IIASA'S POPULATION PROJECT: AGING AND CHANGING LIFESTYLES

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PREFACE

After seven years of existence (1976-1982), the Human Settlements and Services (HSS) Area will be dissolved at the end of this year, as part of a general redesign of the Institute's research program. Areas and Programs will cease to exist as of January 1983. They will be replaced by a new research structure that is organized around a set of nine projects. Some of the activities currently being carried out in the HSS Area will be phased out, others will find their new home in two projects: the Population Project and the Integrated Regional and Urban Development Project.

The Population Project will focus on the human factor in social development and will examine the ways in which industrialized societies might adapt and respond to changes in population dynamics and lifestyles. The future socioeconomic impacts of aging populations, low fertility levels, changing patterns of family formation and dissolution, and increasing rates of female labor force participation will be studied with the aid of multistate methods developed at IIASA.

This paper is a revised draft of the research plan for the Population Project that was approved by the IIASA Council at its November 1982 meeting. It sets out the proposed principal themes for the new research activity. The proposal is being circulated at this time in order to elicit comments, suggestions for modifications, and offers of collaboration from scholars in IIASA's member nations and elsewhere.

A list of recent HSS publications that are related to some of the topics touched on in this paper is included at the back.

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ABSTRACT

Low fertility levels in IIASA countries are creating aging populations whose demands for health care and income maintenance (social security) will increase to unprecedented levels, thereby calling forth policies that will seek to promote increased family care and worklife flexibility. The Population Project will examine current patterns of population aging and changing lifestyles in IIASA countries, project the needs for health and income support that such patterns are likely to generate during the next several decades, and consider alternative family and employment policies that might reduce the social costs of meeting these needs.

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1. INTRODUCTION

The ways in which our society may have to adapt and respond to disequilibria induced by energy shortages, environmental ceilings, and food insufficiencies has been the subject of much analysis and debate during the past decade. In all of this concern with perceived limits to growth, however, insufficient attention has been accorded to the effects of a variable that may overshadow all of the rest in importance: changing population dynamics and lifestyles. The socioeconomic consequences of current and prospective shifts in age compositions, patterns of family formation and dissolution, health status, internal migration, and participation in the labor force will be profound. Yet the probable societal impacts of these changes are poorly understood, and no "early warning" systems have been developed by the national governments who will be facing such problems in the decades ahead. Nor are international agencies examining the system-wide aspects of these interrelated facets of changing demographic patterns. Consequently IIASA, the only international, nongovernmental organization with an inhouse research program of adequate scale, is addressing the problem of population dynamics and changing lifestyles within its overarching research theme of "Man, Technology, and Nature."

The central issue underlying IIASA's future research agenda is *adaptation to change and turbulence*. The aging of the global population and its changing patterns of behavior at the household and family level is an exemplary topic for such an agenda, and it comes at a particularly appropriate moment, following the just concluded United Nations World Assembly on Aging—an assembly that set out many of the principal issues, initiated the global debate, and enacted a World Plan of Action, which calls for precisely the kind of coordinated international research effort that IIASA is best equipped to carry out.

1.1. Aging: An Emerging Global Issue

Within the next few decades, the world will witness an unprecedented increase in the number and proportion of older people. The global population 60 years or older will increase more than three times in the 50 years from 1975 to 2025, growing from 350 million to over a billion during this time interval. The antecedents of this new phenomenon are declining birth rates and increasing life expectancy. The most dramatic growth in the elderly population will occur in the developing countries, where about 70 percent of all people 60 years and older will reside by 2025. The social and economic implications of this population aging will be profound, and the need to prepare a timely and sound response to it led the United Nations to convene its World Assembly on Aging in Vienna during 26 July to 6 August 1982.

The World Assembly considered two sets of issues: humanitarian issues relating to the specific needs of the aging (e.g., health and income security) and developmental issues that revolve around the socioeconomic impacts of population aging. Representatives of governments, intergovernmental and nongovernmental organizations, and specialized agencies of the United Nations participating in the Assembly adopted an International Plan of Action on Aging whose primary aims are

> ...to strengthen the capacities of countries to deal effectively with the aging of their populations and with the special concerns and needs of their elderly,

> and to promote an appropriate international response to the issues of aging through increased international technical co-operation, particularly among the developing countries themselves (United Nations 1982, p. 3).

1.2. The Aging of IIASA's National Populations

Though differing in cultures, socioeconomic systems, and languages, the 17 IIASA member nations share one central, common characteristic: low levels of fertility. In 1982, fully 13 of the 17 countries exhibited below replacement levels of fertility; the other four countries (Bulgaria, Czechoslovakia, Poland, and the Soviet Union) showed fertility levels at or barely above the 2.1 babies per woman total fertility rate that is necessary for one generation to replace itself with another (Table 1). Moreover, past trends suggest that sometime during the 1980s the total fertility rates in *all* of the IIASA countries probably will fall below the 2.1 figure, an event that is already creating concern among national policy makers in several of these countries.

Low fertility levels eventually produce populations with relatively high proportions of the elderly. And when low fertility follows a period of high fertility, a disequilibrium between workers and pensioners arises, as each new worker suddenly has to support more pensioners than did those before him.

According to the most recent estimates and projections published by the United Nations, the total population of the 17 IIASA member nations was approximately 980 million in 1980 and expected (in their medium variant projection) to increase to 1.1 billion by the year 2000 (Table 2).

This aggregate projection conceals the diversity of growth trends among the 17 countries and, at an even more spatially disaggregated level of detail, among their principal subnational populations. For example, the population of the Soviet Union in 1980 was growing at an annual rate of 0.9 percent, whereas that of the Federal Republic of Germany was declining at the rate of 0.2 percent per annum. The growth differentials inside of IIASA countries were even more divergent. The population of the Kanto region in Japan, for example, was growing at an annual rate of

Table 1. Total fertility rate per woman, IIASA countries 1950-1982.

Year	Country								
	Austria	Bulgaria	Canada	Czech.	FRG	Finland	France	GDR	Hungary
1950	2.1	2.9	3.5	3.0	2.1		2.9	2.3	2.6
1955	2.2	2.4	3.8	2.8	2.1		2.7	2.4	2.8
1960	2.6	2.3	3.9	2.4	2.4	2.7	2.7	2.3	2.0
1965	2.7	2.1	3.1	2.4	2.5	2.4	2.8	2.5	1.8
1970	2.3	2.2	2.3	2.1	2.0	1.8	2.5	2.2	2.0
1975	1.8	2.2	1.8	2.5	1.4		1.9	1.5	2.4
1978	1.6	2.2	1.8	2.4	1.4		1.8	1.6	2.1
1981	1.6	2.1	1.8	2.3	1.4	1.6	1.9	1.9	2.0
1982	1.7	2.2	1.8	2.1	1.5	1.6	2.0	1.9	1.9

	Italy	Japan	Nether-lands	Poland	Soviet Union	Sweden	U.K.	U.S.
1950	2.5	3.6	3.1	3.7	2.9	2.3	2.2	3.1
1955	2.3	2.4	3.0	3.6	2.9	2.2	2.2	3.6
1960	2.4	2.0	3.1	3.0	2.8	2.2	2.7	3.6
1965	2.6	2.1	3.0	2.5	2.5	2.4	2.9	2.9
1970	2.4	2.1	2.6	2.2	2.4	1.9	2.4	2.5
1975	2.2	1.9	1.7	2.3	2.4	1.8	1.8	1.8
1978	1.9	1.8	1.6	2.2	2.3	1.6	1.7	1.8
1981	1.7	1.8	1.6	2.3	2.3	1.7	1.9	1.8
1982	1.7	1.8	1.6	2.3	2.3	1.7	1.9	1.9

Sources: Data for 1950-1978 taken from U.S. Bureau of the Census, International Population Dynamics 1950-1979 Demographic Estimates for Countries with a Population of 5 Million or More. Washington, D.C., 1980. All 1981 (and 1982) data taken from Population Reference Bureau, Inc. 1981 (1982) World Population Data Sheet. Washington, D.C., 1981 (1982). Data on Finland taken from Economic Commission for Europe, Post-war Demographic Trends in Europe and the Outlook Until the Year 2000, United Nations, New York, 1975.

Table 2. Population size and average annual rate of increase for the world and for IIASA countries, UN medium variant, 1960-2000, as assessed in 1980.

Region	Population (millions)			Average annual rate of growth (%)		
	1960	1980	2000	1960-1965	1975-1980	1995-2000
World Total	3,037	4,432	6,119	1.99	1.72	1.50
More developed regions	945	1,131	1,272	1.19	0.70	0.48
Less developed regions	2,092	3,301	4,847	2.34	2.08	1.77
IIASA Countries Total	820	980	1,100	---	---	---
Austria	7.0	7.5	7.4	0.58	-0.10	-0.04
Bulgaria	7.9	9.0	9.7	0.83	0.64	0.29
Canada	17.9	24.5	34.8	1.85	1.49	0.93
Czechoslovakia	13.7	15.3	16.8	0.73	0.71	0.49
Fed. Rep. of Germany	55.4	60.9	58.8	1.25	-0.29	-0.16
Finland	4.4	4.9	5.1	0.60	0.63	0.04
France	45.7	53.5	56.3	1.30	0.30	0.22
German Dem. Rep.	17.2	16.9	16.9	-0.26	0.01	0.00
Hungary	10.0	10.8	11.0	0.33	0.40	0.08
Italy	50.2	56.9	59.1	0.67	0.39	0.08
Japan	94.1	116.6	129.3	0.99	0.88	0.49
Netherlands	11.5	14.1	15.2	1.37	0.60	0.30
Poland	29.6	35.8	41.2	1.27	1.02	0.54
Soviet Union	214.3	265.5	310.2	1.49	0.93	0.64
Sweden	7.5	8.3	8.1	0.67	0.20	-0.12
United Kingdom	52.6	55.9	55.2	0.73	-0.05	-0.06
United States	180.7	223.2	263.8	1.45	0.89	0.67

Source: United Nations (1981). *World Population Prospects as Assessed in 1980.* New York: United Nations.

2.2 percent per year in 1980, at the same time that the population of a sister region in Japan, the Kyushu region, was declining by 1.5 percent per year.

Regional disparities in growth rates reflect differentials in fertility, mortality, and migration, and they give rise to regional differentials in the prominence of the elderly in subnational population totals. For example, fully one out of every five residents of Vienna, Austria was 65 years or older in 1980; yet only one in ten residents of the province of Vorarlberg was in that age group at that time. Over 18 percent of the population of the state of Florida in the United States fell into this elderly age group; whereas less than 3 percent of Alaska's population was in this age group in 1980.

1.3. Population: A Central Variable in IIASA's Research Agenda

Population is an important topic in its own right and therefore deserves project status. It also is a central variable in many of IIASA's other nine projects. Population growth and rural-to-urban migration, for example, are fundamental aspects of the structural transformation of agrarian societies and therefore of central importance to studies carried out by the National Agricultural Policies Project.

Future demands for energy are heavily influenced by the number and structure of households and their spatial distribution across national territories in cities of different size. Thus the Energy Program rightly listed population as one of four components driving future energy demand.

Changing patterns of interregional migration and intrametropolitan relocation are fundamental forces shaping urban and regional development. Thus IIASA's Integrated Regional and Urban Development Project has properly emphasized the importance of understanding changing patterns of geographical mobility, population redistribution, and settlement structure.

Finally, a new IIASA research activity, Patterns of Economic Structural Change and Industrial Adjustment, will need to examine changing trends in consumer demand and labor supply to fully understand how technological change is altering the world economy.

2. IIASA'S POTENTIAL CONTRIBUTION TO THE POLICY DEBATE

Many organizations are conducting research on the problems of aging populations and changing lifestyles. They include international organizations such as the World Health Organization in Geneva and national institutions such as the Brookings Institution in Washington, D.C. Nevertheless, IIASA can make a significant contribution to the policy debate on this topic by virtue of its unique position as the only nongovernmental, multidisciplinary, international research institute in the world that has scholars recruited from both centrally planned and market economy nations. Consequently it has a distinct advantage in carrying out international comparative studies of the character outlined in this document.

2.1. An International Forum

Most of the current research in the field of population aging and changing lifestyles is uncoordinated at the international level, and national experiences with similar problems are not widely shared; successful problem resolutions are not disseminated for possible application elsewhere. In light of this, the Population Project at IIASA seeks to serve as a forum for the international exchange of ideas and experiences regarding common problems arising from the aging of national populations, the consequent growing demands for health and income maintenance, and the impacts on these developments of today's changing patterns of family formation and labor force participation.

2.2. A Systems View

It is useful to distinguish between two related aspects of aging: the first is simply the size and rate of growth of the elderly population, the second is the relative "weight" of this population in a society and its change over time. The former is more readily determined because tomorrow's (e.g., in the year 2030, say) elderly have already been born and their number is affected only by mortality, which changes slowly and in a generally predictable manner. The latter, on the other hand, is more difficult to ascertain because the *fraction* of tomorrow's national

population that will consist of the elderly also depends on the number of children, not yet born, who will then be part of that population. And reliable fertility forecasts are notoriously difficult to obtain.

To understand patterns of aging, then, it is necessary to examine patterns of fertility. To understand fertility behavior it is necessary to study patterns of family formation and dissolution and of female labor force participation. The dynamics and policy implications of aging populations cannot be adequately assessed within a partial perspective that omits these key interlinkages. The problem of aging is truly a systems problem, an appropriate component of the research agenda of an international systems research institute such as IIASA.

2.3. A Multistate Analysis

A large and growing body of theory, methods, and applications in demography is concerned with the transitions that individuals experience during their lifetime, as they pass from one state to another: for example, transitions from being single to being married, from being in the labor force to being retired, from living in one region to living in another.

During the past several years, research at IIASA has helped establish a new subfield within demography: *multistate demography*. In the words of Academician Nathan Keyfitz of the U.S.:

> In the elaboration of the several lines of work that are here put together, IIASA has had an important role... a new discipline has come into existence that, on the one hand, unifies preceding work, and, at the same time, reaches out to new kinds of interdisciplinary work (Keyfitz 1980b, p. v).

The application of multistate methods to the analysis of issues of population aging and changing lifestyles is likely to reveal insights that are difficult or impossible to establish using more conventional techniques. Again quoting Dr. Keyfitz:

> That we need to take account of more than one factor

> at a time is increasingly clear. Time in the married state is affected by mortality... because mortality has gone down, and despite the great increase in divorce, married couples stay together almost as long today as they did at the turn of the century... That can only appear in a multiple decrement table showing marriage and mortality simultaneously. Do marriages in which there are children hold together better than those without? To answer this requires a further decrement—parity. And what is the effect on divorce of wives with jobs? A further set of states—working or not—has to be recognized to deal with this. Complicated? Not at all; the matrix theory is the same in four dimensions as in one, and even the methods of calculation are not much different (Keyfitz 1980a, pp. 621-622).

The Population Project at IIASA will apply matrix methods and multistate demographic analysis to examine current patterns of population aging and changing lifestyles. It also will use multistate projection models to simulate the probable consequences of alternative policy interventions that restructure existing incentive systems to produce alternative outcomes, for example, adult mid-career programs to retrain the unemployed, more flexible disability regulations to induce those drawing disability benefits to go back to work, and revised tax incentives to defer early retirement.

3. A RESEARCH AGENDA

The need to integrate the elderly into the social and economic life of their communities has been stressed by those most closely associated with efforts to resolve problems of aging populations. Such integration, they argue, will improve the well-being of the elderly, enrich their remaining years, and reduce the the cost of the programs that support them.

Two principal agents of socioeconomic integration are the family and economic activity. Family care, when available, is considered to be preferable to institutional care, and employment maintains both social status and economic independence. Family policies and employment (retirement) policies, therefore, are two key components of social and economic programs adopted by governments. They will generate two major policy debates in the years

ahead: (1) the roles of the family and the State in assisting the elderly, and (2) the relationship between activity and retirement.

Figure 1 outlines the systems framework that will underlie the Population Project's examination of the societal implications of population aging and changing lifestyles. The principal focus will be on the interrelationships between aging populations, their needs for health services and income maintenance (social security), and the two agents for promoting the socioeconomic integration of the elderly with their communities. Thus the Project will examine the four interrelated topics delineated by the triangles in Figure 1: low fertility, social security, family care, and work-life flexibility and retirement.

3.1. Low Fertility

Past studies of fertility have identified two fundamental explanatory factors that must be kept in mind when assessing probable future levels of fertility: patterns of family formation and dissolution and patterns of female labor force participation. As illustrated in Figure 2, the trends in these patterns are closely (and inversely) correlated with those of fertility; birth rates have declined as divorce rates and the labor force participation rates of married women have increased. Thus efforts to anticipate future fertility levels need to also anticipate future marital status transitions and female labor force participation patterns.

Fertility rates in IIASA member nations have been declining over the past two decades. A sharp reversal of this historical pattern is not a likely prospect. About 10 percent of the women in several European countries go through life without bearing any children and another 20 percent have only one. If bare replacement level fertility is to occur in such countries, 50 percent have to have three children each. Trends, such as those shown in Figure 2, suggest that this probably will not happen soon.

The Population Project will examine current patterns of fertility, marital status change, and female labor force participation in IIASA countries and will identify some of their probable societal consequences and impacts on the aging issue. Some preliminary efforts along these directions have been reported in a

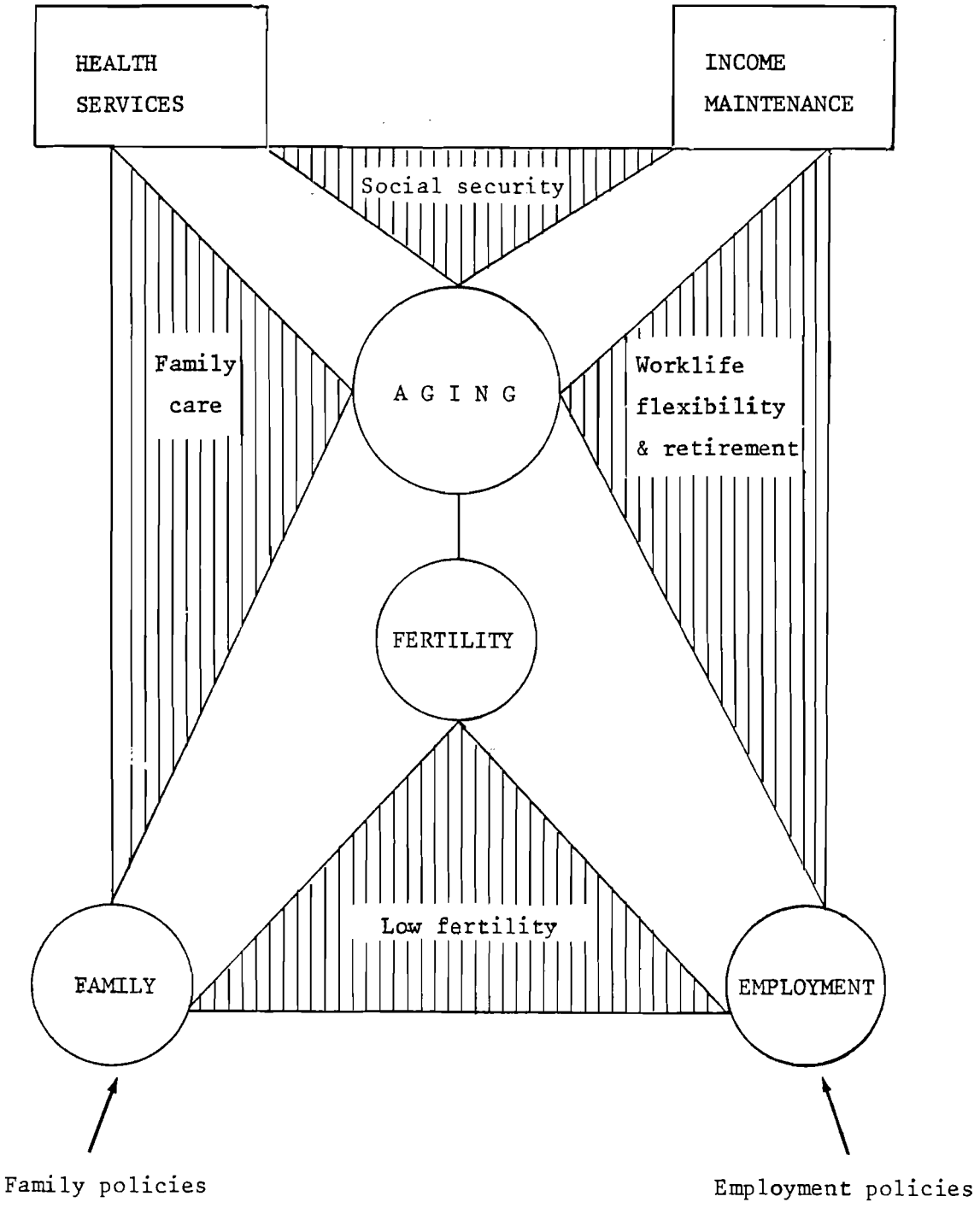
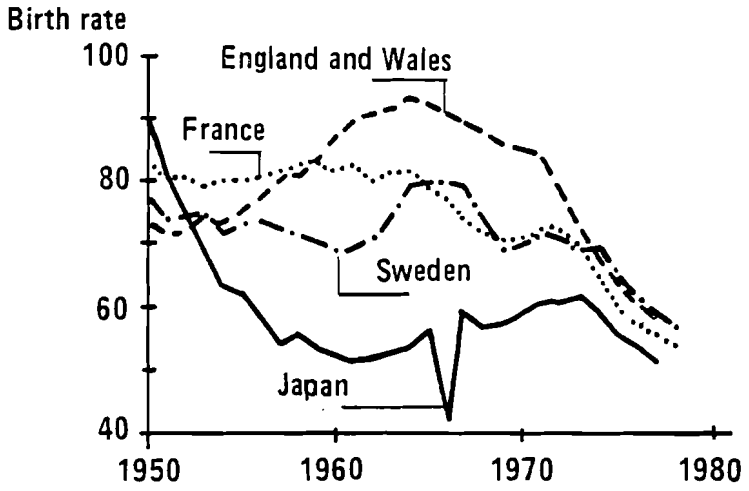
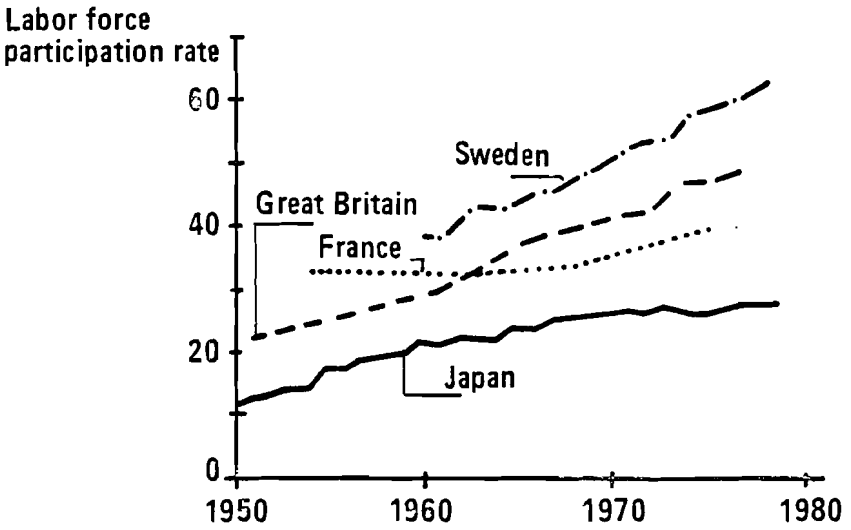


Figure 1. A systems view of the aging problem.

Birth rates per 1,000 women ages 15–44



Labor force participation rates of married women



Divorce rates per 1,000 married women

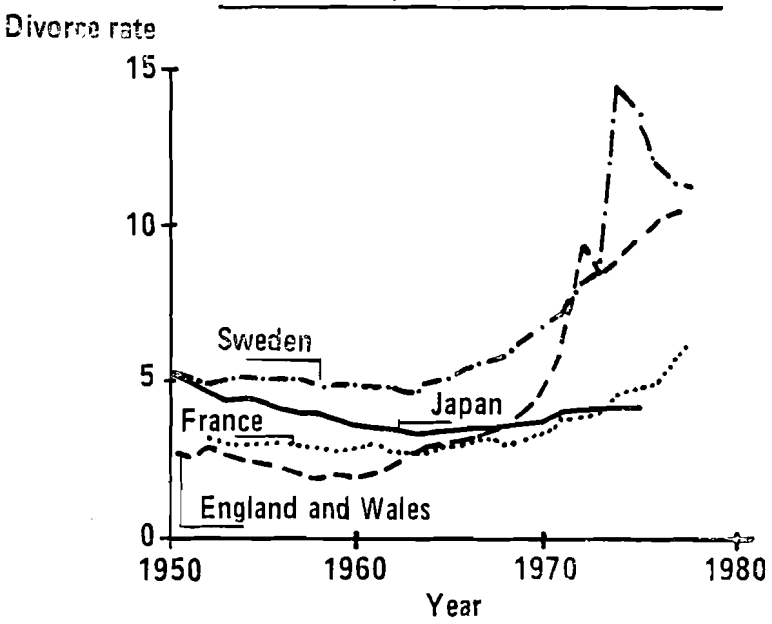


Figure 2. Fertility, labor force participation, and divorce in four IIASA countries. (Source: Becker, 1981).

series of recent working papers (Neusser 1981, Espenshade 1982, Rogers and Williams 1982).

3.2. Social Security

The impacts of declining birth rates are felt in population age compositions: reducing the proportion in the youngest age groups, increasing the proportion over age 65, and leaving approximately the same proportion in the working ages. In many IIASA nations a significant part of the costs of ensuring the well-being of the elderly is borne by those in the labor force by means of payroll taxes or income taxes. Thus if IIASA countries decide to continue current levels of health and income support (social security) benefits to their elderly citizens, then fertility declines imply rising per capita support burdens on the workforce.

Social security programs in many industrialized countries are financed on a "pay-as-you-go" basis, in which today's beneficiaries are supported by today's workers. It is widely believed that such systems cannot be maintained for long by declining populations, and indeed social security is already a serious political issue in countries such as the United States and Canada.

The problem will not be easily resolved because the future prospects are even bleaker. In the United States, for example, the proportion over age 65 will increase dramatically after the year 2010, when the postwar baby-boom cohort enters the retirement ages and when only about two workers will be available to support each retiree.

Paradoxically, despite these bleak prospects, many Western European countries are exacerbating the problem of social security financing by *lowering* the mandatory age for retirement. At the same time that the United States has moved to extend the mandatory retirement age to 70, Western Europe is moving in the opposite direction.

Finally, a number of national policies dealing with retirement work at cross-purposes. For example, although mandatory retirement at age 65 has been outlawed in the United States, tax disincentives to work after this age have not been changed. The

social security benefits of workers between ages 65 and 72 are reduced by $1 for every $2 earned above $5,000. Because social security benefits are tax free, this penalty can mean that such workers keep only 20 cents of every additionally earned dollar.

The Population Project will study current programs for health and income maintenance in IIASA countries and will project expected future demands on such programs that would arise under a number of alternative assumptions regarding future patterns of fertility and survivorship. Preliminary work on social security has already started and is described in a IIASA working paper by Nathan Keyfitz entitled "How Secure is Social Security?" (WP-81-101).

3.3. Family Care

The family is viewed throughout the world as the primary caring agent of the elderly. In many industrial nations today, however, the family is experiencing stresses and reorganizations that are endangering its traditional caring role.

Women are entering and remaining in the labor force for longer periods of time and are therefore caught between the desire and need to work and the responsibility of caring for parents or grandparents. Reduced birth rates have decreased the number of children in families and increased the number of elderly who have few or no children to take care of them in their old age.

Families are extending further across space and over generations. Internal migration disperses kin networks, and prolonged lifetimes combine living kin of several generations. It is no longer unusual, for example, for a 40-year-old parent to have both a 65-year-old parent and an 85-year-old grandparent. And it is becoming increasingly unlikely that all four generations will be residents of the same community.

The absence of family support systems is a social condition that can place aged persons in institutional care just as forcefully as do medical conditions. The growing numbers of elderly without such support systems has increasingly shifted the burden of caring for the elderly to the State. Yet the spiralling costs

of this burden suggest that the contribution of family care will need to be strengthened in the future.

The position of the aging within the changing forms of the family in industrial societies is a topic that merits international comparative analysis. So does the search for policies that promote the cohesion of families and provide them with the support needed for the fulfillment of their historical responsibilities in the care of their older members. Thus the Population Project will address both of these topics in its research program. The analysis of the latter will be largely descriptive; that of the former will involve multistate (multiregional) generalizations of analytical results on kinship networks first developed by Goodman, Keyfitz, and Pullum (1974).

3.4. Worklife Flexibility and Retirement

Our life spans have been increasingly compartmentalized into periods devoted first to schooling, then to work, and then to leisure. The overall effect of the social legislation enacted over the past 50 years has been to establish education, employment, and retirement as separate activities that are undertaken sequentially.

An integrated insurance-pension system that would transfer income between different periods of life as well as provide income maintenance during periods of unemployment and retirement would promote worklife flexibility. For example, each person could be given the right to temporarily withdraw from the labor force for a year or two, while drawing in advance on his or her pension in exchange for postponing final retirement beyond the normal retirement age. Such a system would promote voluntary variations in the supply of labor without corresponding variations in individual income; and it would permit the unemployed to take a "sabbatical" for purposes of further education or retraining.

Little research has been devoted to the study of this more flexible approach to the allocation of a lifetime between periods of education, work, and leisure. Integrated insurance-pension systems that would transfer income between different periods of

life have been proposed, but they have not been seriously analyzed. Classical actuarial techniques are not readily applicable to such multiple transition analyses because they all are based on the notion of a conventional life table—a mathematical apparatus that permits only exits from a population and no re-entries. Multistate demography, on the other hand, is precisely the analytical instrument that can deal with this problem, and IIASA's past work on this topic gives it a comparative advantage to carry out such a research effort.

Some preliminary work in this direction has already taken place. For example, IIASA scholars Nathan Keyfitz and Andrei Rogers have shown, in a recent article, that multiple contingency calculations including moves in and out of employment, insurance, disability, and retirement can be readily examined with multistate methods.

> Disability insurance, withdrawals from a life insurance plan, pensions, multiple lives... all such multiple contingencies, along with marriage, labor force, and other tables treated by demographers, may be formally handled... with simple matrix formulae, uniform calculations, and consistent approximations (Keyfitz and Rogers 1982, p. 59).

4. CONCLUSION

The Population Project will seek to develop a better understanding of how low fertility and mortality combine to create aging populations with high demands for health and income maintenance and reduced family support systems that can provide it. The research will produce:

1. A multistate description of current patterns of fertility, marital status change, and female labor force participation in IIASA countries together with an assessment of their probable societal consequences and impacts on the aging.
2. A report on current programs for health and income maintenance in IIASA countries and projections of future demands on such programs.

3. An analysis of the position of the aging within changing family structures in IIASA countries and a review of national policies that seek to promote an enlarged role for family care.

4. A quantitative assessment of the costs and benefits of alternative systems for transferring income between different periods of life in order to promote work-life flexibility.

Although the Population Project is to start on 1 January 1983, several preparatory actions have already been taken, a number of research activities have been initiated, and an organizational structure has been developed.

The organization of the Population Project's research program will reflect the realities of IIASA's reduced financial circumstances. First, the internal budget can only support a small core group of scholars at IIASA. But they will provide the central leadership and coordination for the research efforts of a much larger group of external collaborating scholars and institutions in over two dozen countries. This network of scholars includes representatives from all of IIASA's member nations and is currently linked by a biannual newsletter, POPNET.

Second, external funds and secondments of scholars to the Institute are expected to increase the in-house staff and its resources by about 50 percent. A few IIASA member nations have offered as well to set up groups of scholars who would remain in their countries but would carry out work for, and directed by, IIASA.

Finally, a number of other national and international organizations are conducting research on various aspects of population aging and changing lifestyles. They offer the elements for a potential *cooperating* network of institutions with activities that might be harmoniously integrated with those of IIASA.

A small core in-house team, a network of collaborating external scholars, secondments, external funds, and cooperation with coordination among several international and national institutions—all are elements of the organizational plan of the Population Project.

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