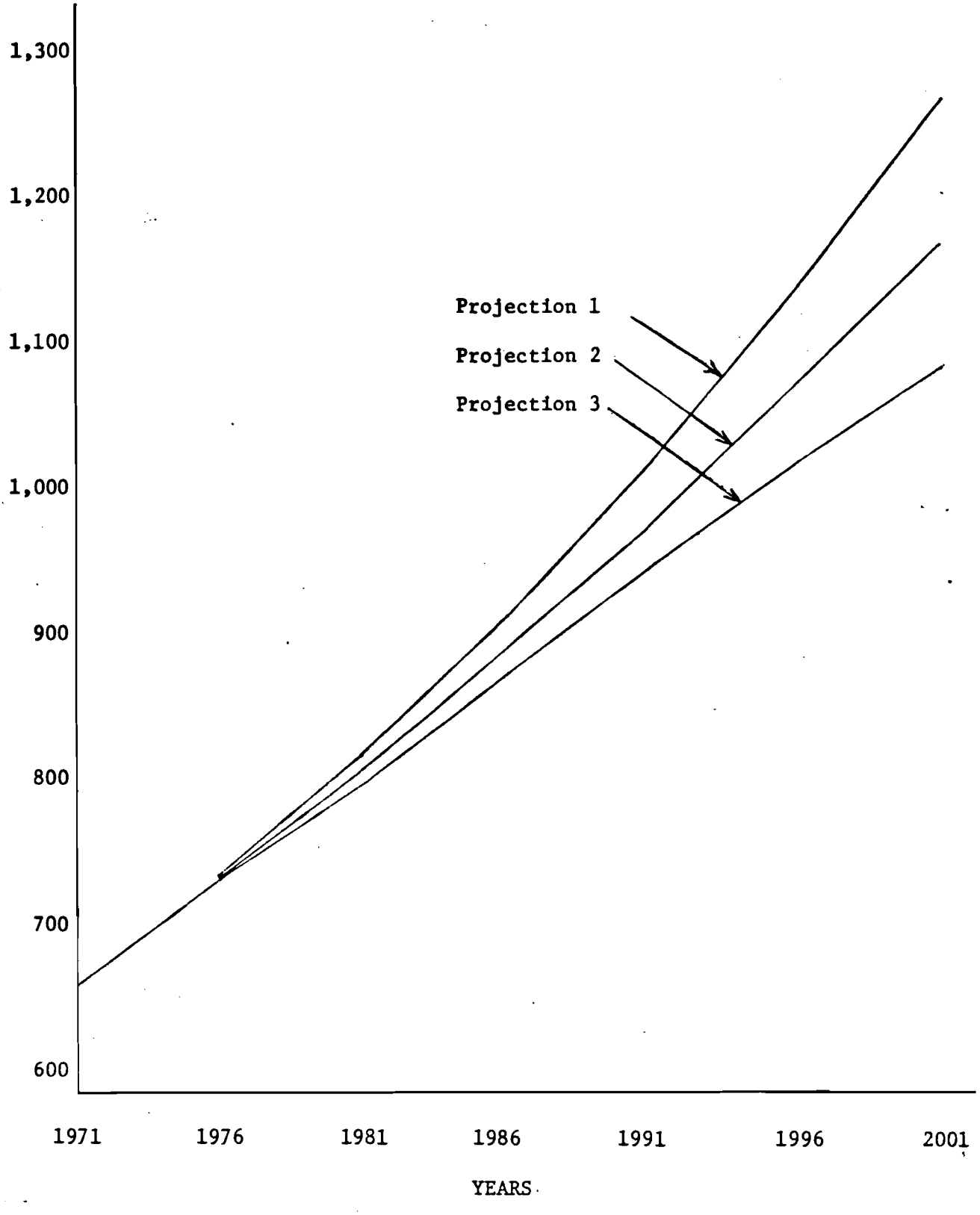


FIGURE F-4 — RURAL LABOR FORCE PER SQUARE KILOMETER OR ARABLE LAND



## FOOTNOTE FOR APPENDIX F

## IMPLICATIONS OF POPULATION GROWTH ON DENSITIES

1/ For example, in 1971 the density in Jakarta was estimated to be over 7,900 persons per kilometer, 634 in Central Java, and 539 in East Java.

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