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Life Span, Health, Savings, and Productivity*

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In this paper we begin by drawing attention to the dramatic increases in the life span of people in most low-income countries during recent decades. We then argue that longer life and the associated improvement in health have important economic implications which have been ignored in the literature. Last, we present evidence in support of two of these implications, namely, the growth of educational investments including the foregone earnings of students and the apparent gains in the productivity of agriculture in India over a period of about 2 decades.

The Life-Span Revolution

A quiet revolution has been altering greatly the mortality tables of many low-income countries. Although it is now obvious that the rapid population growth in these countries is a consequence of the gap that has opened between the persistent traditional birth rates and the much reduced death rates, the fact that the life spans of youths and adults have become much longer is not as obvious.

The widely used standard statistic is the life expectancy at birth. We shall start with it. Since 1950 the life expectancy at birth has increased 40% or more in many low-income countries.[1] Implications aside, this increase in life expectancy is a measure of what must be viewed as an extraordinary achievement. The people of Western Europe and North America never attained so large an increase in life expectancy in so short a period. Thus, in a comparative sense, *this achievement on the part of many low-income countries is unprecedented.* In an effort to determine

* We are indebted to Gary Becker, Allen Kelley, Andrew Kamarck, Simon Kuznets, A. Mitra, M. T. R. Sarma, T. Paul Schultz, Burton Weisbrod, and two referees. The responsibility for the remaining deficiencies is ours.

[1] See the UN Demographic Yearbooks for various years. Note that we shall use the term "life span" to refer to the life expectancy of youth and adults.

the factors and events that explain this remarkable increase in life expectancy, one cannot appeal to any comparable demographic development in Western economic history. Similarly, to explain the economic effects of this achievement within the low-income countries calls for a direct appeal and analysis of the changes in human conditions and circumstances that have characterized these particular low-income countries.

The gains in life span achieved by the low-income countries are well illustrated by the case of India for which there are comprehensive data from the population censuses of 1951, 1961, and 1971. Over this period of 2 decades, the life expectancy at birth of males rose from 32.4 to 46.4 years,[2] which implies an increase in this statistic of 43%. For females, the comparable figures are 31.7 in 1951 and 44.7 in 1971, reflecting an increase of 41%.

Whereas the decline in the mortality of infants and of very young children accounts for a large part of the increase in life expectancy at the time of birth, the observed decline in mortality of people who have reached the age when they are in school or are active productive agents is also large, and it is central in our analysis. To see this part of the decline in mortality, we present some demographic data from India on this point. Increases in the expected life span of youths and adults at various ages beginning with age 10 and on to age 60 appear in table 1. It provides this information for males and for females covering the period from 1951 to 1971. For young people who are in the early years of their working life, the additional years of expected life at ages 20 and 30 are impressively large. Note that the life span of males increased by 8.1 and 6.7

TABLE 1

INCREASE IN EXPECTED LIFE SPAN OF MALES AND FEMALES IN INDIA BETWEEN 1951 AND 1971 AT SELECTED AGES

AGE (Years)	EXPECTED LIFE SPAN				INCREASE 1951–71			
	Males		Females		Males		Females	
	1951	1971	1951	1971	Years	%	Years	%
10.....	39.0	48.8	39.5	47.7	9.8	25	8.2	21
20.....	33.0	41.1	32.9	39.9	8.1	25	7.0	21
30.....	26.6	33.3	26.2	32.0	6.7	25	5.8	22
40.....	20.5	25.9	21.1	25.4	5.4	26	4.3	20
50.....	14.9	19.2	16.2	19.7	4.3	29	3.5	22
60.....	10.1	13.6	11.3	13.8	3.5	35	2.5	22

SOURCES.—For 1951: Government of India, *Census of India, 1951: Life Tables*, ser. 1, paper 2 of 1954 (New Delhi: Registrar General and Census Commissioner, 1954), pp. 35–38; for 1971: *Census of India, 1971: Life Tables*, ser. 1, paper 1 of 1977 (New Delhi: Registrar General and Census Commissioner, 1977), pp. 14–17.

[2] Strictly speaking, the actual calculations of these life expectancies are projections of the demographic events of 1941–51 and of 1961–71. We shall, however, refer to them, in order to save some space, as life expectancies of 1951 and 1971.

years, respectively, for these age classes and that of females by 7.0 and 5.8 years.

To perceive at a glance the full range of the increases in life span between 1951 and 1971, figure 1 is useful. The difference in years in favor of 1971 is shown on the verticle scale. Ages 5–10 or 15 tell the story for the school years. The increase in the expected life span at ages 15–25 is most impressive and, of course, consistent with the figures in table 1.

The record of India is indicative of the dramatic increase that has recently occurred in the life spans of young persons and adults in many low-income countries. In the next section we speculate on some of the major implications of these changes and take a broad look at the relevant literature to see what guidance one can obtain in regard to these implications.

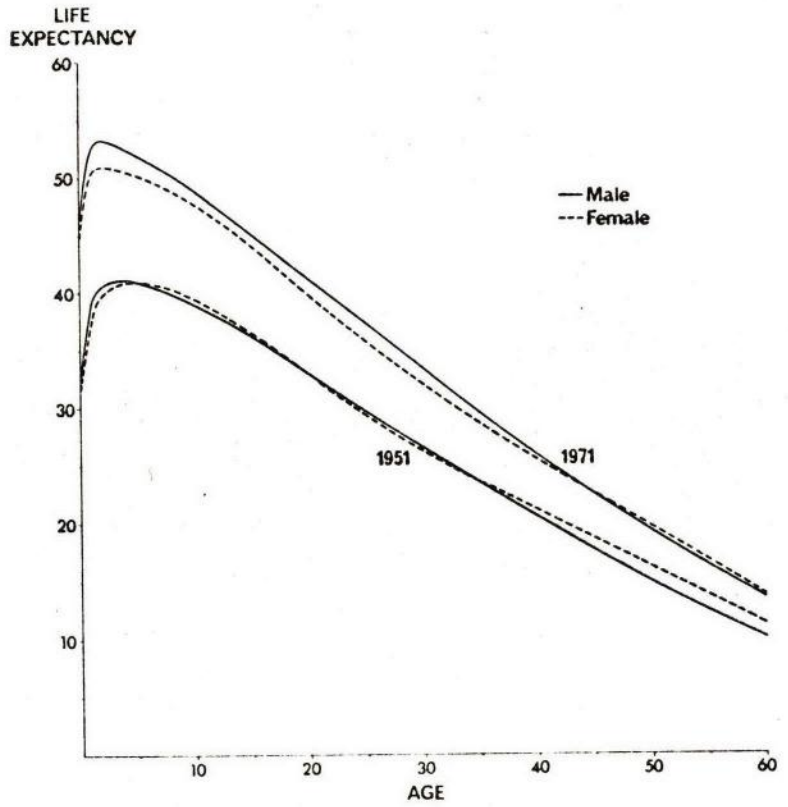


FIG. 1.—Age-specific life expectancy: India 1951 and 1971 censuses. SOURCES.—For 1951: Government of India, *Census of India 1951: Life Tables*, ser. 1, Paper 2 of 1954 (New Delhi: Registrar General and Census Commissioner, 1954), pp. 35–38; for 1971: *Census of India 1971: Life Tables*, ser. 1, paper 1 of 1977 (New Delhi: Registrar General and Census Commissioner, 1977), pp. 14–17.

Some Implications of Increased Life Span and a Review of the Literature

A clear understanding of the implications of the "life-span revolution" requires a proper perspective of the demographic events that have characterized most low-income countries during the last 2 or 3 decades. Much of the literature places strong emphasis on high fertility rates and acceleration of population growth. As a matter of fact, fertility rates have in general not increased in these countries during the period. Acceleration of the population growth has been caused by a large fall in mortality rates while the birth rates remained steady or declined only slightly. The observed fall in mortality and the related increase in life span is linked to large improvement in the health status of the populations in low-income countries. Therefore, an accurate description of the relevant demographic events would be through the sequence improvement in health, fall in mortality, increase in life span, steady fertility, and thus an acceleration in population growth. This description is very different from what the literature emphasizes.

Thus, besides the phenomenon of population growth, which is much emphasized, there are also other important implications that are consequences of the increases in life spans. First, the satisfaction (utility) that people derive from a longer life span must be substantial. Although it is exceedingly difficult to measure the additional utility, there is little room for doubt that the value of life is enhanced by its extension and by the improvements in health that "account" for the observed longer life span.[3] Further, the gain in the state of health that a longer life span implies is an addition to the stock of human capital and should increase the productivity of workers in a variety of ways. The obvious point that a longer life span results in more years of participation in the labor force in low-income countries is of major importance. There is also a clear implication of an increase in the physical ability to engage in work from day to day and a reduction in days lost because of illness. Thus, the daily amount of effective work per worker increases. The direction of the effect in regard to motivation and aspiration of people is also obvious.

Moreover, and very important over time, there is an additional incentive to acquire on-the-job experience and schooling as investments in future earnings which accrue over longer periods due to increased life span. Parents, too, have an additional incentive to invest in the human capital of their children. When account is taken of public and private resources that are allocated to investment in human capital, notably in schooling, the additional "savings" for this purpose would imply that the

[3] The ingenious extension by Dan Usher ("An Imputation to the Measure of Economic Growth for Changes in Life Expectancy," in *The Measurement of Economic and Social Performance*, ed. Milton Moss [New York: National Bureau of Economic Research, 1973]) and its application to deal with this issue will be mentioned later.

real national savings are larger than the estimates that appear in the conventional national accounts of these countries. These are some of the more important economic implications of the observed marked increases in life span that have occurred in many low-income countries.

Our search of the literature provides us with all too few useful findings that pertain to the implications mentioned above. Much of the literature concentrates on birth rates and fertility and not on increases in the expected life span of youths and adults and the economic consequences of these increases. Furthermore, most of the studies that attempt to deal with the effects of population growth on the economy rest on assumptions that lack plausibility, and they use economic concepts that omit the formation of human capital. The critical assumption in many of these studies is that the marginal productivity of labor declines as the work force grows relative to "capital." This assumption or assertion arises primarily because the concept of capital is restricted to material capital, thus overlooking the accumulation of human capital.

Our review of the literature has three broad parts. First, we consider the studies which stress the consequences of population growth in relation to economic development. Second, we briefly discuss the few empirical studies that investigate the relationship between growth of population and savings or investment. Last, we review the research pertaining to health-development relationship.

Coale and Hoover did a pioneering analysis of the effects of population growth on economic development and applied their model to India.[4] Postulating various rates of population growth, they worked out the effects of these rates on age distribution, labor supply, consumption, and savings. Assuming a decline in the mortality rate from about 2.5% per annum in 1956 to around 1.5% per annum in the 1970s, they estimate the effects of different fertility rates on income. Their main argument rests primarily on the assumption that diminishing marginal factor products occur as the labor force grows. A high rate of population growth and hence of the labor force is not supported by a corresponding increase in investment to maintain the same per capita income. Furthermore, a high fertility level increases the "dependency" burden and thus tends to lower private savings and investment rates.[5] Savings and investment in the public sector also tend to be lower because of a greater burden on public "welfare" funds for education and health. Therefore, a fall in per capita or "per consumer equivalent" income is an inevitable consequence of the

[4] Ansley J. Coale and E. M. Hoover, *Population Growth and Economic Development in Low-Income Countries* (Princeton, N.J.: Princeton University Press, 1958).

[5] "Dependency" ratio is usually defined as the ratio of nonworking population to the total population. Of course, the nonworking population has two broad components: the young nonworkers and the old nonworkers (see Nathaniel H. Leff, "Dependency Rates and Savings Rates," *American Economic Review* 59 [December 1969]: 886–97).

conceptual framework employed by Coale and Hoover. Note that while a substantial fall in the mortality rate is assumed, its consequences in terms of savings, human capital formation, worker health, and productivity are not investigated. The authors concede "the reduction of mortality, particularly among children, is an inestimable gain for its own sake. . . . The public health measures that yield lower death rates also raise productivity and morale by reducing absenteeism, weakness, fatigue, lassitude, and disability." They also note that the suppression of malaria can increase the effectiveness of the agricultural work force and reduce absenteeism in nonagricultural sectors. They *do not* quantify these benefits, however, because they assume them to be independent of the course of fertility. Similarly, while they concede that expenditures on schooling can be regarded as investment or consumption, schooling outlays are regarded as essentially nonproductive in their computations.

Stephen Enke was a strong advocate of population control. His principal arguments are neatly summarized in his 1976 study.[6] The reasoning is similar to that of Coale and Hoover: high fertility raises the dependency burden and lowers the rate of investment and per capita income relative to the low fertility situation. Not surprisingly, therefore, his results are close to those of Coale and Hoover. The approach and "philosophy" outlined in two recent documents of the World Bank are also similar.[7] Rise in dependency burden, increase in public expenditures to provide minimum social services, and thus a fall in the rates of savings and investment in the face of a growing labor force result in a lower per capita income in the high fertility situation. Additional points like adverse impact of high fertility on the rural-urban migration rate, on unemployment, and on income distribution are also marshaled in the World Bank documents.

Michael Keeley has recently conducted a useful examination of economic-demographic models of the type mentioned above.[8] He takes as his starting point the Swan-Solow neoclassical, one-sector model of growth and extends the model to include investment in human capital, capital depreciation, technical progress, endogeneity of labor supply, and a savings-and-investment function with dependency ratio as one argument. The main point made in Keeley's rigorous analysis is that no straightforward conclusions are derivable pertaining to per capita income differentials associated with different fertility rates either in the steady-state

[6] Stephen Enke, "Economic Consequences of Rapid Population Growth," in *Population, Public Policy and Economic Development*, ed. Michael Keeley (New York: Praeger Publishers, 1976).

[7] World Bank, *Population Planning*, Sector Working Paper (Washington, D.C.: World Bank, 1972), and *Population Policies and Economic Development* (Baltimore: Johns Hopkins University Press, 1974).

[8] Michael Keeley, "A Neo-classical Analysis of Economic-Demographic Simulation Models," in *Population, Public Policy and Economic Development* (New York: Praeger Publishers, 1976).

equilibrium or during the transitional period. Harvey Leibenstein has also sounded several notes of caution concerning the population control question.[9] His main points concern the following possibilities: (*a*) birth control measures may affect mainly the middle-class families whose members are more productive than others, (*b*) an increase in the number of children in a family may only mean redistribution of consumption within the family with little effect on aggregate savings, and (*c*) the "replacement effect" of high population growth implies that quality of the working force will improve as younger persons with new and better skills replace older workers at a rapid pace. Simon Kuznets features the tremendous possibility of technology borrowing and suggests that growth of population may not be a major obstacle to development as the LDCs succeed in using the new technology.[10] He points out, however, that high rates of population growth may have some undesirable consequences in terms of income distribution or weakening of the democratic structures. In a brief but careful paper, Easterlin stresses the theoretical ambiguity pertaining to the net economic consequences of rapid population growth and refers to some empirical evidence to show that, at least at a preliminary level, the evidence is as inconclusive as is the theory in regard to the overall economic effects of population growth.[11]

The economic implications of increases in life span of young people and adults as mortality declines are not considered by Colin Clark, Swamy, Mitra, and Simon in their profertility arguments. Clark sets forth his position by dismissing the standard arguments in favor of population control. He states that historically, including the recent period, population growth has been associated with larger and not with smaller rates of economic growth. He questions the belief concerning the "necessity" of additional investment to maintain per capita income levels, the postulate that savings rate falls as family size increases, and the fear of shortage of food and other resources to match large increases in population. His bold conclusion is, "Population growth will bring with it not poverty but great economic prosperity." Swamy argues in a vein similar to that of Clark. He dwells extensively on the benefits of population increase and suggests that a high rate of population growth insures adequate product demand and also implies a rising proportion of younger people who serve as carriers of knowledge and who are more productive. Robert Cassen offers

[9] Harvey Leibenstein, "Pitfalls in the Benefit-Cost Analysis of Birth Prevention," *Population Studies* 23, no. 2 (July 1969): 161–70, and "The Impact of Population Growth on Economic Welfare—Non-traditional Elements," in *Rapid Population Growth: Consequences and Policy Implications* (Baltimore: Johns Hopkins Press for the National Academy of Sciences, 1971).

[10] Simon Kuznets, *Population, Capital and Growth* (New York: W. W. Norton & Co., 1973), chap. 1.

[11] Richard A. Easterlin, "Effects of Population Growth on the Economic Development of Developing Countries," *Annals of the American Academy of Political and Social Science* 369 (1967): 98–108.

an interesting critique of the "favorable" points listed by Swamy. Mitra, too, argues against the proposition that a high rate of population growth impedes economic development. He uses some country-level data to show that there is no positive association between the marginal rates of saving and the rate of growth of income. Julian Simon has also recently tried to show that medium fertility levels may be better than low fertility levels in terms of per capita (or per worker) output in a long-term projection. Using what he calls a "richer simulation model," Simon postulates a production function, a savings and investment function, and a labor-supply function. With his specification of the behavioral and technological relations and the assumed range of parameter values, he shows that LDCs may be better off in the long run with medium rather than low fertility levels.[12]

Since the rates of public and private savings and capital formation are considered crucial to the developmental process and since a high rate of population growth is supposed to affect savings and investment rates adversely, a careful study of the impact of population growth on savings is of importance. Some investigators have tried to analyze this aspect directly. Leff estimated a savings function from cross-sectional data relating to a sample of countries and tried to show that a high dependency ratio tended to depress savings. Adams and Gupta questioned Leff's conclusion on both conceptual and methodological grounds.[13] Even aside from the objections raised by Adams and Gupta, Leff's results seem to arise from the nature of his sample, and it is dubious if similar results would be obtained if another sample of countries were used. Allen Kelley questions the simplistic dependency concept.[14] Besides pointing out the theoretical ambiguity regarding the effect of dependency rates on savings, he shows that age composition of the dependent population is important. Working with somewhat broader models, he finds with respect to urban Kenya that the number of children in the family does *not* have any adverse effect on financial savings. If the concept of savings is expanded to include

[12] Colin Clark, *Population* (Rome: Instituto per la Cooperazione Universitaria, 1973); Subramanian Swamy, "Population Growth and Economic Development," in *Population in India's Development: 1947–2000*, ed. Ashish Bose (New Delhi: Vikas Publishing House, 1974); Robert Cassen, "Development and Population," *Economic and Political Weekly* 9, nos. 31–33 (August 1976): 1173–86; P. K. Mitra, "Observations on Economic Consequences of Population Growth in Developing Countries," *Artha-Vikas* 1 (January 1975): 33–44; Julian Simon, "Population Growth May Be Good for LDCs in the Long Run: A Richer Simulation Model," *Economic Development and Cultural Change* 24, no. 2 (January 1976): 309–37.

[13] Leff, n. 5 above; Nassau Adams, "Dependency Rates and Savings Rates: Comment," *American Economic Review* 61, no. 3 (June 1971): 472–75; K. L. Gupta, "Dependency Rates and Savings Rates: Comment," ibid., pp. 469–71.

[14] Allen C. Kelley, "Population Growth, the Dependency Rate and the Pace of Economic Development," *Population Studies* 27, no. 3 (November 1973): 405–13; and "Interactions of Economic and Demographic Household Behavior," mimeographed (New York: National Bureau of Economic Research, 1976).

schooling, the number of children may even seem to have a slightly positive effect. Repetto and Shah, while pointing out the theoretical ambiguity with respect to the impact of children on savings, try to estimate the effect of various household variables on the *long-term* saving behavior of families.[15] Working with recent resurvey data from Matar Taluka in India, they find that family size seems to have an adverse impact on long-term savings.

Since most of the recent acceleration in the growth of population in the developing world has been caused by a dramatic fall in mortality while fertility has remained either unchanged or declined very little, it is important to determine the extent to which fall in mortality is related to improvements in health and is revealed in the vitality of people, and in their productivity. Of the several dimensions along which the effects of public health programs, fall in mortality, and increase in life span on output and productivity can be investigated, one relates to opening up new areas and increase in cultivated acreage. Sovani has investigated the case of Sri Lanka (Ceylon) in that regard and found a positive effect of malaria control. Behrman shows positive acreage response to a fall in malaria deaths in several Thai districts. Winslow mentions the cases of South Africa and Sardinia (Italy), among others.[16] There are some studies dealing at various levels with the direct effects of health on productivity and output. According to Barlow, the suppression of malaria in Ceylon had a substantial positive effect on national income, at least in the short run.[17] A study by the World Bank covers rubber plantation workers in Indonesia, and Winslow describes with care the cases of Bangladesh (then East Pakistan), Malaysia (then Federated Malay States), Rhodesia, and South Africa.[18] All these indicate substantial positive effects of improvement in health on production. Borkar refers to a study indicating that in India's agriculture sector 116 million man-days were saved in the year 1956 as a result of malaria control.[19]

With the authority acquired from years of careful work, Malenbaum presents various estimates of the effect of health on agricultural produc-

[15] Robert Repetto and Vimal Shah, "Demographic and Other Influences on Long-Term Savings Behavior in an Indian Rural Development Block," Occasional Paper no. 1 (Ahmedabad: Gujarat Institute of Area Planning, 1976).

[16] United Nations, Economic and Social Council, *Population Trends and Agriculture Development: Case Studies of Sri Lanka and India*, prepared by N. V. Sovani (Paper E/Conf. 60/Sym. 1/11), April 1973; Jere Behrman, *Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand, 1937–63* (Amsterdam: North-Holland Publishing Co., 1967); C. E. A. Winslow, *The Cost of Sickness and the Price of Health* (Geneva: World Health Organization, 1951).

[17] Robin Barlow, "The Economic Effects of Malaria Eradication," *American Economic Review* 57, no. 2 (May 1967): 130–48.

[18] World Bank, *Health: Sector Working Paper* (Washington, D.C.: World Bank, 1975); Winslow, n. 16.

[19] G. Borkar, *Health in Independent India* (New Delhi: Government of India, Ministry of Health, 1957).

tion.[20] A part of his evidence relates to some districts in India, another part deals with districts in Thailand, and yet another consists of an intercountry analysis. In most cases he finds that better health has a positive association with agricultural output. In a rigorous and careful analysis, Burton Weisbrod et al. find that the effect of Schistosomiasis and other parasitic diseases on actual worker earnings in St. Lucia is small,[21] but the adverse affect is substantial on *potential* labor productivity.

Preston examines the recent mortality declines in the developing countries and concludes that while the expected negative effect on fertility is not as yet observed on a significant scale the effect on capital formation and output appears to be similar to that of higher fertility.[22] One interesting part of Preston's work is his estimate of the additional incentive to invest in schooling as a result of decline in mortality and increase in life span. However, Preston overlooks completely the effect of mortality declines, and of the associated improvement in health, on worker productivity.

Mainly at the theoretical level, Mark Perlman and Rashi Fein consider various aspects of the relationship between health and economic development.[23] H. Correa proposes several theoretical models that incorporate simultaneously the effects of population, health, and nutrition on economic development.[24]

Finally, we mention the novel approach developed by Dan Usher to determine the utility that people derive from increased life expectancy.[25] Based primarily on the intuitively appealing proposition that people derive satisfaction both from the quantity of consumption and the period over which they expect to live and consume, he would add to the conventional estimates of the rate of growth of national income a component attributable to increase in life expectancy. Usher's approach suggests a fruitful possibility in regard to the measurement of increase in welfare arising from enhanced life expectancy.

[20] Wilfred Malenbaum, "Health and Productivity in Poor Areas," in *Empirical Studies in Health Economics*, ed. H. E. Klarman (Baltimore: Johns Hopkins University Press, 1970), "Progress in Health: What Index of What Progress," *Annals of the American Academy of Political and Social Science* 393 (1971): 109–21, and "Health and Economic Expansion in Poor Lands," *International Journal of Health Services* 3, no. 2 (1973): 161–76.

[21] Burton Weisbrod, Ralph L. Andreano, Robert Baldwin, Erwin Epstein, and Allen C. Kelley, *Disease and Economic Development: The Impact of Parasitic Diseases in St. Lucia* (Madison: University of Wisconsin Press, 1973).

[22] Samuel H. Preston, "Causes and Consequences of Mortality Declines in Less Developed Countries during the Twentieth Century," mimeographed (New York: National Bureau of Economic Research, 1976).

[23] Mark Perlman, "On Health, Population Change, and Economic Development, in *Spatial, Regional and Population Economics*, ed. Mark Perlman et al. (New York: Gordon & Breach, 1972); Rashi Fein, "Health Programs and Economic Development," in *The Economics of Health and Medical Care* (Ann Arbor: University of Michigan Press, 1964).

[24] Hector Correa, *Population, Health, Nutrition and Development* (Lexington, Mass.: Lexington Books, 1975).

[25] Usher, n. 3 above.

To sum up, although the dramatic increases in life span in low-income countries are strong and clear, the existing economic literature pays scant attention to them. This literature at best contains some clues pertaining to the aspects of the implications on which our analysis concentrates. We now take up a more detailed discussion of two of the major implications that merit considerable attention but have been largely overlooked or misconceived.

Investment in Schooling Associated with Increases in Life Span over Time

One major implication of increases in life span is that economic incentives to invest in schooling, health, on-the-job training, and migration rise. These are all forms of human capital. As these investments become more rewarding, people respond—both privately and publicly—by allocating more resources to the formation of human capital. Although the implication is quite straightforward, much of the literature emphasizes the contrary point of view—that the demographic situation in most low-income countries is likely to depress rates of investments and capital formation. As emphasized earlier, the error arises primarily because of the omission of human capital from the conventional concepts and measures of savings, investment, and capital formation. Evidently, the larger the human capital component is that is omitted from these conventional measures, the larger is the error involved, which assumes special significance when one is engaged in a discussion of the implications of the demographic events of recent decades in low-income countries. We support this proposition by considering investments in one form of human capital, namely, schooling.

Despite the "human investment revolution in economic thought" and the large number of empirical studies that support the hypothesis that schooling is primarily an investment in future earnings and future satisfactions,[26] most of the literature covered in our review treats schooling outlays as consumption. Most analysts, in drawing inferences from the observed population growth, consider schooling as they do food, that is, as a consumer good, and treat increases in public expenditures on schooling that are associated with population growth as "welfare" expenditures, as a burden on the state, and as a use of resources that has the effect of reducing "savings" that would otherwise be available for investment pur-

[26] Mary Jean Bowman ("Human Investment Revolution in Economic Thought," *Sociology of Education* 39, no. 2 [1966]: 111–37) coined the phrase "human investment revolution in economic thought." In respect to empirical studies, see Mark Blaug, *Economics of Education: A Selected Annotated Bibliography* (New York: Pergamon Press, 1970), for an annotated bibliography and George Psacharopoulos, *Returns to Education: An International Comparison* (San Francisco: Jossey-Bass, Inc., 1973), for a broad overview.

poses. Thus a serious conceptual error is committted in treating as consumption what is primarily an investment, and, as the data from India show, the error is sizable.

It is well known that expenditures on schooling including higher education are a substantial fraction of national income in most countries. What is less well known is that these expenditures are *large* relative to the conventional national accounting measures (concepts) of savings and investment which exclude expenditure on schooling. Taking India as an example, it is seen that the proportion that schooling expenditures bear to national income, savings, and investment is not only large but has tended to increase over time.

Sharma and Ram have suggested modifications to India's national income statistics for the period 1960–61 through 1965–66 with special reference to the concepts referred to above.[27] The key to their suggestions is the treatment of schooling as an investment. We have extended their estimates to include 1950–51 and carried these forward to 1970–71. Table 2 presents these estimates in some detail. Based on that table, we stress the following facts:[28]

1. Even the estimated institutional costs of schooling rose from about 1% of national income (NNP) in 1950–51 to over 3% in 1970–71. This increase in schooling expenditures relative to national income is a remarkable achievement. The observed increase in schooling expenditures is often regarded as a "burden," the reason being a conceptual confusion and the failure to recognize that educational costs are a worthwhile investment.

2. Total costs of schooling, which include the foregone earnings of students, rose from about 5% of NNP in 1950–51 to over 11% in 1970–71. Accordingly, relative to the increase in NNP, total investment in schooling more than doubled over these 20 years.

3. With respect to the conventional estimates of capital formation, institutional schooling expenditures were about 8% as large in 1950–51[29] and rose to about 15.5% in 1970–71. Total schooling costs were about 35% as large as conventional "capital" formation in 1950–51, and they rose to over 55% in 1970–71.

4. If, as is appropriate, one treats schooling as a form of investment, we observe that the large increase in the investment in schooling implies

[27] D. Sharma and R. Ram, "Suggestions for Treatment of Human Capital in National Accounts—with Illustrations from Indian Data," *Review of Income and Wealth* 20, no. 4 (December 1974): 501–14.

[28] Estimates of current schooling costs in billions of rupees by years beginning with 1950–51 through 1967–68 and also the annual national income and gross domestic capital formation appear in another paper by us (Rati Ram and T. W. Schultz, "Some Economic Implications of Increases in Life Span with Special Reference to India," in a festschrift in honor of V. K. R. V. Rao, forthcoming). Copies of these tables may be obtained from us on request.

[29] Note that the estimate of capital formation for 1950–51 is conjectural and is probably an overestimate.

that gross investment increased from about 20% of NNP in 1950–51 to nearly 32% in 1970–71, although the ratio of conventional capital formation to NNP increased only modestly.

It seems, therefore, that far from depressing the rates of savings and capital formation, the demographic events in India over the period are at least partly responsible for *raising* the total investment, and this has occurred in large part because of a relative increase in the "schooling capital." This result is, of course, hardly surprising, because incentives to invest in schooling are likely to increase as (*a*) adult life span becomes longer and health of the population improves, (*b*) the disequilibria that characterize much of economic modernization enhance the value of the

TABLE 2

NATIONAL INCOME, CONVENTIONAL CAPITAL FORMATION ESTIMATES, AND SCHOOLING INVESTMENT IN INDIA: 1950–51, 1960–61, AND 1970–71

Item	1950–51	1960–61	1970–71
1. National income (NNP) in billion rupees, current prices	95.3	132.6	344.1
2. Gross domestic capital formation (nonhuman), billion rupees, current prices; figures in parenthesis show 2 as a percentage of 1	14.3 (15.0)	25.4 (19.2)	69.9 (20.3)
3. Expenditures of educational institutions, billion rupees, current prices; figures in parenthesis show 3 as a percentage of 1	1.1 (1.1)	3.4 (2.6)	10.8 (3.1)
4. Opportunity cost of students' time, billion rupees, current prices	3.9	6.0	27.9
5. Total costs of schooling (educational investments), billion rupees, current prices (4+5); figures in parenthesis show 5 as a percentage of 1	5.0 (5.2)	9.4 (7.1)	38.7 (11.2)
6. 3 as a percentage of 2	8.0	13.4	15.5
7. 5 as a percentage of 2	35.0	37.0	55.4
8. Enrollments (million)			
a) Preprimary and primary	18.7	33.8	55.1
b) Secondary	4.9	10.9	21.4
c) Postsecondary	2.0	3.2	5.2
d) Total	25.6	47.9	81.7
9. Total population (million)	361.1	439.2	548.2

SOURCES.—Item 1: for 1950–51, Government of India, *Statistical Abstract of the Indian Union* (New Delhi: CSO, 1967), for the year 1966; for other years, *National Accounts Statistics: 1960–61 to 1973–74* (New Delhi: Government of India, 1976). Item 2: estimated at 15% of NNP for 1950–51; for other years, Government of India, *Basic Statistics Relating to the Indian Economy: 1950–51 to 1975–76* (New Delhi: CSO, 1977), p. 19. Item 3: *Statistical Abstract of the Indian Union* for the year 1975. Item 4: for 1960–61 taken from D. Sharma and R. Ram, "Suggestions for Treatment of Human Capital in National Accounts—with Illustrations from Indian Data," *Review of Income and Wealth* (December 1974): 501–14; for other years, estimated on the basis of *real* opportunity cost being the same as in 1965–66. (It is *important* to note that these estimates are subject to large variations depending on the method used and the assumptions made. We hope, however, our figures do indicate the correct orders of magnitude.) Item 8: *Statistical Abstracts of the Indian Union* for 1975. Item 9: *Basic Statistics Relating to the Indian Economy: 1950–51 to 1975–76*, p. 5.

ability provided in part by schooling to deal with such disequilibria, and (*c*) the greatly reduced child mortality rates and the resultant increase in child survival rates probably lower the real cost of children's schooling.[30] In addition, deliberate public policy may also have had the effect of increasing the supply of schooling, thus reinforcing the effect of demand in generating a relative increase in schooling capital.

The main point of this section, based on the evidence of a major developing country, is the positive relationship between increases in life span (and improvements in health) and total savings and investment when educational capital is included. Before concluding this section, however, a brief comment on two questions is in order. First, is this association between increased life spans and the observed increases in resources allocated to education in substantial part a consequence of the longer life spans? Although our analysis is not conclusive, it does suggest the type of response that economic theory predicts, even though the entire increase in schooling investments may not be "due to" longer life spans and reduced mortality. The other question is related to the first. Are we implying that if the growth in population had been slower, the formation of schooling capital would have been smaller? Our answer is yes, if the slower growth of population would have been the consequence of a continuance of high mortality rates along with the traditional (high) fertility rates. Our conclusion is that the increased formation of schooling capital is at least in part a consequence of the same factors (reduced mortality and increased life span) that have caused acceleration of population growth.

Health and Productivity

We presented at the outset some evidence that life spans in low-income countries have increased impressively and argued that these increases reflect improvements in health. We have combed in vain various studies of medical professionals in the area of public health that would explain these gains in health. At best they serve to guide our speculations. The suppression of malaria, the reduction of cholera and tuberculosis, and the virtual elimination of smallpox, along with the reduction in the health toll of still other diseases by public programs, are a part of the story. The availability and wide use of various antibiotics purchased privately have

[30] We recognize the complexity of the issue concerning the effect of a reduction in *child* mortality on the demand for child "quality" (schooling) and child quantity (numbers). The direction of the effect will depend on the sources of such a reduction. To the extent that public health measures, which are largely exogenous to the families, generate such reduction, the effect on the demand for child schooling is ambiguous. (See Gary Becker, *A Treatise on Family* [forthcoming], esp. chap. 4, for an illuminating discussion of the child quality-quantity interaction.) However, it seems likely that in a setting like that of rural India the effect of reduced child mortality on the demand for schooling is positive. Of course, the factors mentioned in *a* and *b* in any case predict a positive effect on the demand for child schooling.

contributed, but it is not known how much. Better water, housing, and clothes are also relevant factors. Whether gains in nutrition from more and better food have played a major role in the improvement in health, as they did in bringing about much of the decline in mortality in Western countries up to about the beginning of this century, is not known at present. While much is being published on malnutrition, it appears that the improvements in nutrition that have been achieved in many low-income countries are not on the research agenda. This reveals both a bias and a neglect.

These comments may provide plausible leads, but they remain speculations and are not tested explanations. Leaving the lack of explanations at that, we proceed to one of the consequences of the observed declines in mortality, specifically, the effects of these declines on the amount and quality of the work that people do. The analysis that follows rests basically on the proposition stated earlier that improvements in health account for the longer life spans, and also that better health results in more and better work by the labor force.

The implication, accordingly, of the improvement in health has two parts: (1) more man-hours are supplied as a consequence of the reduction in "sick" time and prolongations of life, and (2) better health and greater vitality of workers result in more output per man-hour.[31] The first part can be conceptualized as a shift of the labor supply curve to the right, while the second can be regarded as a rightward shift of the marginal product curve and hence of the demand curve of labor. Such a shift in the demand curve tends to raise wage rates whereas the shift to the right of the supply curve tends to lower wages; both have the effect of raising the effective size of the labor force.

The direct effect of health on productivity is reinforced by increased investments in various forms of human capital. Increases in life span and in vigor and vitality, coupled with the implied increases in earnings, provide incentives to workers to invest more in their training and skills. By "training" and "skills" we do not necessarily mean sophisticated on-the-job training; we simply mean acquisition, out of a vast spectrum, of any sort of training and skill that makes a person a better worker. This aspect of additional human capital formation that results from a decline in mortality and the increases in life span has been mentioned earlier. It may occur during and after the investment in schooling.

There are several ways in which the effect of health on productivity can be empirically assessed. At a simple level, one can estimate a production function of output with some index of health as one of the inputs.

[31] Evidently sickness reduces vitality not merely during the period of illness but also, in varying degrees, after that period when one starts working. In other words, what is assumed here is that the decline in mortality also implies in large measure a decline in morbidity and in the postmorbidity debilitation and therefore a rise in the general health of the labor force.

Malenbaum explored that method.[32] One can also relate wage rates to health and other earning generating characteristics on the lines pioneered by Weisbrod et al.[33] Yet another possible approach is to relate the gains in total productivity over a period to health improvements and other variables like "technical change." The analyses attempted in this section represent a mixture of these approaches and pertain to the growth of output in India's agriculture.

The first exercise is conducted in the framework of "growth-source accounting." The usual growth accounting framework compares the growth of output with a "weighted" sum of the growth of inputs and seeks an explanation for the output growth unexplained by the growth of inputs. Increase in schooling of workers and "technical change" (shift of production function) are often credited for the unexplained growth of output (the "residual"). Improvement in the quality of the labor force as a consequence of better health is, however, also an obvious claimant on the residual.

The setting considered by us is India's agriculture of the period 1951–71. First, we point out that in each of the two decades 1951–61 and 1961–71 there is a substantial part of the growth of output that is not explained by the growth of conventional inputs (land, labor, and capital) and schooling. Second, although due to the limitations of available data we do not try to apportion the residual among the various claimants, we offer the conjecture that the magnitudes of the residual in the two decades pose a puzzle which may be attenuated by considering the role of improved worker health in raising output.

The calculations that follow are based on Ram.[34] The method and the underlying logic are explained in that paper at some length. Here we shall only state the main results summarized in table 3, which indicates the magnitudes of the "explained" and "unexplained" parts of increase in output during each decade. Items 11 and 12 show clearly that a substantial part of the growth of output *does* remain unexplained in both periods. It would in part be a reflection of the "technical progress" and in part a consequence of the improvement in the health of workers.

The difference in the magnitudes of the residual for the two periods, however, presents a puzzle. Although there is considerable scope for difference of opinion regarding the "correct" rates of growth of inputs and also possibly of the output, the large difference between the residuals for the two decades seems sturdy enough and is consistent with the findings in Evenson and Jha's careful work conducted in quite a different frame-

[32] See Malenbaum, n. 20 above.

[33] See Weisbrod et al., no. 21 above.

[34] Rati Ram, "India's Agriculture during 1950–70: An Exercise in Growth Source Analysis," University of Chicago Agricultural Economics Paper 74:14, mimeographed (Chicago: University of Chicago, 1974).

TABLE 3

ACCOUNTING OF THE GROWTH OF OUTPUT IN INDIA'S AGRICULTURE DURING 1951–61 AND 1961–71

	1951–61	1961–71
1. Increase in output during the decade (%)	48.7	28.0
2. Increase in labor input during the decade (%)	31.0	20.0
3. Increase in capital input during the decade (%)	30.5	38.0
4. Increase in land input during the decade (%)	20.9	6.5
5. % increase in output "explained by" increase in labor input (2 × 0.5)	15.5	10.0
6. % increase in output "explained by" increase in capital input (3×0.25)	7.6	9.5
7. % increase in output "explained by" increase in land input (4×0.25)	5.2	1.6
8. % increase in output "explained by" increase in labor, capital and land (5+6+7)	28.3	21.1
9. % increase in output attributable to increase in the schooling of labor	2.7	1.5
10. % increase in output explained by increase in labor, capital, land and schooling (8+9)	31.0	22.6
11. % increase in output NOT explained by increase in labor, capital, land and schooling (1 − 10)	17.7	5.6
12. 11 as percentage of 1	36.3	19.3

SOURCE.—Rati Ram. *India's Agriculture during 1950–70: An International Comparison* (San Francisco: Jossey-Bass, Inc., 1973).

NOTE.—"Weights" of labor, capital, and land are assumed at 0.5, 0.25, and 0.25, respectively. Ram discusses at length the rationale for taking these values of shares. However, the pattern of the results is quite insensitive to the assumptions concerning the shares within a wide range.

work.[35] If one believes that "technical progress" in India's agriculture is a major reason behind the unexplained growth of output, it is indeed implausible that the "residual" should be much smaller in 1961–71 than in 1951–61, since it was mainly during the 1961–71 period that the "green revolution" took place and technical advances in agriculture were presumably large.

The consideration relating to the effect of improvement in the health of the labor force helps to resolve the puzzle. There is reason to believe that the public health measures initiated during the First Five-Year Plan (1951–56) and carried through the Second Plan (1956–61) had much more dramatic effect than the additional measures undertaken later. Therefore, improvement in the health of the agricultural labor force is likely to have been much larger in 1951–61 than during the following decade. In support of this view, we appeal to several figures. It has been stated officially that the incidence of malaria dropped from about 75 million in 1952–53 to about 1.1 million in 1959–60.[36] To the extent this is

[35] Robert Evenson and D. Jha, "The Contribution of Agricultural Research System to Agricultural Production in India," *Indian Journal of Agricultural Economics* 38 (1973): 212–30.

[36] K. N. Rao, *The Nation's Health*, issued on behalf of the Ministry of Health, Government of India, 1961, p. 29.

an accurate assessment, the improvement over the decade 1951–61 is staggering. On the other hand, the malaria eradication program suffered a setback after 1965,[37] although, of course, the incidence did not revert to old levels. Similarly, a massive drive against tuberculosis was launched in the 1950s, and special teams were set up for testing for possible infection and to administer BCG vaccination. By the end of 1959, 138 million people had been tested and nearly 48 million vaccinated.[38] Therefore, it seems reasonable to believe that the improvement in the health of the agricultural labor force during 1951–61 was larger than that during 1961–71, and health gains contributed much more to the growth of output during 1951–61 than during 1961–71. The fact that a much larger fraction of the increase in output during 1951–61 remains unexplained by the growth of usual inputs which do not include worker health is, in our view, a reflection of the larger contribution made by health to output growth during the period. The suggested linkage offers a plausible explanation for the puzzle and also indicates that the effect of improvement in health may be substantial.

The foregoing analysis is essentially conjectural even though plausible. We have not been able to make any direct assessment of the effect of worker health on output, for which data at a less aggregative level are needed. We use state-level data for a more direct investigation of the role of health in raising agricultural output. The procedure adopted is to relate reduction in mortality rates with increase in agricultural productivity or output. We wanted to consider data on mortality from an early period like 1952–53. However, comparable mortality rates at the state level are available only from 1958–59 and run through 1966–67, although the productivity and output series are available for a much longer period.[39] Thus, due to data limitations we restrict our analysis to the period 1958–59 through 1964–65. Change in mortality rate between 1958–59 and 1964–65 is used as an argument in the function explaining increase in agricultural productivity over the same period.[40] In simple notation, $DPRD = f(DMORT)$ where $DPRD$ is percentage change in total agricultural productivity ($DPRD1$) or in output ($DPRD2$) and $DMORT$ is percentage change in mortality rate over the period. The equation is estimated by ordinary least-squares method, and the result is the following (t-statistics are in parenthesis):

$$DPRD1 = \underset{(-1.82)}{-9.806} + \underset{(2.22)}{0.300}(DMORT)$$

$$R^2 = .28 \qquad \text{Regression } F = 4.28,$$

$$DPRD2 = \underset{(-0.41)}{-2.56} + \underset{(2.25)}{0.353}(DMORT)$$

$$R^2 = .28 \qquad \text{Regression } F = 5.05.$$

The above regressions indicate that fall in mortality alone explains about 28% of the interstate variation in agricultural productivity (and output) over the 7-year period considered by us. Moreover, the positive effect of falling mortality on productivity and output is substantial. The coefficients which are significant at the conventional levels of significance indicate that 1% fall in the mortality rate accounts for over 0.3% increase in total productivity or output. It means that if the mortality rate were to fall by 50% (say from 2.5% per year to about 1.25% per year) one might expect the agricultural productivity to increase by about 15%, which is obviously a very substantial increase.

Although the above results are impressive, two questions can be raised. One question concerns the possibility of improving the above specification by including other variables that also affect productivity or output. The major difficulty in that regard is obvious. Since we have only 15 observations, loss in the degrees of freedom is rapid as more variables are included. However, inclusion of a research variable was tried, but the estimated coefficient of that variable was not at all significant in the productivity or the output regression. The other question concerns the direction of causality or the possible "endogeneity" of mortality change. Of course, a proper answer to this question requires estimation of a simultaneous-equations system, which is hardly feasible with such a small sample. However, a plausible answer at a simple level is possible. If, as we believe, most of the observed fall in mortality and morbidity during the period was caused by public health measures, then mortality changes could indeed be regarded as exogenous in the equations estimated above.

[37] Government of India. *India: A Reference Annual, 1975* (Delhi: Controller of Publications, 1975), p. 79.

[38] Rao.

[39] Death rates based on registration data are known to be inaccurate and are not usable. The National Sample Survey Reports give mortality rates at the state level for the period 1958–59 through 1966–67. From 1967, birth- and death-rate data at the state level are available from the Sample Registration records. However, the two series are not comparable. Therefore, this part of the analysis is restricted to the period 1958–59 through 1964–65. The years 1965–66 and 1966–67 are excluded because of the abnormal drought situation in those years.

[40] Changes in productivity and output are measured by changes in the indexes of productivity and output for the relevant years in Evenson and Jha. To avoid problems arising out of large "random" components in productivity and output measures, the means of the productivity indexes for 1957–58, 1958–59, and 1959–60 are taken as corresponding to the year 1958–59, and similarly for the output. The means for the years 1963–64 and 1964–65 are used as the relevant figures for 1964–65. Changes in mortality are based on the National Sample Survey Reports for the relevant years.

The endogeneity question can also be handled in another simple way. We know that the incidence of malaria was very high in many districts of India around 1954. We also know that the incidence was reduced sharply by 1965 through publicly sponsored malaria control and eradication programs. Thus the impressive reduction achieved in the incidence of malaria during this 11-year period was almost entirely exogenous to the agricultural production operations. Therefore, it makes sense to compare the growth of agricultural output in those districts where the incidence was high, but was reduced markedly by 1965, with the increase in output in those where the initial incidence was low (and where, therefore, improvement in this respect was small). For the purpose of such a comparison, forty-five districts having high malarial incidence and fifty-three districts with low malarial incidence in the early fifties were selected.[41] The Appendix contains a list of these districts. Increases in food-grain output and yields in the districts in these two sets between 1954–55 and 1964–65 were compared.[42] The difference is as expected: average growth of output and yield in the "high-incidence" districts was higher than in the "low-incidence" districts. The increases in output and yields are shown in table 4. If a somewhat different group of crops is considered the difference is even more striking. Taking the particularly labor-intensive crops of rice, jowar, maize, ragi, wheat, gram, tur, groundnut, cotton, jute, mesta, sugar, and tobacco, it is found that the mean increase in the output of these crops between 1954–55 and 1964–65 in the high-incidence districts

TABLE 4

MEAN PERCENTAGE INCREASE FROM 1954–55 TO 1964–65

	Food-Grain Output	Food-Grain Yield
"High-incidence" districts.....	33.6	28.3
"Low-incidence" districts.....	30.2	21.9

[41] The selection was done on the basis of the degree of "endemicity" of malaria in these districts. "Hyperendemic" and "epidemic" districts are regarded as having "high" incidence, and "hypoendemic" and relatively malaria-free districts are treated as those with "low" incidence. Almost all districts which fell in either of these two groups and for which crop output data for the period were available have been included. The degree of endemicity was determined with reference to the malaria maps and description of incidence contained in *Manual of the Malaria Eradication Operations* (New Delhi: Indian Government, Directorate General of Health Services, n.d.), pp. 147–385.

[42] The crops included are all of the major food grains and pulses, namely, rice, jowar, bajra, maize, ragi, wheat, barley, small millets, gram, tur, and "other pulses." The da'a on output and area are taken from *Estimates of Area and Production of Principal Crops in India: 1954–55 to 1964–65* (New Delhi: Directorate of Economics and Statistics, Government of India, Ministry of Agriculture, 1970), detailed tables.

was 45.0% while in the low-incidence districts it was only about 38.6%. The difference in the mean increase in yield is likely to be even bigger. Despite several objections that could be raised in relation to this simple procedure, we believe it provides reasonably good evidence in support of the proposition that the near eradication of malaria during the early part of this period in India contributed significantly to increases in agricultural output and yields. What applies to the effect of malaria eradication also applies to other events that led to improvements in health, decline in mortality, and increase in life spans.

To sum up, we have presented several pieces of evidence in this section in support of the statement that improvement in health and reduction in mortality, which are reflected in increased life spans, have a positive effect via labor productivity. Although each part of the analysis may individually be subject to criticism, collectively they provide substantial support for our position. And while the evidence presented relates to India, it is our belief that the results are also widely applicable to other low-income countries. Thus one can see empirically also that the list of economic implications that one finds discussed in the literature in relation to the recent demographic situation in low-income countries misses this labor productivity dimension.

Concluding Remarks

We begin by featuring the large increases in the life expectancy of youth and adults in low-income countries where death rates have declined sharply relative to the modest decline in birth rates. The resulting acceleration in population growth has received much attention, but the economic implications of the associated increases in the life span of young people and adults have received all too little attention. We point out that the recent demographic events in low-income countries are best described by the sequence improvement in health, fall in mortality, increase in life span, little change in fertility, and hence an acceleration in the growth of population. A proper study of the economic implications of these events should include other important consequences and not merely that of population growth. We discuss various other economic implications. We point out that increases in life span strengthen the incentives to acquire additional schooling and that the improvement in the health of adults increases the quality of the labor force and its productivity. Our appeal to the literature indicates that one can get little guidance from it in respect to the implications we want to consider and that in particular the conventional concepts of savings and investment that are used are very much in error because of the omission of human capital in the form of health and schooling. In our appeal to Indian data using a simple and straightforward approach, we find that from 1950–51 through 1970–71 increase

in the investment in schooling has been impressively large. When investment in schooling is treated as part of and thus is added to the conventional estimates of capital formation, investment and savings are seen to have been rising appreciably relative to national income. This important result is contrary to much of the literature that deals with population growth and its effect on savings and investment. We also examine along simple lines growth of agricultural output in India between 1951 and 1971 with a view to accounting for some of the residual that remains unexplained after taking into consideration the conventional measures of the contribution of labor, land, capital, and schooling toward increase in output. The results lend support to the view that improvement in the health of workers raises their productivity. A more direct analysis of the effect of reduction in mortality between 1958–59 and 1964–65 on agricultural output and productivity in various states in India also provides evidence in the same direction. Further, a comparison of the growth of output and yields between 1954–55 and 1964–65 in two sets of districts provides considerable support for the proposition that control of malaria contributed positively to increase in agricultural output. In short, data from India's agriculture provide fairly good evidence of the positive effect of health improvement, fall in mortality, and increase in life span on productivity and output. Thus, we provide evidence for the proposition that, at least partly because of the large increases in life span and substantial improvements in health that underlie the recent acceleration in growth of population in low-income countries, such growth of population has been, contrary to most popular beliefs, associated with an *increasing* rate of savings and capital formation and a sizeable enhancement of productivity. While the empirical work done by us relates to India, we believe the results have wider applicability to low-income countries. This paper will have served its purpose if it succeeds in bringing the unsettled issues on which we have concentrated onto the research agenda of working economists.

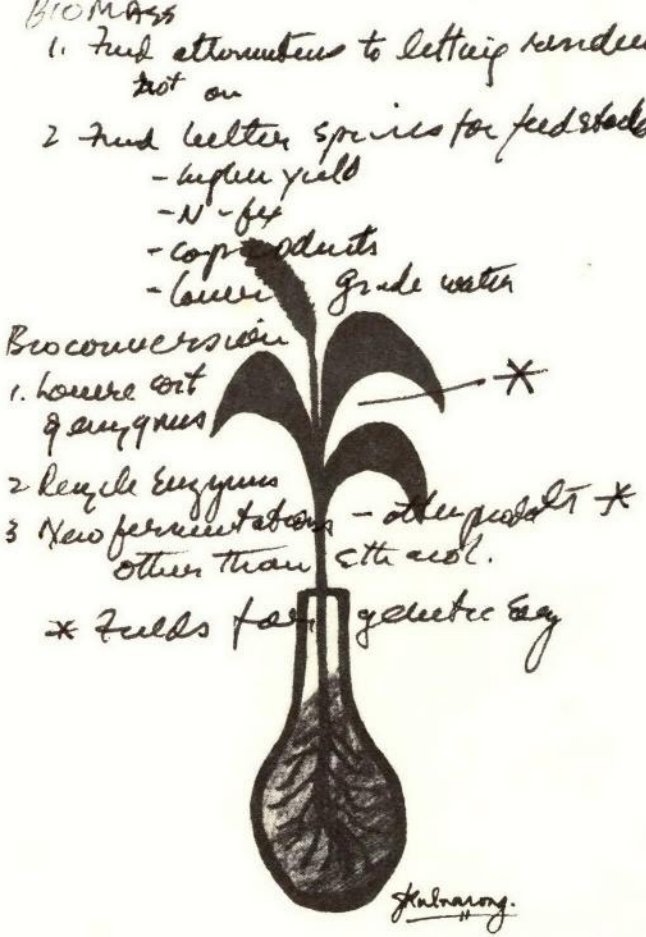
In a society where life is short, labor earns a pittance; work is hard and life is harsh. Vitality is low, illiteracy abounds, and people languish. A turn toward a better future comes when the span of life increases. Incentives become worthwhile to acquire schooling, and the time spent at work becomes more productive. The stock of human capital in the form of better health and more schooling becomes larger, and it enhances the quality of labor. These investments in human capital matter. In Marshall's perceptive words, "Capital consists in a great part of knowledge" and ". . . knowledge is the most powerful engine of production."[43]

[43] Alfred Marshall, *Principles of Economics*, 8th ed. (New York: Macmillan Co., 1920), bk. 4, pp. 138–39.

Appendix

"HIGH" AND "LOW" MALARIAL-INCIDENCE DISTRICTS OF INDIA INCLUDED IN THE COMPARISON OF OUTPUT/YIELD INCREASE BETWEEN 1954–55 AND 1964–65

High-Incidence Districts		
1. Adilabad	16. Chanda	31. Kalahandi
2. Anantapur	17. Dhulia	32. Keonjhar
3. Nizamabad	18. Jalgaon	33. Koraput
4. Visakhapatnam	19. Nanded	34. Mayarbhanj
5. Warangal	20. Nasik	35. Phulbani
6. Ahmedabad	21. Thana	36. Sender Garh
7. Bharuch	22. Belgaum	37. Bharatpur
8. Kaira	23. Bijapur	38. Jhalawar
9. Panch Mahals	24. Chikmagalur	39. Kota
10. Surat	25. Coorg	40. Tonk
11. Bastar	26. Dharwar	41. Dehra Dun
12. Vidisha	27. Hassan	42. Nainital
13. Guna	28. N. Kanara	43. Cooch Behar
14. Raipur	29. Shimoga	44. Jalpaiguri
15. Shivpuri	30. S. Kanara	45. Jaipur
Low-Incidence Districts		
1. Chittoor	19. Mahesana	37. Sholapur
2. Cuddapah	20. Damoh	38. Bellary
3. Guntur	21. Datia	39. Kolar
4. Hyderabad	22. Jabalpur	40. Barmer
5. Karimnagar	23. Sagar	41. Bikaner
6. Khammam	24. Chingleput	42. Jaisalmer
7. Kurnool	25. Kanya Kumari	43. Jhunjhunu
8. Medak	26. Madurai	44. Jodhpur
9. Nalgonda	27. Ramanathapuram	45. Sikar
10. Nellore	28. Salem	46. Badaun
11. Srikakulam	29. S. Arcot	47. Ballia
12. Bhagalpur	30. Tirunelveli	48. Fatehpur
13. Gaya	31. Tiruchirapalli	49. Faizabad
14. Patna	32. Ahmednagar	50. Ghazipur
15. Saran	33. Akola	51. Partapgarh
16. Shahabad	34. Kolhapur	52. Rae Bareli
17. Amreli	35. Poona	53. Sultanpur
18. Banas Kantha	36. Satara	



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ANNOUNCING A

Workshop on Priorities in Biotechnology Research for International Development

July 26 - 30, 1982
Washington, D. C.

Board on Science and Technology
for International Development
Office of International Affairs
National Research Council
Washington, D. C.

Funds for this workshop are provided through a grant to the National Academy of Sciences from the U.S. Agency for International Development

- Hepatitis B vaccine – liver cancer
- 1 virus ([illegible]) – Nasopharyngeal CA + Burkitt lymphoma
Schistosomiasis – 2 protective vaccines against [illegible] in animals
Hybridoma + genetic engineering – to distinguish 3 strains of leishmaniasis

PURPOSE OF THIS WORKSHOP

Recent research in cell biology, molecular genetics, recombinant DNA, and related fields appears to be laying the groundwork for important technological developments. The impact is likely to be major on a variety of economic activities involving food, chemistry, pharmaceuticals, energy and environment. Either through direct participation, or the impact of work done elsewhere, developing countries will feel the effect of these new directions in science and technology over the coming years.

At the request of the U.S. Agency for International Development (AID), this workshop will assess the potential impact of the "new biology" on agriculture, health, and energy, and will provide AID with recommendations on opportunities, strategies, and policies for possible program initiatives.

ORGANIZATION OF THE WORKSHOP

Stage One: Open Meeting
Auditorium
National Academy of Sciences
2101 Constitution Ave., NW
Washington, D. C.
July 26-27, 1982

This stage will address the state of the art of the "new biology." Discussions in agriculture, health, and energy will be presented followed by panel discussions involving U.S. and Third World scientists.

Stage Two: Closed Working Groups
Coolfont Conference Center
Berkeley Springs, West Virginia
July 28-30, 1982

A number of invited participants will gather in small, closed working groups to recommend priorities for programs that might be undertaken by AID and other donor organizations in support of biotechnology activities related to agriculture, energy, and health.

AGENDA

MONDAY, July 26 9:30

Morning

Welcome	Dr. Robert H. Burris *(Workshop Chairman)* University of Wisconsin
Opening Remarks	Mr. M. Peter McPherson Administrator, AID
	Dr. Nyle C. Brady Sr. Assist. Admin., AID
Addresses	Dr. David Baltimore Massachusetts Institute of Technology
	Dr. M.S. Swaminathan International Rice Research Institute Manila, Philippines

✓ Afternoon

Agriculture Overview	Dr. Lowell Lewis University of California, at Berkeley
	PANEL DISCUSSION

TUESDAY, July 27 8:30

Morning

Remarks	Dr. Frank Press President National Academy of Sciences
Health Overview	~~Dr. Alexander G. Bearn~~ (Ken Warren) Merck, Sharp and Dohme New York, New York
	PANEL DISCUSSION
Energy Overview	Dr. Henry R. Bungay Rensselaer Polytechnic Institute
	PANEL DISCUSSION

Afternoon

Departure of panelists for Coolfont Conference Center

(CLOSED SESSIONS)

→ Shift to software
- Successive inst-dev.

Issues

1. General Pitfalls

2. Returns
+ Social benefits - quality of life
- Powerful group / more political acceptable
- Economic - redist. of wealth

/ Human capital.

3 Problems - poor institutions weak. Incentives - long lead time on returns & difficulty on rate of return

4 Comparative to [illegible] of Bank

- lack of sector investment + review of plans

- strong econ + financial orientation to fields like Health & Educ.
- difficulty of social sectors
Potential to improve greater than for hard sectors - Electric Power, Inst. building, Roads..
improvement quality of country's science orientation
introduce ideas of [illegible]

Management different access
i. lower returns
ii. modify financial inform.
iii. need appropriate techno (incentives)

Bottom

Political rather than economic returns
Have economic but no financial returns
· CBAnalysis + rates of return

EDUCATION

Cochrane

In lending in education as in other sectors we must confront issues of internal and external efficiency. The first set of issues revolve around making the delivery of education of various levels as efficient as possible - finding the optimal mix of facilities, teachers, textbooks, etc. External efficiency requires that investment takes place in those kinds of schooling or training that have the highest rates of return.

While it is more difficult to measure benefits from investments in education than in more traditional forms of investment, the economic benefits to education are easier to quantify than those in other social sectors because we have large amounts of data on earnings for individuals of differing education levels. It is much more difficult to measure health status and thus get earnings differentials by health.

Private and social rates of return for a number of LDC's are shown on the next page. Since the individuals do not, but society must pay the full cost of schooling we find private returns exceed social returns. This difference is particularly dramatic at higher levels of education. This can create pressures to expand education in general and in some cases higher education in particular beyond what is socially optimal 1/. Egypt is an example where such pressures appear to have led to an over-expansion of university education and relatively slow growth at the primary level.

The rates of return, both private and social are generally high, in most cases exceeding 10%. When interest rates were lower, there was thus substantial justification for lending at most levels in most countries, assuming that investments in all sectors had social returns equal to the interest rate, but as interest rates rise there is an increased need for selectivity among projects in this and in other sectors. One problem that arises is that as we become more selective in project choice it becomes increasingly necessary to include non-economic as well as economic benefits in our calculations and this is difficult in all sectors. These non-economic benefits are substantial. Education affects fertility and child nutrition and mortality in predictable ways. For example, evidence shows that an additional year of education for mothers leads an average to a 9 per 1000 reduction in mortality of her offspring. Part of this results from the fact she is more likely to be married to a better educated and thus richer husband, but a larger part of the effect arises from her improved child care, and possibly lower fertility.

In education we have also begun to learn how to increase internal efficiency,

1/ Increased use of fees would not only raise funds for social investment but discourage over expansion, but would raise problems of equity.

though we are far from being able to determine the optimal mix of facilities, teachers, textbooks, etc. in any particular context. There does appear to be general evidence, however, that increasing class size above 20 has a relatively small effect on learning and that in many countries provision of textbooks is far more cost effective than reducing class size. Knowledge of this sort has helped the Bank recommend more efficient allocation of resources than previously. As internal efficiency is increased in any sector its external cost benefit ratio improves.

Rates of Return.
CB. Rates (%)

REGION OR COUNTRY TYPE	N	PRIVATE			SOCIAL		
		PRIM.	SEC.	HIGH.	PRIM.	SEC.	HIGH
Africa	(9)	29	22	32	29	17	12
Asia	(8)	32	17	19	16	12	11
Latin America	(5)	24	20	23	44	17	18
LDC Average	(22)	29	19	24	27	16	13
Intermediate	(8)	20	17	17	16	14	10
Advanced	(14)	(a)	14	12	(a)	10	9

SOCIAL DEVELOPMENT IN BANK/IDA COMMITMENTS FY82

	US $ million	% total*
Rural Development	2,200	16.6
Urban Development	375	2.9
Water Supply & Sanitation	441	3.4
Education	526	4.0
Population, Health & Nutrition	36	0.3
	3,578	27.2
* Total Bank/IDA	13,016	100%

Poverty analysis of projects indicates that roughly ~~1/3~~ 1/3-1/2 of Bank/IDA commitment are directly addressed to social development for the ~~under~~ rural and urban poor i.e. 10-15%. This fraction has been ~~apparently~~ ~~constant over the past decade~~, not changed significantly over the past decade.

RURAL DEVELOPMENT

— double space

Rural development ~~pa~~ lending is directed to the small scale farmers, tenants, squatters and landless peasants who constitute the rural poor. The rural poor as a poverty target group includes people whose p.c. income is 1/3 or less of the national average or whose minimum nutrition and consumption needs cannot be met. The ~~World~~ Bank ~~calls~~ designates as rural development projects ~~are defined~~ all agricultural projects in which at least 50% of the direct benefits accrue to the rural poor. A typical rural development project would contain a core of agricultural investment (livestock development; crop expansion, investment credit) supported by input supply and commodity storage, processing or marketing components — a feeder road, ~~and~~ essential social services such as health and primary education.

The Bank attaches a very high priority to ~~the~~ lending for rural development. Has increased 10 fold between 1968 and 1973 and again tenfold between 1979 and 1987. It now stands at $ 2.2 B per year. In relation terms the proportion of agricultural lending which qualifies as rural dev. lending has increased from 10-20% 10 years ago to over 50% currently. ~~Since agriculture is the means of livelihood of the majority of the poor of the least dev.~~ Rates of return vary considerably ~~between~~ ~~Since ag~~ The more complex projects with a large number of different components have proved ~~difficult~~ particularly difficult to implement. Since agriculture is the principal ~~mainstay~~ of Economic activities of most of the poor of the least dev. countries and of the poor regions of the remaining dev. countries, Ag + R.D. lending will continue to be the most important ~~activities~~ contribution by the Bank to both social + econ. dev.

Urban Sector. While the rural poor have ~~held the spotlight~~ been centre stage.

~~Recognition of~~ the importance of urbanization in developing countries was recognized at beginning of 1970's. Based on past trends it was projected that by Y2000 more than 1/2 worlds' popn would live in urban areas and that 4 out of 5 of the worlds largest cities would be in developing countries. Urban popn was expected to ↑ from 1.3B to 3.3B. LAC 3/4 urban. Even in Africa, least-urbanized region, urban popn is expected to quadruple between 1980 and 2000 – in Kenya the popn of Nairobi is doubling in 8 yrs.

Until the late 1960's there was little appreciation of the need for sound policies and ~~inves~~ carefully planned investments to provide shelter, public transportation, employment and urban social services such as health in urban areas. Bank lending began in 1972 with the following major objectives: ~~To assist~~

i to ~~develop policies~~ assist member govts to provide efficient and effective urban services, to develop new policies and more effective management of services

ii to address solution particularly to the urban poor (who are majority of urban popn).

iii to demonstrate low cost technical solutions which are affordable to the urban popn and could be the basis for subsequent improvement. Pressure to lower standards below those adv. by tech agencies

iv to ~~reduce~~ limit the financial burden on the public sector for urban development by providing as many services as possible on a non-subsidized basis

Lending program FY72-81 62 projects — value $2B. Except in EAC + LAC

Over 1/2 projects are urban shelter; remainder urban transport, integrated urban + regional dev. projects. Rates of return are estimated at about 20% for these projects.

Current lending program averages 10 projects — with total new obligation of $375 m in 1982 or 3% Bank lending. per year. ~~The greatest emphasis is given to~~ shelter — both for new housing and the need to improve existing substandard units. ~~A key issue has been the~~ security of tenure in order to obtain tenant commitment to invest, and maintain the premises.

The principal problems encountered have been

1. Lack of institutional framework to plan and manage multisectoral programmes — especially so in Africa.
2. Acquisition of land for new developments and granting of secure tenure to project householders.
3. Reasonable cost recovery for sites and services. special problem of sustained collections, etc.
4. Tendency to upgrade standards and reduce affordability of shelter or services
5. Implementation of social services such as health and nutrition without the backup system

~~In 1983.~~

Urban lending is projected to more than double over the next 5 yrs. to nearly $4B, extension to 23 new countries, chiefly in Africa. The principal challenge is to accelerate the pace of urban development beyond what is possible ~~been achieved~~ with demonstration project ~~investments~~ by. e.g.

- promoting changes in housing finance, municipal finance and the packaging of public and private sector activities
- the use of intermediaries to pass on funds to private developers of varying scale.

Water Supply + Sanitation

~~para 1~~ Adequate supplies of safe water and adequate facilities for disposal of human wastes are currently available to less than 50% of urban populations and less than 20% of rural popⁿ in developing countries. Furthermore, existing systems are deteriorating in ~~quality~~ both adequacy of access and quality due to rapid population growth and inadequate maintenance. Deficiencies in WS&S ~~contribute to morbidity and mortality particularly from diarrhoeal diseases.~~ are responsible for the prevalence of many disabling diseases and ~~are~~ for the ~~largest single c~~ high mortality of infants and young children from diarrhoea. Lack of access to drinking water is a heavy burden for rural women) ~~may have to spend several hours each day carrying water~~ e.g. In U. Volta rural women ~~average 2-3 hours per day carrying 50 lbs water - ago~~ with an energy cost equal to 1/3 of their caloric intake.

are estimated to consume 1/3 of their food energy intake carrying 50 lbs of water for 2-3 hrs/day

World Bank estimates indicate that $300 B of capital investments would be needed to reach the objectives of ~~the~~ the United Nations Drinking Water Decade i.e. to provide drinking water for all by 1990. This ~~would involve~~ ~~a~~ level of total investment ~~by all governments and external~~ would be ~~ago~~ more than 10x higher than during the past decade 1971-80. ~~World Ban These a~~ Furthermore, ~~the~~ these estimates make no provision for recurrent costs which are a critical factor in maintenance of service ~~and major difficulty in~~ and which are difficult to recover completely through user charges ~~particularly in rural areas~~

The current levels of bank lending for water and wastes is $440 m ~~about~~ with approx 2/3 for urban water supply and 1/3 for rural water supply. ~~Simple~~ Suitable technology is ~~not an~~ substantial progress has been made towards simple, reliable technology or ~~the~~ hardware. The principal obstacles are two: (1) ~~there is an~~ reluctant ~~r~~ consumer willingness to pay user fees ~~since~~ particularly in rural areas where other sources of unclean water may be available. (2) changes in personal hygiene ~~must be coupled with water supply to obtain~~ bringing about ~~the~~ healthiest benefits of water supply are not realized.

~~cont'd~~

When did Bank begin lending
What ~~is~~ are major groups of projects

Education:

Illiteracy is a critical limitation on both economic + social dev. While substantial improvements are being made in education in most parts of the world, primary school enrollments remain below 50% in many countries particularly in West Africa (eg. 21% in U. Volta and 23% in Niger). The picture for female education is even more dismal. In 13 countries in West Africa and the Middle East, less than 1/3 of girls of primary school age are enrolled ~~in 13 countries in these regions~~. Less than 10% of girls are enrolled in Bhutan, Afghanistan + YAR and 20% or less Chad, U. Volta, Mali + Mauritania

The economic benefits of investments in education have been estimated and both private and social rates of return are generally high, in most cases exceeding 10%. ~~Pr~~ The high private returns of higher education, which ~~[illegible]~~ usually has the highest public subsidy, has led ~~to strong pressure to expand higher education~~ ~~for example~~ in some countries to overexpansion of university education and relatively slow growth at the primary level.. (Egypt). ~~But the value [illegible] of primary school education has been~~ ~~A study~~ 1976 Data showed that in comparison with industrialized countries the ratio of expenditures ~~in Expenditures per student [illegible]~~ on higher education ~~were twice as high as~~ to those on primary education was about 2:1 ~~in industrialized countries but 100 x greater in the poor~~ Sub-saharan Africa ~~where [illegible] illiteracy is~~ * where the lowest levels of literacy prevail the ratio was over 100 to 1.

The ~~general~~ sound econ + social value of primary level general education is ~~no~~ increasingly recognized. ~~The average [illegible]~~ Studies in 4 ~~[illegible]~~ sample of countries demonstrated that the annual output of a farmer who had completed 4 years of primary school was on average 13% more than one who had not

attended school, provided complementary inputs required for improved farming techniques were available. Even without them, the increase in output was substantial but smaller. From an equity viewpoint primary education tends to be redistribution toward the poor. ~~and has particularly favourable~~ In the case of girls it has favorable effects on fertility and the health, nutrition and education of children. For example an additional year of education of a mother leads to an average ~~B~~ of 9 per 1000 reduction in mortality of her offspring and willingness to limit family size has a strong association with ~~the~~ the educational level of the mother.

→ Bank's direct lending : amount

priorities

Population, Health + Nutrition

Health is the most recent sector to be added to the development activity of the the Bank. In 1979, the bank authorized direct lending for health. Until that time health had only been supported through components of integrated rural and urban dev. projects

Investments in health are justified on three grounds:

i Enhancing human well being and meeting basic needs of the poorest segments of the population which in many developing countries have no access to simple health measures

ii Enhancing human capital by improving educability of students and increasing productivity of the adult work force through the control of diarrhoea + common infestations, like hookworm and diseases such as malaria, schistosomiasis, severe bleedings. As noted in WDR III the 10 dev. countries with the highest life expectancy in relation to income found in 1960 subsequently attained growth rates which were 1.6% higher than those of all dev. countries for which data were available.

iii The third justification for health investment is the close linkage with population control. Survival of infants and children is the most important determinant of fertility and the health care system is the principal means in most dev. countries for making available FP services

~~Bank investments in health~~

~~The health status of~~

~~There is a tenden~~

In ~~many~~ most developing countries current health investments are disproportionately directed to the urban areas, to curative care, and to more sophisticated ~~health~~ services ~~in~~ modelled after the pattern in industrialized countries. ~~The Bank intention~~ As a result there are great disparities ~~between~~ in health status ~~in the~~ between urban and rural areas. ~~and high mortality and morbidity rates in rural populations. from diseases for which simple, inexpensive control measures exist.~~ In northern Brazil, West Africa, and ~~some~~ several countries of the Mid East ~~and South~~ Asian subcontinent life expectancy is ~~little~~ 40-50 years chiefly because ~~nearly 1 child in 4 dies during the first year of life and 1 in 5 during~~ ~~the~~ 1 child in 3 ~~fails to survive to the 5 years of age~~ dies before age 5 from diseases for which simple, inexpensive control measures exist.

The principle objective of the bank's support for health is to redirect investments to the underserved rural and periurban poor, and to ~~improve~~ encourage the choice of ~~health investments health~~ more cost-effective health intervention. Key issues are the establishment of management capability to operate a dispersed service delivery system, training ~~of aux~~ and supervision of auxiliary health workers and stimulatory policies on financing which recognize

realistically the v. limited public funding for recurrent costs and the significant private resources already being spent [largely] for ineffective health care. ~~The first projects~~ Over the next few years the Bank ~~The pipeline~~ expects to ~~finance~~ support 6-8 health projects per year equivalent to between 1 and 2% of ~~B~~ total lending. In addition the bank supports a global research project on ~~aimed to discover effective control measures for~~ malaria, schisto, oncho, ~~trypa~~ trypanosomiasis leprosy ~~for which effective control~~ + tropical diseases for which effective control measures do not yet exist. [These diseases are 20 to 300 x commoner than cancer in the developing world but have [as a group] ~~received~~ been the focus of a ~~only a~~ minute [research] investment ~~in scientific research~~ by the worlds scientific community ($10m) of over $800m on cancer in U.S. alone.

??

Nutrition

~~Recent~~ Estimates indicate that 600,000,000 people in less developed countries, i.e. 46% of the region's population, ~~receive enough~~ are not getting enough to eat (below 90% of FAO/WHO requirements) and in some countries up to 30% or more of the children ~~have conditions of~~ suffers at least, on a seasonal basis, moderate or severe malnutrition. Improved agricultural production is an essential step in combating this problem but national self-sufficiency in food production alone will not eliminate malnutrition which is rooted in poverty, feeding practices and disease. Through ~~improving N considerations~~ ~~in~~ agric. + health projects and through 4 ~~free~~ 5 sep'tal nutrition projects the Bank has assisted countries to examine ~~the~~ more economical and effective means of ~~reducing malnutrition~~ targeting assistance to at-risk group (increasing food availability to the poor) and eliminating severe ~~infant or~~ protein-calorie malnutrition of mothers and children. ~~The aim~~ purpose is to ~~find~~ encourage interventions in many sectors. These measures are important approaches ~~to the~~ in the short term, the greatest lasting improvements are likely to result from changes which incorporate nutritional considerations in the design of programs in other sectors particularly agriculture, rural dev't + health.

Many countries have experience direct food assistance strategies: which cover ~~which seem~~ which are rel. ineffective and extremely expensive.

Population

The denominator for all economic dev. is population.. So much of the progress made through domestic + int'l investments in the production sector is cancelled out by growth in population which matches or may exceed growth in GNP and pose an difficult impossible challenge food supply, job creation and improvement in basic services of ~~Proportions of world population~~ education, health, shelter.

It is clear from projections that world population will increase from 4 to 6 billion ie by 2 Billion in the next 18 years. In ~~India~~ China, India, Bangladesh and Indonesia which rep ½ the worlds popn this represents a massive growth but at a rate reduced by the population control efforts being mounted with varying degrees of effectiveness in these countries. ~~China~~ In Africa, however, while the populations are smaller, growth rates are higher, economic prospects less favorable and there is ~~no~~ unwillingness ~~to institute~~ or inability to implement pop. control programs. In Kenya for example, the average woman completes 8.6 pregnancies and the popn is projected to increase four fold in the next 40 years if fertility does not decline.

The Bank has offered supported to countries ~~in their efforts~~ to control population since 1972, but ~~there have been~~ few ~~relatively~~ countries have had explicit pop policies and have been interested in project assistance. Key factors in the success of ~~these~~ population programs

~~are on the one hand demand~~ of the ~~population~~ nation ~~for~~ ~~fer~~ ~~fertility~~ ~~to small limiting~~.

are demand for methods to limit ~~family size~~ fertility and the ~~sa~~ effectiveness of supply of ~~these methods~~ family planning services. ~~the~~ Demand is strongly influenced by education of the mother, health of the children, cultural traditions and ~~employment~~ practices relating to the employment of children. Supply is usually limited by an ineffective health delivery system to the rural and urban poor. ~~An~~ ~~one~~

¶ There are no quick fixes for the problem of population growth. ~~Thai~~ Indonesia, ~~and~~ Thailand Colombia, ~~Sr~~ and Sri Lanka are examples of rapid fertility decline with conventional family planning programs. (~~In~~ Indonesia's crude birth rate fell 21% between 1960 and 1977 and contraceptive usage increased from 3% in 1970 to over 40% in Java + Bali in 1980 and to 31% for the country as a whole). In contrast, in Pakistan and Kenya large expenditures on family planning have ~~had~~ not increased contraceptive usage significantly and birth rates have not declined. ~~In these circumstances~~

DRAFT I-I
SCochrane:pat
July 15, 1982

Amount of Investment by Bank
Principal Aspects of Investment:
Hoped for benefits.
Extent of Success - Example
Econ-Rates

Social Development: A Case for Investment

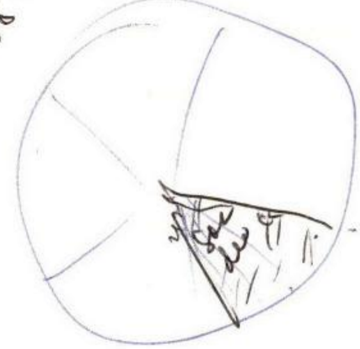
Investments in the social sectors, such a health (including nutrition, and water supply), education, and family planning present speical problems of evaluation and feasibility. They must be embodied in specific individuals to be effective, but the benefits accrue both to the individuals and spill over to society at large, but both effects often have relatively long payoff periods. These characteristics of social investment also explain some of the difficulties that arise in developing and financing successful programs. These programs require that individuals participate in activities which in many cases require radical changes in basic behavior. If these changes are perceived to be beneficial to themselves, individuals will make them[1/], but they are unlikely to make changes for payoffs to society as a whole rather than to themselves if these changes are personally costly. Thus the problem of reaching high levels of participation to achieve economies of scale in the program as well as to maximize social spillovers make it difficult to charge for services in the social sector. For example individuals may be willing to pay for curative but not more socially efficient preventative medicine, or they may be willing to pay for the education of sons, but not for the education of daughters.

Since social programs often require high recurrent relative to capital cost and given the difficulty of cost recovery in social development, these programs are highly vulnerable to short-term financial crises. (Tough prospects for 80's in Africa) More rigorous attention to financial dicipline, and efforts to raise revenues from beneficiaries are required to persuade budgetary/planning authorities of the merit of investments in these sectors. The trade-off between greater cost

1/ A great deal of work has confirmed the responsiveness of peasants to incentives, but in many cases the causations are sufficiently complex that they may not see the benefits without education.

Prepare chart out.

1982 Chart I



Social Development

- Urban
- Rural Dev. (?% of Agric.)
- WS&S
- Education
- PHN

FY82
No of projects $ value

% Bank lending key sectors.—

For ~~Health~~

recovery of programs that are desired by individuals and support of programs that have greater social spillovers is clearly complicated by issues of equity.

Because of the importance of behavioral aspects, compounded by uncertainties about technological relationships, between interventions and outcomes, the benefits - economic and social - of investments in these sectors are especially difficult to predict, thus creating additional problems in obtaining funding from budgetary/planning agencies. But an increasing amount of evidence is accumulating about benefits - as discussed below. Thus investment in the social sector must address the most fundamental questions of economic development, who will benefit from progress and how will it be financed. The key to making investment in this sector competitive is the ability to have efficient programs which maximize the ability to mobilize domestic as well as international resources. This requires increased knowledge of the payoffs to various intervention so that programs can be targeted. It also requires careful management and financial accountability in sectors where these have traditionally been weak. The examples below will illustratre what we have learned.

FAMILY PLANNING PROGRAMS Cochrane

It is clear from projections of the world populations that population will probably increase by almost 2 billion in the next 18 years. In some countries, such as Kenya, the population may increase by 5 times in the next 40 years if fertility does not decline. This growth will clearly be difficult to accommodate.

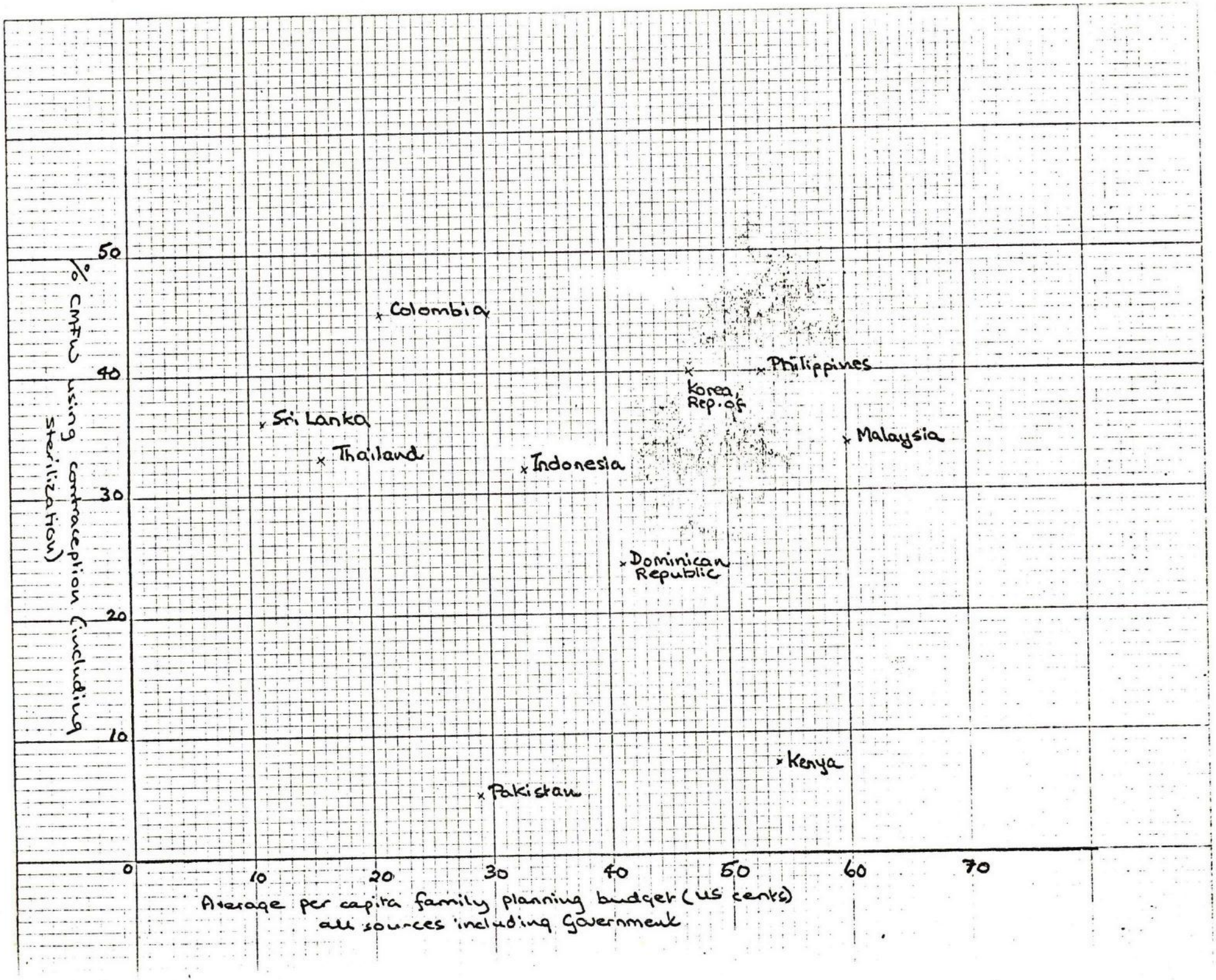
It is extremely difficult, however, to calculate the rate of return to family planning programs for several reasons.

First, the consequences of population growth vary substantially across countries. For example, in Egypt, the most difficult problem given the scarcity of arable land and the country's commitment to a well-fed population is the growth of the food deficit. For Brazil, structural adjustment problems arising from oil price increases have been made politically more difficult because of the rapid growth of the labor force. For Thailand, increasing regional differentials in welfare seem the most unacceptable consequences. In Colombia, employment and income distribution problems seem the most serious consequences of rapid population growth. In Nepal, land and food availability will be even more problematic than for Egypt because present levels of food consumption are lower. In all countries, the objectives of increasing coverage of basic health and education programs as well as capital deepening are made more difficult by rapid population growth.

These various consequences of rapid population growth are difficult to quantify but are none the less real. But the need for family planning arises not only because of perceived negative economic consequences of rapid population growth but for reasons of health. In some countries high levels of illegal abortion caused such serious health problems that governments shifted their pro-natalist positions to ones which support the right of parents to control their fertility. In other countries, traditional concern for the health of mother and children if births are too closely spaced provides a motivation to provide family planning for spacing.

The recognition that need exist for family planning does not mean that all countries should invest to the same degree in family planning. Here again targeting is important. Where there is very limited demand for family planning efficiency suggests that non-governmental agencies can handle the demand. In other context where a primary motive of family planning is improved health and where demand is low but widely dispersed, integrated maternal and child health programs are the most efficient ways to reduce fertility. The efficiency of free standing programs depends on the environment. A great deal is yet to be learned about the efficiency as opposed to the effectiveness of passive programs versus outreach programs and on the usefulness of information communication and education programs to stimulate demand. What is clear is that there is no simple boiler - plate solution to reducing birth rates. What is required depends on the levels of social development, the structure of the

health delivery system, the availability of commercial channels for distribution and most important the level of government commitment and the desire among individuals to reduce fertility. Thailand and Indonesia, as well as Colombia and Sri Lanka, are examples of rapid fertility decline with fairly conventional family planning programs, but in Pakistan and Kenya large expenditures on family planning have not increased usage substantially (see attached graph). The major question that needs to be answered is whether the failure of conventional programs was inevitable given low levels of demand and low government commitment and if so, what better alternatives existed.


50
40
30
20
10
0
% CMFW using contraception (including sterilization)
Colombia
Philippines
Korea, Rep. of
Sri Lanka
Malaysia
Thailand
Indonesia
Dominican Republic
Kenya
Pakistan
10
20
30
40
50
60
70
Average per capita family planning budget (US cents) all sources including Government

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. John R. Evans, Director, Population, Health and Nutrition Dept. DATE: August 20, 1982

FROM: Marjorie K. Sheen (through Mr. T. A. Blinkhorn, IPA/PAD)

SUBJECT: The Bank's seminars in Toronto and Montreal on August 24-26

This will serve to confirm final details and provide updated information regarding the Canadian seminars in which you are participating next week.

An updated agenda for each seminar is attached. There will be a breakfast at 7:30 a.m. preceeding both meetings for the Bank program speakers to meet the Canadian chairman and review the program for each session. This breakfast meeting will take place at the hotel; a message will be left for you upon your arrival at the hotel regarding exact place and the names of those who will attend. Mr. Blinkhorn will serve as host at the breakfast meetings. Please advise me or Mrs. Starr Solomon, who will be assisting us at the meetings, if you are not able to join us.

The following hotel reservations have been made for you: Sheraton Centre in Montreal for the night of August 25. When appropriate, there is a "late arrival" guarantee confirmed for you.

Representatives from the media will be present during the morning sessions of both the Toronto and Montreal meetings, (there will be no press attending the afternoon sessions). There may be a television crew doing a small amount of filming in Toronto and there are tentative plans for taping of that session for a Canadian radio program. There will be wide coverage of the Bank in coming weeks and you may receive requests for interviews while you are at the meetings which we encourage. In addition to requests made through Mrs. Solomon, who is coordinating media arrangements for us, you may be approached directly by journalists. Mrs. Solomon and I will advise you of interview requests which are made through us.

If it is convenient to your schedule, you may wish to attend a press conference scheduled for Wednesday, August 25 at 10 a.m. at the Westbury Hotel's Buckingham Room. The Annual Report and the Annual Meeting will be discussed and there may be questions at the briefing within your area of expertise; your comments, therefore, could add a valuable dimension to the discussions and we welcome your attendance. Mr. Blinkhorn will chair the briefing and Mr. Hopper will also be present.

Attachment
MKSheen:lar

cc: Mr. Vogl

DEVELOPING COUNTRIES IN THE 1980s:

OPPORTUNITIES FOR ECONOMIC AND SOCIAL DEVELOPMENT

August 24, 1982
The Westbury Hotel -- Toronto, Ontario

Chairman: Robert M. MacIntosh, President,
Canadian Bankers Association

8:30 a.m. Registration

9:00 a.m. Plenary Session

World Bank and IFC Operations: Challenges and Priorities -- Thomas A. Blinkhorn, Chief, Public Affairs; Carl T. Bell, Chief, Information Unit, International Finance Corporation

The Role of the World Bank in Developing Countries -- W. David Hopper, Vice President, South Asia Regional Office

Social Development: The Case for Investment -- John R. Evans, Director, Population, Health and Nutrition Department

12:15 p.m. Luncheon

Luncheon Address: Bernard Wood, Executive Director, the North-South Institute

2:00 p.m. Workshop sessions:

Expanding Canadian Business Opportunities through World Bank Procurement -- Donald A. Strombom, Procurement Adviser, Projects Advisory Staff; Frits Jonker, Senior Vice President, Acres International, Ltd.; A.D. Burford, A.D. Burford International, Ltd.

Co-Financing: What's at Stake for Canadian Banks -- Carl W. Ludvik, Assistant for Co-financing, Office of the Regional Vice President for Latin America and the Caribbean; David Hilton, Bank of Nova Scotia

Directions in Development for the 1980s -- Everardus J. Stoutjesdijk, Director, Development Economics Department; Professor Al Berry, Department of Political Economy, University of Toronto

4:00 p.m. Reception

5:00 p.m. Final Adjournment

DEVELOPING COUNTRIES IN THE 1980s:

OPPORTUNITIES FOR ECONOMIC AND SOCIAL DEVELOPMENT

August 26, 1982
Centre Sheraton -- Montreal, Canada

Chairman: Jean Paul Vincent, President,
Alliance Compagnie Mutuelle d'Assurance-Vie

8:30 a.m. Registration

9:00 a.m. Plenary Session

World Bank and IFC Operations: Challenges and Priorities -- Thomas A. Blinkhorn, Chief, Public Affairs

The Role of the World Bank in Developing Countries -- W. David Hopper, Vice President, South Asia Regional Office

Social Development: The Case for Investment -- John R. Evans, Director, Population, Health and Nutrition Department

12:15 p.m. Luncheon

Luncheon Address: Bernard Wood, Executive Director, the North-South Institute

2:00 p.m. Workshop sessions:

Expanding Canadian Business Opportunities through World Bank Procurement -- Donald A. Strombom, Procurement Adviser, Projects Advisory Staff; Camille Dagenais, Chairman of the Board, VSNC Group; Owen McClements, Director of Marketing, Lab-Volt Ltd.

Co-Financing: What's at Stake for Canadian Banks -- Carl W. Ludvik, Assistant for Co-financing, Office of the Regional Vice President for Latin America and the Caribbean; Ed P. Neufeld, Senior Vice President and Chief Economist, Royal Bank of Canada

Directions in Development for the 1980s -- Everardus J. Stoutjesdijk, Director, Development Economics Department; Professor Andre Raynauld, Department of Economics, University of Montreal

4:00 p.m. Reception

5:00 p.m. Final Adjournment

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. John Evans, Director, PHN

DATE: August 31, 1982

FROM: Marjorie K. Sheen, IPA MKS

SUBJECT: Canadian Seminars, August 24-26

The large attendance and active participation of Canadians in last week's seminars indicated a keen interest in the Bank; their comments and observations were very positive, with a recurring note of appreciation for having an in-depth view of the Bank's goals and activities.

Thank you very much for the time you gave to the seminars; your active involvement was an important factor in the success of the meetings.

A number of journalists filed stories as a result of their attendance at the seminar and interviews with Bank staff. Their articles are being compiled and we will provide you with a collection of clippings once they have been assembled.

cc: F. Vogl
T. Blinkhorn
W. Baum

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Dr. John Evans

DATE: August 19, 1982

FROM: Susan Cochrane SH

SUBJECT: Horror Stories in Female Literacy

Female literacy is very low in some south Asian countries as well as in West Africa and the Middle East, but exact estimates are not available for many countries. Seven countries have documented levels of female literacy below 10%--Nepal (5%), Mali (6%), Liberia (9%), Afghanistan (4%), Upper Volta (3%), Benin (9%) and the Yemen Arab Republic (1%). In Bangladesh, Mozambique, Haiti, Pakistan, Morroco and Nigeria, female literacy is documented to be between 10 and 20 percent.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Dr. John Evans

DATE: August 19, 1982

FROM: Susan Cochrane SC

SUBJECT: Education Horror Stories: Pick and Choice

While substantial improvements are being made in education in most parts of the world, primary enrollments remain below 50% in many countries, particularly in West Africa (21 percent in Upper Volta and 23 percent in Niger). The picture for female education is even more dismal in West Africa and the Middle East. Less than 1/3 of the girls of primary school age are enrolled in 13 countries located in these areas. Less than 10 percent of girls are enrolled in Bhutan, Afghanistan and the Yemen Arab Republic and 20 percent or less in Chad, Upper Volta, Mali and Mauritania.

Notes for August Annual Meeting Seminar

1. Investments in the improved shelter, water supply, sanitation, health and education are seen both as a goal of development, and through the increased productivity of an efficiently located, satisfied and healthy population, a means of development.

2. Where significant externalities exist or where services do not benefit the recipient directly or where the benefits are sufficiently long term or preventive so that the recipient is unaware of the value - in these circumstances, willingness to pay (quite aside from the question of ability to pay) cannot reflect the true economic value to the society of housing, water and health and its supporting infrastructure.

Athelys

(Dinner: Tuesday night)

FRIDAY

Thursday

- ~~Pick up~~ Deliver ~~H. Goodman forms~~
- ~~Small dictating machine~~
- ~~Tax forms from act~~ + gas
- ~~Phone Miss Howe re appt for Apr 23.~~
- ~~Check F-G ack to ...~~ —
- ~~Remind Goodman re 30,000~~ — 2/3 down + $10,000 after end of Sept.
- ~~Phone ...~~

- Phone Dr Norris, Miss Howe 864,9700 x 265 re - time appt / ~~time for~~ name + date for certif changes
- [redacted]
- Sept [redacted] Wolff
- Mon[redacted] acct
- Small [redacted] machine
- TGH [redacted]
- Phone [redacted] re Wed 27th

DEVELOPING COUNTRIES IN THE 1980s:

OPPORTUNITIES FOR ECONOMIC AND SOCIAL DEVELOPMENT

August 24, 1982
The Westbury Hotel -- Toronto, Ontario

Chairman: Robert M. MacIntosh, President,
Canadian Bankers Association

8:30 a.m. Registration

9:00 a.m. Plenary Session

World Bank and IFC Operations: Challenges and Priorities -- Thomas A. Blinkhorn, Chief, Public Affairs; Carl T. Bell, Chief, Information Unit, International Finance Corporation

The Role of the World Bank in Developing Countries -- W. David Hopper, Vice President, South Asia Regional Office

[redacted] Social Development: The Case for Investment -- John R. Evans, Director, Population, Health and Nutrition Department

12:15 p.m. Luncheon

Luncheon Address: Bernard Wood, Executive Director, the North-South Institute

2:00 p.m. Workshop sessions:

Expanding Canadian Business Opportunities through World Bank Procurement -- Donald A. Strombom, Procurement Adviser, Projects Advisory Staff; Canadian Discussant to be announced

Co-Financing: What's at Stake for Canadian Banks -- Carl W. Ludvik, Assistant for Co-financing, Office of the Regional Vice President for Latin America and the Caribbean; Dennis Belcher, General Manager, Special Loan Services, Bank of Nova Scotia

Directions in Development for the 1980s -- Everardus J. Stoutjesdijk, Director, Development Economics Department; Professor Al Berry, Department of Political Economy, University of Toronto

4:00 p.m. Reception

5:00 p.m. Final Adjournment

DEVELOPING COUNTRIES IN THE 1980s:

OPPORTUNITIES FOR ECONOMIC AND SOCIAL DEVELOPMENT

August 26, 1982
Centre Sheraton -- Montreal, Canada

Chairman: Jean Paul Vincent, President,
Alliance Compagnie Mutuelle d'Assurance-Vie

8:30 a.m. Registration

9:00 a.m. Plenary Session

World Bank and IFC Operations: Challenges and Priorities -- Thomas A. Blinkhorn, Chief, Public Affairs

The Role of the World Bank in Developing Countries -- W. David Hopper, Vice President, South Asia Regional Office

(10:45 a.m. Break)

[redacted] Social Development: The Case for Investment -- John R. Evans, Director, Population, Health and Nutrition Department

12:00 noon Adjournment of Plenary Session

12:15 p.m. Luncheon

Luncheon Address: Bernard Wood, Executive Director, the North-South Institute

2:00 p.m. Workshop sessions:

Expanding Canadian Business Opportunities through World Bank Procurement -- Donald A. Strombom, Procurement Adviser, Projects Advisory Staff; Camille Dagenais, President, SNC

Co-Financing: What's at Stake for Canadian Banks -- Carl W. Ludvik, Assistant for Co-financing, Office of the Regional Vice President for Latin America and the Caribbean; Ed P. Neufeld, Senior Vice President and Chief Economist, Royal Bank of Canada

Directions in Development for the 1980s -- Everardus J. Stoutjesdijk, Director, Development Economics Department; Professor Pierre-Paul Proulx, School of Industrial Relations, University of Montreal

4:00 p.m. Reception

5:00 p.m. Final Adjournment

WORLD BANK SEMINAR -- TORONTO

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND	ACAD	A	B	C
1	RICHARD DAVIS	DEPARTMENT OF FINANCE						X
2	JIM GRAHAM	ONTARIO INTER. CORP		X			X	
3	ROBERT SHEPPARD	UNIVERSITY OF TORONTO			X	X		
4	JANET MASON	I & T. TORONTO						X
5	RALPH MCKIM	FOUND. INT. TRAINING			X			X
6	JOHN KIRTON	UNIVERSITY OF TORONTO			X		X	
7	MICHAEL J. MILROY	CALA				X		
8	ED ROGERS	UNION BANK OF SWITZ.	X				X	
9	FRITS JONKER	ACRES		X		X		
10	ART BURFORD	A. D. BURFORD INT.		X		X		
11	RICHARD BIRD	UNIVERSITY OF TORONTO			X			
12	PETER FRANK	PETER FRANK & ASSOCIATES		X		X		
13	VANESSA HAMMOND	CANADEX DIST.		X		X		
14	ROY MORLEY	KAPPELE, WRIGHT ETC		X				X
15	M. DAVID GUTTMAN	WESTEEL-ROSCO		X		X		
16	STEPHEN TRIANTIS	UNIVERSITY OF TORONTO			X			X
17	PAUL BAILEY	CONTINENTAL BANK	X					X
18	TOM HIRST	HATCH ASSOCIATES		X				X
19	FRED CARDEN	YORK UNIVERSITY			X			X
20	HILDA DUPLITZA	CDA. MANU. ASSOC.						X
21	ANNE WHYTE	UNIVERSITY OF TORONTO			X			X
22	CHRIS D. COUZENS	PROCTOR & REDFERN		X				X
23	SURINDER SURI	-					X	
24	GERARD MARSH	INCO LIMITED		X			X	

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND	ACAD	A	B	C
25	PHILLIP RAWKINS	RYERSON INTER.		X				X
26	GERHARD ZIEPA	DRESDNER BANK	X				X	
27	ART LATHROP	CONTINENTAL BANK	X				X	
28	JAMES L. HOLLAND	SECURITY PACIFIC BANK	X				X	
29	AL DROPPO	CDA. BANKERS ASSOC.	X				X	
30	DENNIS BELCHER	BANK OF NOVA SCOTIA	X				X	
31	JOHN KRIJGSMAN	IMPERIAL BANK OF COMM.	X				X	
32	KENNETH D. KEEGAN	TEXACO CANADA		X				X
33	FRANK SALERNO	CHASE MANHATTAN	X					X
34	KATHERINE GRAHAM	QUEENS UNIVERSITY			X			X
35	ROBERT MACINTOSH	BANKERS ASSOCIATION						
36	ANN AURELIUS	BARLCAYS BANK OF CDA.	X				X	
37	BRIAN WRINKLESS	GOULD MANUFACTURING		X				
38	DOUGLAS BARKER	MASSEY FERGUSON IND.		X				
39	HARRY EASTMAN	UNIVERSITY OF TORONTO			X		X	
40	E. ARAKELIAN	CANADIAN GENERAL ELECTRIC		X				
41	DR. ROSS AMERIE	CANEDCOM INTERN. LTD.		X		X		
42	WALTER FREY	SWISS BANK CORP. (CAN)	X					X
43	RALPH V. VONGHIA	CDA. IMPER. BANK OF COMM	X				X	
44	Wm. C. FAASSEN	CDA. IMPER. BANK OF COMM	X				X	
45	F. ALLAN DAVIS	STONE & WEBSTER CAN. LTD		X				X
46	ALBERT KEZES	INTOP MANAGEMENT LTD.		X		X		
47	MICHAEL O'NEILL	WAJAX INTERNATIONAL		X		X		
48	MALCOME MAUGER	BARCLAYS BANK OF CANADA (Luncheon Only)						

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND.	ACAD.	A	B	C
49	C. V. JOHNSTON	UN. of Western Ontario			X			
50	WAYNE YOUNGE	GOULD MANUFACTURING		X		X		
51	LES GRAHAM	KILBORN LTD.		X		X		
52.	CHARLES STEVENSON	STEVENSON, LUCHAN ASSOC.		X		X		
53.	PETER EBERLEE	TOTTEN, SIMS, HUBICKI, ASSOC.		X		X		
54.	PAUL GREER	TIMBERJACK INC.		X		X		
55	HENRY KROCKER	FEDERAL PIONEER LTD.		X		X		
56	HARRY WINSOR	FISHERIES DEVELOPMENT		X				X
57	J. D. SCOTT	CANADIAN IMPERIAL BANK	X				X	
58	FRANK G. STANLEY	CANADIAN IMPERIAL BANK	X				X	
59	DENIS BUTCHER	TRADE EXCHANGE GROUP		X		X		
60	J. JONES	GRINDLAYS BANK OF CANADA	X				X	
61	DAVID CONNELLY	GRINDLAYS BANK OF CANADA	X				X	
62	RON HOLMES	BECHTEL CANADA LTD.		X		X		
63	ALAN HOLMES	BANK OF MONTREAL	X				X	
64	J. D. JENIKOV	BANK OF MONTREAL	X				X	
65	T. MELNYK	OFFICE OF THE PREMIER					X	
66	MICHAEL O'NEILL	OFFICE OF THE PREMIER					X	
67	JIM GRAY	EXTEL COMMUNICATIONS		X		X		
68	ED COFFEY	EXTEL COMMUNICATIONS		X		X		
69	JIM STEVENSON	EXTEL COMMUNICATIONS		X		X		
70	EDMOND Y. YAO	COLONIAL HOMES COMPANY		X		X		
71	BEN SENNIK	TACONIC CORP LTD.		X		X		

WORLD BANK SEMINAR -- MONTREAL

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND.	ACAD	A	B	C
	NAZMINE LAKHA	BANK OF MONTREAL	X			X		
	EDWARD NEUFELD	ROYAL BANK	X				X	
	PATRICK HUGON	LOGTRANS		X		X		
	K. C. DHAWAN	CONCORDIA			X	X		
	JEAN BAHEUX	LOGTRANS		X				X
	MARTIN BAKKER	EXPORT DEVELOPMENT		X		X		
	PIERRE TRUDEAU	BANK OF MONTREAL	X				X	
	GERALD COMEAU	COMEAU, BOYLE		X				X
	MAURICE MASSE	CANAC CONSULTANTS		X				X
10	PIERRE DUPONT	BELL CANADA INTERNATIONAL		X		X		
11	JOHN LOEWEN	ENTREPRISES KIEWIT		X		X		
12	BAHGAT KORANY	UNIVERSITE DE MONTREAL			X			X
13	W. COLIN C. MACKAY	ROYAL BANK	X				X	
14	LEO BILODEAU	GAUCHER PRINGLE CARRIER		X				X
15	PIERRE DARCHE	DOMINION BRIDGE SULZER		X		X		
16	ARVIND JAIN	MCGILL			X		X	
17	MICHELLE COTE	UNIVERSITE DE MONTREAL			X			X
18	DUNCAN CAMERON	UNIVERSITE OF OTTAWA					X	
19	ROBERT GIBBINS	CP CONSULTING SERVICES		X				X
20	J. DENIS BELISLE	CP CONSULTING SERVICES		X		X		
21	JEAN DENIS VINCENT	ALLIANCE COMPAGNIE MUTUELLE		X				
22	JEAN-PIERRE DORMEAU	TECSULT INTERNATIONAL		X		X		
23	HARRY BEATON	BEAUCHEMIN-BEATON		X				X
24	J. AHMAD	CONCORDIA			X			X

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND.	ACAD	A	B	C
5	JEAN-CLAUDE DESMARAIS	CENTRE D'ETUDE INTER.			X	X		
6	PIERRE SIMON	CONCORDIA			X			X
7	PIERRE POITRAS	BOMBARDIER INC.		X				X
8	E. HUGH ROACH	ALCAN ALUMINIUM		X				X
9	PATRICK O'HARA	IBM CANADA		X				X
0	GUY MONTY	HYDRO QUEBEC		X		X		
1	JAMES THOM	MONTREAL SHIPPING		X		X		
2	TIMOTHY WAGG	CONSOLIDATED BATHURST		X			X	
3	DAVID A. GOLDEN	TELESAT CANADA		X				X
4	JOSE DECAMPOS PERERIA	MARINE INDUSTRIE LTEE		X		X		
5	CLAUDE COURTINE	BANQUE STANDARD CHARTERED	X				X	
6	JEAN TRUDEL	CAISSE DE DEPOT ET PLACEMENT	X			X		
7	IRVING BRECHER	MCGILL			X			X
8	JORGE IWASZKIEWIEZ	URQUIJO CANADA		X			X	
9	GILLES SUGUIN	BANQUE ABN DU CANADA	X				X	
0	FRANK KUNZ	MCGILL			X			X
1	PETER SCHIBLER	UBS REPRESENTATIVE	X					X
2	ANTONIO PERRAZZELLI	BANCA DEL LABORO	X					X
3	PIERRE-PAUL PROULX	UNIVERSITE DE MONTREAL			X			X
4	DAVID IWAASA	DEPT. OF FINANCE				X		
5	JOHN COLEMAN	DEPT. OF FINANCE					X	
6	MARIO GUERRERA	ROYAL BANK	X				X	

	NAME	COMPANY	TYPE				WORKSHOP	
			BANK	IND	ACAD	A	B	C
7	CONRAD MENARD	LAFARGE		X			X	
8	KEVIN DWYER	LAFARGE		X		X		
9	PAUL J. S. WILSON	ROYAL BANK	X				X	
0	GERARD PHILIPPON	BANK OF MONTREAL	X				X	
1	MOHAMED BHANJI	DOMINION TEXTILE		X		X		
2	FRITS JANSEN	BBC BROWN BOVERI		X		X		
3.	MARTIN PATRICK	LAVALIN INTERNATIONAL INC.		X		X		
4	LOUIS BAYNE	H.R.E. INDUSTRIES CANADA		X		X		
5	ANDRE RAYNAULD	UNIVERSITY DE MONTREAL			X			X
6	HASSAN PARVEZ	BANK OF CREDIT & COMMERCE CANADA					X	
7	TIBOR MILETICS	DOMINION ENGIN. WORKS LTD.		X		X		
8	GERRY ROWE	CANADIAN GENERAL ELECTRIC		X			X	
9	RAJAT NAG	MONTREAL ENGIN. CO. LTD.		X			X	
0	LEN BICKERTON	HURTERFIBER CONSULTANTS INC.		X			X	
1	EKHARD SIGGEL	CONCORDIA UNIVERSITY			X	X		
2.	GILLES BOURQUE	BUILDING PRODUCTS OF CANADA		X		X		
3	ALFRED HOUGHTON	C. I. POWER SERVICES LTD.		X		X		
4	CLAUDE HOTTE	GENDRON, LEFEBVRE INTERNATIONALE LTEE		X		X		
5	RAYMOND-Z. LEGAULT	GEOMINES		X		X		
6	MICHEL GOULET	MAHEU, NOISEUX & CIE		X		X		
7	ALFRED MARQUIS	ROCHE INTERNATIONAL LTD.		X		X		
8	PIERRE PINEAULT	SIMONDS CUTTING TOOLS		X		X		
9	D. SANSCARTIER	HEWITT EQUIPMENT		X		X		
0	MICHEL SICOTTE	PETRO-SUN INC.		X		A		

	NAME	COMPANY	TYPE			WORKSHOP		
			BANK	IND.	ACAD	A	B	C
1	D. K. WHISH	C. E. CANADA LTD.		X		X		
2	PHILIP WHITTALL	INTERIMCO		X		X		
3	GUY LECLERE	TRECOT INC.		X		X		
4	M. NEILSON	MCGILL UNIVERSITY			X			

FORM NO. 75
(9–78)

THE WORLD BANK

ROUTING SLIP	DATE: 7/29

NAME	ROOM NO.
JRE	

	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	CLEARANCE		PER OUR CONVERSATION
	COMMENT		PER YOUR REQUEST
	FOR ACTION		PREPARE REPLY
	INFORMATION		RECOMMENDATION
	INITIAL		SIGNATURE
	NOTE AND FILE		URGENT

REMARKS:

- More for Toronto.
- Believe it or not, neither Education nor OPD seem to be able to point to any demonstrably successful education projects!

FROM: JW	ROOM NO.:	EXTENSION:

Hence the emphasis on (a) Successful program & (b) what Bank MAY have contributed.

A CASE STUDY: INDONESIA Cochrane

Despite private efforts to provide family planning in Indonesia as early as 1952, there were considerable constraints on its use: religious and moral codes opposed family planning and in the 1930's and 40's, laws restricted its use and national policies were pronatalist.

The government recognized that a population problem existed, but felt the short term solution was transmigration and the long term solution was socio-economic development.

In 1957, the Indonesia Planned Parenthood Association (IPPA) consolidated its position and began persuading the government that family planning was a legitimate right of parents and a method of improving maternal and child health. The change in population policy, however, did not come until the change in government in 1966 and the population policy and program was unveiled in the first five year development plan (FY1970-74).

Initially, services were provided by a clinic approach, but in 1970 an outreach program was initiated whereby the Health Ministry personnel would provide family planning services using a village leadman and his wife as a focal point for popularizing contraceptive practice and in the early 1970's, nurses, midwives and fieldworkers began proving information, motivation, prescriptions and follow up. Acceptors were also used as motivators. The distribution of methods was broadened in 1974 to include shopkeepers and suppliers of ayurvedic medicine. In general, in-home and personal contacts were found better for providing information and motivation than mass communication.

The results: Indonesia's crude birth rate fell 21.3% between 1960 and 1977 and contraceptive usage rates increased under 3% in the early 1970's in Java and Bali to over 40% in 1979/80 and the usage rate for the country as a whole reached 31%.

The success of the program is attributable to its administrative flexibility and the decentralization of responsibility for services to the village level. This was highly effective particularly in Bali where there exist a high degree of social and cultural cohesion in the village structure. The decentralization thus provided political commitment at the local level which was matched by strong commitment at the central level.

Thus Indonesia illustrates the importance of NGO (IPPA) in initiating a family planning effort, the necessity of central and local support for the program objectives and the importance of outreach and personal contacts for information and motivation, as well as the need for a wide variety of distribution channels.

THE BANK'S CONTRIBUTION TO INDONESIA'S FAMILY PLANNING PROGRAM

The significant contribution to this program was to provide the underpinnings for the program in 1969. The Bank - UN - WHO mission prepared the sector report that provided this basis. The report also identified organizational issues and this led to the organizational structure to the National Family Planning Coordinating Board at the time of the First Population Project in 1972. The common strategy set out in the Sector Report provided the framework for donor program assistance. The sector study, coordinated financing with the UNFPA and technical assistance helped initially to enhance the political and administrative commitment for a major and uncharted program; it ensured the avoidance of some of the errors of the earlier programs elsewhere and played no small part in the program's success. The project also tested population education in schools and this was replicated nationwide before the end of the first project.

As of 1980 substantial success had been achieved in Java and Bali as described above, but in the outer island, usage was low and access to facilities limited. The Bank's third population loan to Indonesia has been designed to improve the access in this area as well to support current program activities and to strengthen basic health care services in those areas as a delivery system.

CASE STUDY IN EDUCATION: MALAYSIA

Malaysia is a case study in which the economic and non-economic returns to schooling are well documented. In urban areas, it has been shown that the annual earnings of those with primary school were almost four times higher than those with no school, and those with secondary school are four times that of people with only primary education. Higher education yields lower relative increases in earnings. Education's effect in the urban sector, however, is only part of the picture. Considerable debate has existed over whether education is productive within the rural agricultural sector. Jamison and Lau have shown that the annual percentage increase in agricultural productivity for one additional year of schooling, other things being equal, ranged between 2.3 and 5.1 percent for the same period. When the cost of providing such schooling is taken into account, both of these figures provide impressive data on economic returns. Calculated returns to investment education adjusting for cost are not available in detail, but in 1978 private rates of return for secondary and higher education exceeded 30 percent.

Data also exist on the non-economic returns to schooling in Malaysia. This is a case where fertility is lower, the higher the amount of education; and those with upper primary school have a half a child less than those with no school (on average). These with secondary school have between one and two fewer children than those with no school.

Mothers with more education also have healthier children. Women with some primary school have 23 percent higher child survival than those with no schooling and women with upper primary have 46 percent higher.

Thus in Malaysia, education at all levels contributes to economic growth in urban and rural areas, as well as making a positive contribution to health improvement and demographic stability.

The delivery of education in Malaysia has also been highly effective in that over 94 percent of the students complete primary school compared to 80 percent for the upper quartile of countries, but the student/teacher ratio is abnormally low and the expenditures per student at the primary level are $197 - substantially above the average developing country.

BANK'S CONTRIBUTION

The Bank's first three education projects in Malaysia covered technical, vocational, and agricultural education as well as curriculum development, educational television, pre-service teacher training and the development of a science university. The fourth education project in 1976 was the Bank's first major involvement in Malaysia primary education. At that time it was recognized that both income, public services, in general, and education specifically were distributed very unequally among geographic areas. As a step in correcting the imbalance and improving the distribution of benefits of primary education, the Bank made a loan of $35 million to construct 4,100 classrooms and 850 primary schools in the most disadvantaged areas. In addition to improve distribution of educational access, procedures were established within the Ministry of Education for school mapping and for planning primary school facilities. The loan also provided for an expansion of the number of primary school teachers. While a final assessment is not yet available, it is expected that it has improved the access of poorest groups to the benefits of primary education.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Distribution

DATE: June 25, 1982

FROM: Thomas A. Blinkhorn, Chief, PAD

SUBJECT: Canadian Seminars, August 24-26, 1982

1. We look forward to your participation in the Canadian seminars scheduled in August. The Toronto meeting will be held on Tuesday, August 24, at the Westbury Hotel; on August 26, the program will be presented in Montreal, at Le Centre Sheraton. (A block of rooms is being held for use of the Bank staff in each hotel.)

2. Ms. Marjorie Sheen will be coordinating arrangements and plans for these meetings. She is now in Toronto confirming site arrangements; upon her return to the office next week, she will be in touch with you regarding meeting details and to discuss your participation in the seminar programs.

Distribution: Messrs. Hopper, Evans, Vogl, Vibert
Srinivasan, Stoutjesdijk

cc: Messrs. Benjenk, Sankaran, Blackman, Drake
Mrs. Stitt, Ms. Sheen

TB:sm

0846

8:30. Meeting
- Bob Hecklebach
. Weekly Dolesson
Weekly Dolesson
Sheen X 75487
Rm # D846

Mr. Jeremy Warford, PHN (o.r.) June 14, 1982

John R. Evans, PHN

Annual Meeting Seminars

1. The World Bank will present seminars in the third week of August in Toronto and Montreal in preparation for the Annual Meeting to be held in Toronto in September. The plenary sessions in the morning of each of the seminars will deal with the following topics:

i. Problems and Opportunities in the Third World - Benjenk or Vogl.

ii. Role of the World Bank in Working with Developing Countries - David Hopper

iii. Social Development: A Case for Investment - John R. Evans

2. I would assume that my presentation should focus primarily on the sectors in which we are engaged but with passing comment about rural and urban development. The types of issues that come to mind immediately are the following:

i. Population as the denominator for economic development, current trends, possible interventions, successes and failures.

ii. Food supply and nutrition, the dichotomy, current status, prospects for the decade, the special problems of the landless and very poor - possible solutions, examples of successes.

iii. The water decade, objectives and progress todate. The software problems of maintenance and health impact.

iv. Health. The primary health care approach, the need for selectivity of investment. Problems of management and recurrent cost financing.

v Education. Priorities (ie 1° not 2°.30). Econ. returns

3. These are only preliminary throughts and I would appreciate suggestions from the Policy Unit brains trust. It would be desirable to incorporate some aspects of Bank experience in the discussion of each of the topics. In addition, the arguments should be assembled which would support "the case for investment in social development". Thanks for your help.

Major Problem: Management
: Community Part

WDR III

JREvans/rmf

Conclusion: Don't think of soc. dev. as conception or separate from Econ. dev.

Recurrent cost burden
(E) Foreign Exch loss from drugs
(D) Human Capital Agric.

(A) Pop. Decline
(B) Econ returns eg Educ, Health as well as
(C) Linkage health + econ dev in Accumulation + drainage Schisto etc

Arr. Aug 23rd

Aug 24th :

Aug 25th Press Conf. Toronto 10 am (optional)

Aug 26th :

Vogel: overview of Bank
[illegible]: objectives of Bank.
Officer lunch
Evening: 45 min - 60 min.
20 min presentation: ← A case for Social Investment – POP^n, NUTR., EDUC, HEALTH. | success stories - case studies
40 min Q + A.
Lunch: B. Wood - N/S.
Afternoon: 3 special sessions ← Procurement, Cofinancing, Int'l Econ Issues

Any items from Draft WDR
Subjects - case studies - success - economic returns
- illustrate a principle.
-

? SLIDES:
Corporate, Banks, Academic - 60 people

Materials: WDR 1980 - Paul Isenman's "book"
WDR 1982 - Agr. &RD
Population; + Basic Indicators (

INFORMAL STYLE: no written paper.

Key items: Pop^n = Econ. Devel^n.

DEVELOPING COUNTRIES IN THE 1980s

OPPORTUNITIES FOR ECONOMIC AND SOCIAL DEVELOPMENT

August 24, 1982
The Westbury Hotel
Toronto, Ontario

August 26, 1982
Centre Sheraton
Montreal, Canada

Co-Sponsors: C.D. Howe Institute
The World Bank

Chairman:

8:30 am. Registration

9:00 am. Plenary Session--Buckingham Room

World Bank Operations: Challenges and Priorities in the 1980s -- Frank Vogl, Director, Information and Public Affairs

The Role of the World Bank in Developing Countries -- W. David Hopper, Vice President, South Asia Regional Office

10:45 am. Break

11:00 am. Social Development in Developing Countries: The Case for Investment -- John R. Evans, Director, Population, Health and Nutrition Department

12:00 pm. Adjournment of Plenary Session

12:15 pm. Luncheon -- Westbury C Room

Luncheon address: Bernard Wood, Executive Director, the North-South Institute

2:00 pm. Workshop sessions:

Expanding Canadian Business Opportunities through World Bank Procurement -- ~~Raghavan Srinivasan~~, Procurement Adviser, Projects Advisory Staff

Co-Financing: What's at Stake for Canadian Banks -- Frank Vibert, Senior Adviser, Co-Financing Operational Staff

Directions in Development for the 1980s -- Everardus J. Stoutjesdijk, Director, Development Economics Department (Canadian Discussant)

4:00 pm. Adjournment of Workshops

4:15 pm. Reception

5:30 pm. Final Adjournment

T. J. Ho.

NUTRITION

1. Main points are

   (a) On the benefit side, the focus of attention on the physical benefits of food supplementation may have painted an unduly bleak picture of the effectiveness of nutritional intervention. There is growing belief that the greater benefits from supplementation may be from increased responsiveness to the environment (e.g.), with increased activity) and hence improved cognitive or mental development.

   (b) On the cost side, improved efficiency in the use of limited resources for nutritional intervention may lead to significant improvements in cost effectiveness. Principal innovation has been more targetted food subsidies and food supplementation schemes.

2. Effects on cognitive development

   (a) Evidence to date is scanty but this issue should be pursued further.

      (1) Guatemala (1977): Children aged 36-48 months showed improvement in cognitive development with supplementation.

      (2) Bogota, Colombia (longitudinal study started in 1973): As of 1979, nutritional supplementation seemed to show modest effects on performance in behavioral tests.

      (3) Mexico (1968-72): Children aged 0-24 months and mothers showed increased physical activity with supplementation.

   (b) Increased activity of parents could result in greater stimulation for child.

3. More cost-effective delivery of services

   (a) Brazil: Government is sponsoring a geographically targetted food subsidy program as a result of a successful but expensive Bank - sponsored project that had too wide coverage. (Food subsidy component of Bank project resulted in improved nutritional status of children aged 24-71 months.)

   (b) Tamil Nadu: Bank project that provides highly targetted, short-term feeding through carefully designed screening system; initial results appear positive. It was previously believed that it was extremely difficult to reach younger children (aged 6-36 mos.) and difficult to run a selective food supplementation program in India.

This project has shown that it is operationally feasible to do so. The screening process sllows targetting not only of supplementary feeding but also of other interventions such as nutritional education and vitamin A supplementation.

(c) Indonesia: Another form of targetting is applied in the design of the message/content of the nutrition education component. Education is aimed directly at undesirable feeding practices prevalent in the local setting, with specific behavioral changes identified as the immediate goal.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. Jerry Warford, Chief, Policy Unit, PHN DATE: August 4, 1982

FROM: Michael A. Cohen, Chief, URBOR

SUBJECT: Note on Urban Operations

1. The attached information is in response to Mr. Evans' request to Mr. Churchill for a brief note on urban operations. Most of this information is presented more fully in the attached Retrospective Review of Urban Operations, which was sent to the Board for information.

2. Urban lending from FY72-81 included some 62 operations, amounting to US$2,014 million in lending. Operations can be divided into four types: urban shelter (36) which include both sites and services and slum improvement, urban transport (10), integrated urban projects (13) which included shelter, employment, and frequently transport, and regional development (3). Average estimated rates of return for these projects are about 20%, with urban transport and integrated urban projects consistently maintaining slightly higher rates. The integrated projects, typically developed during FY77-80, were able to reach down further in the urban income distributions and according to the conventional methodology, had a higher urban poverty content. Some 58% of urban shelter projects and 70% of the integrated urban projects had more than 60% of their total costs devoted to the urban poor. We estimate that about 11 million people have received direct benefits from projects, with a larger number benefitting from city-wide programs such as solid waste management, transport, and social services. By the end of FY81, the average project included some 62,000 households or some 350,000 people as direct beneficiaries, suggesting that pilot projects had grown substantially during the decade of lending.

3. The four basic instruments mentioned above were intended to assist governments in developing an "urban" perspective to the problems of urban growth, as distinct from sub-sectoral views which were common in 1970. It is evident that while many projects have delivered direct benefits to poor households, it is difficult to clearly determine whether such an urban perspective has developed among borrowers. The review paper distinguishes six types of impacts, focusing most heavily on policy impact, and concludes that various aspects of urban policy are in the process of changing in some 35 countries as part of Bank assistance in the sector. In quantitative terms, the most successful project has been the Kampung Improvement Program in Indonesia which has expanded in scale and is now extended outside of Jakarta to other cities. The attached PPAR on the Calcutta Urban Development Projects provides an additional case of some interest. Taken together, our review of lending experience, including implementation, suggests that projects can both reach the poor and have a satisfactory rate of return. The completed urban PCR's support this conclusion.

4. Turning to the future, the major issue facing urban lending is the need to increase the scale of urban service provision in developing countries. Bank operations have been self-consciously called "catalysts" or "demonstration projects". The issue of replicability has been at the forefront, yet it is now evident that replicability cannot mean simply doing more of the same thing. The replication of small-scale urban shelter projects will have little impact on the scale of the problem in LDC's. We are therefore looking at alternative types of projects, building on the experience and policy changes of the 1970's. Issues such as housing finance, municipal finance, and packaging of public and private sector activities are becoming increasingly important and are now reflected in lending. Projects in countries such as Morocco involve using intermediaries to pass on funds to private developers of varying scale to produce a wide range of infrastructure and shelter packages. The issues are now becoming central to the research strategy as well.

5. On the basis of current CPP's, we expect to have a 300% increase in urban lending for the period FY82-86, moving from 62 projects in ten years to 94 in five years. East Asia and LAC are the major recipients of this increased activity. We expect to initiate urban lending in another 23 countries, mostly in Africa over the same period.

Attachments (2)

cc: Messrs. Churchill, Madavo, Dunkerley

MAC:jm

FORM NO. 75
(9–78)

THE WORLD BANK

ROUTING SLIP	DATE:

NAME	ROOM NO.
Dr. J Evans.	N 237

X	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	CLEARANCE		PER OUR CONVERSATION
	COMMENT		PER YOUR REQUEST
	FOR ACTION		PREPARE REPLY
	INFORMATION		RECOMMENDATION
	INITIAL		SIGNATURE
	NOTE AND FILE		URGENT

REMARKS:
As discussed, herewith our cockshy at what we think you are looking for. Pls don't hesitate to contact us if it doesn't meet your needs.

FROM:	ROOM NO.:	EXTENSION:
M. Mercer	N 1035	60085

P.S. Draft compiled by J. Alvarez & C. Harman

Rural development is a strategy designed to improve the economic and social life of a specific target group of people - the rural poor. It involves extending the benefits of development to the poorest among those who seek a livelihood in the rural areas. The group includes small-scale farmers, tenants, squatters, and landless peasants. In more specific terms, the World Bank calls "rural development projects" all those agriculture projects in which at least 50% of their direct benefits accrue - or are expected to accrue - to the rural poor, irrespective of whether they finance only one or several kinds of investments and services. For this purpose, direct benefits are defined as a significant and permanent increase in the income of project beneficiaries through increased production or employment. The rural poor (or the poverty target group) is composed of people whose per capita income is below either the absolute or the relative poverty level, whichever is higher. Absolute poverty level is that below which minimum nutrition and consumption needs cannot be met. Relative poverty level is defined as per capita income which is one third of the average per capita income in a country. Both poverty levels are country-specific and are periodically updated by the Bank's relevant country economist.

Once there is a strong commitment to poverty-oriented developmental efforts at the national level, rural development objectives can be sought in various ways. The choice of methods and their sequence reflect social, cultural, and political factors, as well as technical considerations. In some cases, rural development projects still cover only one dimension in development, such a irrigation, or credit, or forestry, on the like. In most cases, however, rural development projects include several components, aiming at attacking in a proper time and spatial framework the most important constraints to development. A "typical" rural development project would so contain, say, a "core" agricultural investment or technological activity (e.g. irrigation improvement; livestock development; crop expansion; investment credit, etc.), "supported" by input supply and commodity storage, processing

or marketing components - to provide for the required inputs and to dispose of the ensuing production -; a feeder road component - to open up the project area or the most isolated or promising parts of it; primary education and primary health care components - to improve the project beneficiaries' quality of life and enhance their capabilities and productivity; and a credit component (if credit was not a part in the "core" component) to allow the project beneficiaries to afford the required investments at the farm level and the acquisition of the additional inputs needed. Typically, rural development projects are geographically bound, operating in carefully identified areas which have an underutilized potential for increased production, employment and income.

The Bank has attached a very high priority to lending to support rural development projects. This increased tenfold between 1968 and 1973, and again tenfold between 1979 and 1981. In absolute amounts, it has stood at US$2.2 billion during the past two years. In relative terms, it rose from some 10 - 20% of total lending for agriculture and rural development in 1968-71, to some 30% of it in 1972 and 1973, and to roughly 50% thereafter. It has oscillated between 47% in 1976 and 57% in 1981, and reached an all-time, though exceptional, high in 1982 (70%).

A couple of examples would help to illustrate the kinds of rural development projects the Bank supports. In Brazil, the Bank has supported eight rural development projects in the poverty-stricken Northeast region. One of the latest was in the State of Piaui. There, the State Government is purchasing under-utilized farms and settling very small holders and landless peasants. Bank support goes to finance feeder roads, input supply, marketing facilities, small irrigation schemes, applied research and extension, schools and health centers, while the official banking system provides short- and medium-term credit. In Malawi, the Bank has supported seven rural development projects in four different areas. The most widely

known is in the Lilongwe area, where three successive - and successful - projects have been supported. They have aimed at increasing agricultural productivity in a large area of high potential in central Malawi and further the transition from a traditional to a market economy. The projects have consisted of land development and demarcation; construction of marketing and storage facilities, and provision of extension services, credits and inputs (mainly fertilizer and improved seed) to farmers in the project area.

The Piaui and Lilongwe projects have, or will have, 149,000 small farm families. Nevertheless the anticipated economic rates of return are good, estimated at 20% for the ongoing Piaui project and, very conservatively calculated at, 8% for the completed Lilongwe projects. None-withstanding occasional inevitable relative failures, these figures are reasonably representative.