

An International Perspective on Pakistani Human Capital Investments in the Last Quarter Century

JERE R. BEHRMAN and RYAN SCHNEIDER

The objective of this paper is to place Pakistani human capital investments in the past quarter century in an international perspective. As background, a simple analytical perspective is presented first. Then empirical experience from various developing countries is summarised. This relates to some dimensions of the determinants and the impact of human capital investments and related policies. Next, various dimensions of Pakistani human capital investments in schooling and health are compared with the international experience of the past quarter century, controlling for per capita income and initial literacy rates and subject to caveats about such comparisons. These comparisons suggest that, in the aggregate, Pakistan has had relatively low investments in schooling and relatively high investments in health. Consideration of the composition of these investments suggests that, in a comparative sense, Pakistani investments have been skewed towards higher rather than basic education, towards physician-intensive curative rather than basic preventative health care, towards males relative to females, and towards middle- and upper-income groups that tend to benefit more from post-primary schooling and from physician-related health services. The concluding section speculates on the implications of this perspective for Pakistani human capital investment policies.

1. INTRODUCTION

Human capital investments have long been considered by some¹ to be critical in attaining development goals such as growth, structural change, and lessening poverty – though the relative emphasis on human capital has waxed and waned over time. Recently, the importance of such investments in attaining these goals has been emphasised strongly in policy-related perspectives on economic development

Jere R. Behrman is the William R. Kenan, Jr. Professor of Economics at the University of Pennsylvania, Philadelphia, USA. Ryan Schneider is a student in the Ph.D. programme in economics at Yale.

Authors' Note: This paper was prepared for the IFPRI project on Human Capital Accumulation in Post-Green Revolution Rural Pakistan. We thank Harold Alderman, Shahrukh Khan, Mark Rosenzweig, David Ross, Richard Sabot, T.N. Srinivasan, and an anonymous referee for useful discussions and comments on related topics. The usual disclaimer applies.

¹Though certainly not by all. Corbo (1992), for example, provides a recent review of the historical perspective on development strategies in Latin America which includes virtually no mention of human capital investments, suggesting that human capital generally has not been considered by many to be critical in Latin American development strategies.

such as the World Bank (1990, 1991) and the UNDP (1990), and also in the more academic perspective of the so-called “new neoclassical economic growth models” of Romer (1986); Lucas (1988); Azariadis and Drazen (1990) and others in which increasing returns to scale and externalities to human capital are central to the analytical possibilities of ongoing and diverging growth.

The purpose of this paper is to provide a perspective from the international development experience on human capital investments and economic goal attainment in Pakistan. This perspective has two major components: First, consideration of how analysis of human capital investments and of policies in other developing countries may inform analysis of human capital investments and possible related policies in Pakistan. Second, consideration of how Pakistani human capital investments and stocks compare with those of other developing countries. Such comparisons may raise some questions about the total or the composition of Pakistani human capital investments.

The paper is organised as follows. Following this section, Section 2 presents some simple considerations to help analyse human capital investments and related policies. Section 3 summarises some of the relevant empirical evidence on such investments from other developing countries. Section 4 presents a comparison of indicators of Pakistani human capital investments and changes in those investments with the cross-country experience. Section 5 is a summary and conclusion.

2. SIMPLE ANALYTICAL CONSIDERATIONS REGARDING DETERMINANTS OF HUMAN CAPITAL INVESTMENTS, THEIR IMPACTS AND POLICIES

Many empirical studies and interpretations of such studies for policies regarding human capital investments are not sensitive to simple analytical considerations, with the result that the interpretations and the policy justifications may be quite misleading. We summarise briefly here some simple analytical considerations for the household demands for investment in human capital and related policies and for the supply side of these investments and related policies. This summary provides the bases for interpreting developing country empirical evidence in the next section and the policy implications thereof regarding the determinants and the impact of human capital investments in the rest of the paper.

Household Demands for Human Capital Investments and Related Policy Considerations

Households and the individuals in them are the proximate sources of demands for human capital investments, given their predetermined assets, production functions for human capital, and current and expected prices for the inputs

used in human capital investments and for the outcomes of the production process, all of which can be summarised in the present discounted value of expected marginal benefits for different human capital investments for a given individual (hereafter “marginal” benefits) as in Becker’s (1967) Woytinsky lecture. The marginal benefit curve is downward-sloping if plotted against human capital investments because of diminishing returns to human capital investments, since individuals have given endowments (genetic and environmental) and since, to the extent that human capital investments take time (such as schooling and training), greater investments imply greater lags in obtaining the returns and a shorter post-investment period in which to reap the returns from the investment. Equilibrium human capital investment in the individual is at a human capital investment level for which the marginal benefit equals the marginal cost of the investments since for any lesser investment the marginal benefit is greater than the marginal cost so that gains can be made by increasing the investment (and vice versa). The marginal cost also is in present discounted value terms since some of these costs may be experienced in the future. These marginal costs may increase with human capital investments because of the increasing opportunity cost of more time devoted to such investments (especially for schooling and training), and because of increasing marginal costs of borrowing on financial markets.

If the marginal benefit curve is higher for every level of human capital investment, *ceteris paribus*, the equilibrium human capital investment and the equilibrium marginal benefit, both, are greater. The marginal benefit curve may be higher for a number of possible reasons that can be illuminated by comparing two otherwise identical individuals except for the difference noted:² (1) one individual may have greater endowments such as more ability and drive that are rewarded in schooling and in post-schooling labour markets due to some combination of genetic and home environmental factors. Such an individual invests more in human capital in equilibrium, which means that to obtain an estimate of the impact of human capital investments on some outcome, one can not just consider the association between the human capital investment and the outcome (i.e., the association between years of schooling and wage rates), but one must control for the endowments underlying the different human capital investments (see Section 3). (2) One individual may have better health and a longer expected life due to complementary investments, so that the post-investment period in which that individual reaps the returns to the investment is greater and therefore the expected returns are greater. (3) One individual may have human capital investments options of higher quality (e.g., access to higher quality public schools or public health services) so that the marginal benefits

²For some of these comparisons (e.g., the last two) the otherwise identical individuals would have to live in different societies and economies.

for a given level of investment are higher, and the equilibrium investments greater.³ (4) One individual may have greater marginal benefits to a given level of such investments because of labour market discrimination that favours that individual due to gender, race, language, family, village, or ethnic group. (5) The returns to investing in one individual may be garnered more by the investor or the relevant decision-maker than the returns to investing in the other (e.g., if traditional gender roles dictate that children of one sex, but not the other, provide old-age support for their parents, parental incentives may be greater to invest in children who are likely to provide such support).⁴ (6) One individual may have greater marginal benefits to a given level of such investments because of greater externalities from the human capital investments of others in the same labour market (e.g., due to greater knowledge). (7) One individual may have greater marginal benefits to a given level of benefits because of being in a more dynamic economy in which the returns to such investments are greater.

If the marginal cost is lower for every level of human capital investment, *ceteris paribus*, the equilibrium human capital investment is greater, with the marginal benefit at the higher investment level as lower. The marginal cost might be lower for a number of possible reasons that can be illuminated by comparing two otherwise identical individuals except for the difference noted: (1) One individual may have lower-cost access to educational and health services related to such investments because of closer proximity to such services or lesser user charges. (2) One individual may have less opportunity costs for the time used for such investments (e.g., due to gender specialisation in household and farm tasks performed by children). (3) One individual may come from a household with greater access to credit because of greater wealth or status or better connections. (4) One individual may face lower utility costs of such investments because of cultural norms that favour some activities associated with such investments more for some individuals than for others (e.g., in some societies, it is not thought desirable that girls past puberty intermingle with males outside of the family in transit to school or in school so that the preference costs of schooling are lower for boys than for girls).

The above considerations suggest a number of ways in which governmental

³If the investor (or the investor's family) must pay at the margin for greater quality, the amount of the investment does not necessarily increase with a higher quality option. What happens to the equilibrium investment in this case depends upon where the marginal cost curve for the higher quality option is, in addition to the locations of the marginal benefit curve.

⁴There may be some at least partially compensating mechanisms. For example, if sons are expected to provide old-age support to parents and parents have to provide dowries for their daughters such as in south India, it may appear that there are much stronger incentives to invest in sons than in daughters. But if more educated daughters can obtain high quality husbands with lower dowries as Rao (1990) reports for south India, investing in daughters' education has a return in the form of reducing subsequent dowries.

policies may increase human capital investments by affecting household demands for such investments: through increasing the private marginal benefits by increasing complementary investments, improving the quality of related services, and improving labour markets (including lessening discrimination); and through reducing the private marginal costs by increasing the accessibility and reducing the user charges of human capital-related public services, by increasing inducements for the expansion of those services from private providers, by facilitating arrangements that lessen the opportunity cost of time for such investments (e.g., sibling care and more flexible school hours for older girls), and by improving capital markets.

But just because the government could increase human capital investments through such mechanisms does not mean that it should do so, or that it should pursue all of them. To think about what the government should do, it is necessary to think about the policy objectives of the government and the best means to pursue those objectives. Of course, a part of the answer regarding the best means relates to empirical realities about the magnitudes of private responses to various governmental policies, to which we turn in Section 3. But, first, it is useful to think about some basic policy objectives and their implications.

One widespread general policy objective is to increase productivity and productivity growth. To pursue such an objective suggests that policy interventions should be undertaken when (1) there are market failures that cause distortions and (2) the marginal costs of policy interventions in terms of direct resources and added distortions are likely to be less than the marginal benefits, given the imperfect information that policy-makers have about a rapidly changing economic environment and the behaviour of individuals and various private and public entities. The dimension of human capital investments that is the most emphasised with regard to productivity and efficiency reasons for policy interventions pertains to important positive technological externalities⁵ that range from control of contagious diseases to the benefits of better knowledge. Another possible reason that social benefits may exceed private benefits would be marginal income or wealth taxes. If the social marginal benefits exceed private marginal benefits, policies may be warranted on productivity/efficiency grounds to increase private human capital investments by shifting the private marginal benefits curve up or the private marginal cost curve down (or some combination) so that the incentives would be for investing in closer to the socially optimal level of schooling for this individual. Because a substantial component of social costs is distortions introduced by policy interventions, there is some presumption that there is a policy hierarchy in which more direct price interventions are ranked more highly.⁶ For example, direct subsidies for schooling are

⁵Technological externalities are *not* transferred through markets as are pecuniary externalities.

⁶Though there may be other costs to policies than the distortion costs (e.g., important political costs). For discussion of the notion of such a policy hierarchy, see Corden (1974).

likely to cause less distortion than shifting the marginal benefit curve through subsidising production of goods and services in the production of which more-schooled individuals work in order to shift the private benefit curve (since the latter also would increase the returns to all other factors used in such production). The art of good policy in regard to efficiency and productivity objectives, in the uncertain real world with many other constraints under which policy-makers operate, is to select policies that are high in the policy hierarchy (including the possibility that no policy is better than some policy since it is possible that all policies have high marginal social costs).

Other widespread general policy objectives pertain to the distribution of opportunities and outcomes. With regard to opportunities, it might be stated that all citizens should have opportunities to improve their command over resources through self-betterment and hard work. With regard to outcomes, it might be stated that all citizens have the right to an existence above some poverty line or to some basic needs. It is clear that the concern with opportunities is not identical to the concern with outcomes. There are some members of society for whom a rich range of opportunities does not guarantee achievement of some basic needs because of age or disabilities. Attainment of basic needs for the very young and very old and the disabled may be an important social goal that is not furthered much by guaranteeing them equal opportunities. But the concerns with opportunities and with outcomes are related for many members of society. And in most societies efforts to establish a greater equality of opportunity and the attainment of basic needs both are characterised by having human capital investments playing a central role. The usual rationale with regard to more equal opportunity is that the poor have only their own labour time as an economic asset to sell; therefore, one of the more promising strategies to improve their opportunities for a greater command of resources is to enrich the value of their time and what it will command in labour markets through human capital investments in them.⁷ The rationale with regard to basic needs is that among the more important of such needs are the basic levels of human capital investments in education, health, and nutrition.

The question of opportunities can enter either through the marginal benefits or the marginal costs. If there is unequal access to labour market or other opportunities for certain racial, ethnic or language groups or for females, for example, this may be reflected in lower marginal benefits for such individuals, and therefore lower equilibrium human capital investments, all else being equal. If the private returns to human capital investments are systematically lower privately for poorer families than socially, because of higher discount rates due to the immediate pres-

⁷Other possibilities would be to redistribute other assets to the poor. But often this is not a politically palatable alternative.

tures of poverty, the marginal benefits for individuals from poorer families are lower than for otherwise identical individuals from richer families. If the costs of human capital investments are higher due to less access to capital markets for poorer than for richer individuals, the marginal cost curve is higher for poorer than for richer individuals, and the equilibrium human capital investments lower, all else being equal. If there is greater travel time to obtain services of equal quality for the poorer individuals in more remote areas, again the marginal costs tend to be higher and the equilibrium human capital investment lower. If there is gender division in household tasks, with girls specialising in sibling care or boys specialising in agricultural production, the marginal costs and the equilibrium human capital investments may differ by gender.

In the interest of more equal opportunities, policies could be adopted to assure more equal access to labour market opportunities, more equal access to capital markets, more equal access to social services, etc. These policies could work through shifting the marginal benefit curves up and the marginal cost curves down for the poorer members of society, as discussed above. Or they could attempt to work through legal requirements for minimal human capital investments, such as compulsory schooling levels. But the probable success and the implications of various policy alternatives vary substantially with the alternatives. Perhaps the most attractive of these alternatives are those that are likely to increase efficiency as well as opportunities for the poor. Examples include the reduction of discrimination in labour markets⁸ and in access to social services, as well as reduction of capital market imperfections. Other policies to assure more equal opportunities for human capital investments by the poor, however, may have efficiency costs by introducing distortions. Consider, for example, the policies concerning the pricing of social services related to education, health, and nutrition. By lowering such prices and, therefore, the private marginal costs through government-subsidised provision, one can increase utilisation of such services by the poor. But general subsidised provision of such services is likely to benefit the middle and upper classes more than the poor – unless the service being subsidised is an inferior good or has very low-income elasticity of demand; to place large strains on the public budgets if it is widely used (which often leads to a deterioration of quality); to encourage population growth by reducing the private costs of children; and to discourage private suppliers of the good or service. Therefore, a host of issues (e.g., selective targeting) are raised by such policies, to which we return in Section 5.

⁸As noted above, such a policy probably would tend to increase the marginal benefits for some of the poor, and therefore, their equilibrium human capital investments. But note that such a policy also might increase the opportunity cost of the time of the poor for such investments and thus increase the marginal cost, with some offsetting effects.

Regulations and legal requirements regarding human capital investments are also options. For instance, consider the effort to mandate minimum human capital investments. If such efforts are to have any meaning, they must mandate higher levels than would occur in their absence. However, if the mandated levels are above the privately optimal ones, the private incentives are to evade the mandated levels.

Finally, although for many poorer members of society, improving opportunities will improve their attainment of basic needs, yet that is not the case for all members of society. If universal attainment of basic needs is an important objective, some policies, hopefully well-targeted, must be directed towards those who by virtue of age or disability can not take advantage of the human capital investment opportunities to increase their own command of resources sufficiently.

Supply-side Considerations and Some Further Policy Implications

Important questions about the supply side pertain to efficiency in the choice and level of outputs, the choice and level of inputs, and the use of given inputs to produce outputs. If supply is efficient, various human capital investment-related services are provided to the point at which the marginal social benefits of the last unit of each equals the marginal social costs of producing the last units of each, inputs are used to the point at which the value of the social marginal product equals the marginal social costs of each, and inputs are fully employed. The basic policy issues on the supply side pertain to the question: How to create a policy environment so that these services are provided as efficiently as possible, subject to some constraints including, for example, concerns about distribution? How can supply provision be organised so that providers are responsive to individual and social demands to provide the right quantities and qualities of these services and to use the right combination of inputs to produce these outputs (in light of the true marginal social costs of these inputs) –all in a world in which information is quite imperfect about the nature of demands and about the production processes. Pricing issues for such services and the inputs that are used in them pertain to how to create the incentives for the socially desirable supplies, given the possibility of market failures due to externalities and economies of scale and given equity objectives. Such concerns may mean that prices should differ from what free market prices would be. But they are unlikely to mean that prices should differ as much from market prices as often is the case for the provision of social services and the payment of related inputs in most developing countries (e.g., widespread “free” services in monetary terms – though not in total terms given some form of rationing – and payments to inputs – primarily staff – based on credentials and tenure, not on marginal productivity).

Good information is important both for good policy formulation and for developing institutions that function efficiently in the provision of services related to education and health investments. Good information is critical, for example, in making decisions about the cost-effectiveness of various types of education and health policies and about where resources should be directed. For consumers to be able to make intelligent choices about different types of education and health services, moreover, good information about the nature and impact of such services is critical. But on *a priori* grounds, there is reason to believe that many types of information are not provided sufficiently by private entities. That is because many types of information have public good characteristics in the technical sense that access to information is not exclusive. At zero or very low marginal social costs, additional people can have information without reducing the information held by others. However, there are no incentives for private entities to disseminate such information to the point at which the price equals the zero or very low marginal social costs. Therefore, governmental collection, analysis, and provision (or subsidisation) of information *a priori* is likely to increase efficiency.

3. EMPIRICAL EVIDENCE FROM DEVELOPING COUNTRIES ON SOME DIMENSIONS OF THE DETERMINANTS AND THE IMPACT OF HUMAN CAPITAL INVESTMENTS AND RELATED POLICIES

The available related empirical evidence varies considerably in its coverage and in its quality. With respect to coverage, for instance, there are many studies that consider the determinants and the impact of schooling, but relatively few that consider other forms of education such as adult training programmes. Likewise, there are many studies that consider issues related to infant and child health, but relatively few that consider adult health.

With respect to the quality of existing studies, there are a number of problems that are ignored in many existing studies. It is useful to mention three. *First*, many of the existing studies do not control well for the implications of the simple framework presented in the previous section: individuals with higher human capital investments in, say, years of schooling are likely to be individuals with more ability, who come from family backgrounds that provide more reinforcement for such investments and who have lower marginal costs for such investment, and who were likely to have had access to higher quality schools. Therefore, the estimates in such studies probably suffer from omitted variable biases. The association of years of schooling with outcomes, such as wage rates, fertility, and child health, does not necessarily represent causality because in most estimates years of schooling represents not only time in school, but also factors that are correlated with years of

school such as ability, family background, and schooling quality. To obtain an insight into the impact of years of school on such outcomes, one needs to control for these other factors, as do some – but not many – of the existing studies. *Second*, most of the existing studies do not control for sample selectivity. That is, for explicit examples, in estimating the impact of adult schooling on their wage rates or on choices of treatment for their sick children, they do not control for the fact that wages are reported only for individuals who elect to participate in the labour force, or that curative treatment choices are made only by those who perceive the existence of morbidity. Since the individuals who receive wages or who perceive morbidity are not likely to be randomly selected (e.g., in many developing country contexts those with more assets are likely to select themselves out of wage labour markets into family farms and firms; certain types of morbidity, likewise, are more likely to be perceived by individuals who are more integrated into capital city and international information systems), the failure to control for the sample selection process may bias considerably the estimated impact of human capital investments. Similarly, if studies do not control for who attends certain types of schools (e.g., public versus private, vocational versus general, regular versus experimental), the results may not be informative about the school effects because of the selected nature of the students. *Third*, many of the studies do not control for simultaneity. For instance, healthier and better nourished individuals may perform better in school and have higher wages and greater productivity, but that does not mean that better health and nutrition cause the better performance in school and in labour markets. Parents who invest more in their children's schooling plausibly may invest more in their children's health and nutrition, so that children who are healthier perform better in school in part because of such parental concern that leads to more investment in both health and schooling, and not only because better health leads to better schooling performance. In this case, control for simultaneity probably would result in smaller estimated impact of child health and nutrition on child schooling success than is suggested if there is not such control for simultaneity. On the other hand, there may be differences across parents in the extent to which they are interested in child health versus child schooling, either due to preference differences or rate of return differences, so that parents who invest more in child health tend to invest more in child schooling. In this case, control for simultaneity probably would result in larger estimated impact of child health and nutrition on child schooling success than is suggested if there is not such control. Adults with more income may purchase more health and better nutrition, so the health/nutrition – income/productivity association may reflect causality in either direction. In either case, simultaneity need be controlled in order to obtain estimates of the impact of improved health and nutrition on performance in school and in labour markets.

We do not here wish to belabour the problems in making inferences from the available empirical studies.⁹ But we do hope to be sure that readers are sensitive to these limitations in the underlying studies that form the basis for the following summary of what we know and what we do not know about human capital and development, even though we do not continue to qualify the results in what follows. Also, in what follows, we do not refer to particular studies, of which there are a very large number, but attempt to distill the basic results from the myriad of studies that exist in the literature.¹⁰

With such caveats in mind, we now briefly describe a number of the more relevant findings in the literature with regard to the impact of human capital investments, the demand-side determinants of human capital investments, and the nature of the supply side for such investments.

1. The Impact of Human Capital Investments

1.1 The impact of schooling duration on wages and on economic productivity is considerable, with returns relatively high to lower schooling levels and as high on average for female as for male schooling: A large number of studies report substantial associations between years of schooling and such outcomes, both on a micro and on a macro level.¹¹ Control for factors such as omitted variables and selectivity tends to lessen the size of these effects, but they still appear to be fairly large on average in comparison with other investments, particularly in the contexts of changing economies. Such controls also reduce the extent to which calculated rates of return are relatively high for lower schooling levels (including, on the cost side, both the private and the public resources devoted to schooling), but the result seems to hold to a lesser degree even with such controls. The available estimates do not, however, incorporate externalities; if these are positive as often is claimed, the total returns to schooling may be higher than the most careful present estimates suggest, perhaps with different effects for different school levels. Even though in most developing countries the mean wage rates for females are lower than are those

⁹For more extensive discussion of such issues see Behrman (1990, a, b, 1991); Behrman and Deolalikar (1988); Haddad, Carnoy, Rinaldi and Regal (1990); Hanushek (1986); Harbison and Hanushek (1990); Jamison and Mosley (1990) and Schultz (1987, 1988, 1991).

¹⁰For discussions of and references to individual studies, see the surveys in Behrman (1990, a, b, 1991); Behrman and Deolalikar (1988); Haddad, Carnoy, Rinaldi and Regal (1990); Hanushek (1986, 1989); Hanushek and Harbison (1990); Jamison and Mosley (1990); King and Hill (1991); Lockheed and Verspoor (1990); Schultz (1987, 1988, 1991); UNDP (1990) and World Bank (1990, 1991).

¹¹Fischer (1991), for example, states that the association between human capital and economic growth in cross-country macro data is stronger than any other with the exception of the association between physical investment and economic growth. He also notes, however, that such associations do not necessarily indicate the direction of causality.

for males even after controlling for schooling and labour market experience, the rates of return in terms of estimated impact on wages of female schooling tend to be as great (and in some cases, greater, particularly with control for differential selectivity of males versus females into wage work) as those for males.¹²

1.2 The impact of schooling duration, particularly for females, on non-market outcomes appears considerable; this means that the total effect of female schooling tends to be greater than that of male schooling: The considerable associations between female schooling and outcomes such as health, nutrition, and fertility tend to be lessened with control for omitted variables and with possibilities of substitution between female and male schooling in household production, but nevertheless there seems to be a fairly large impact in a number of cases. If such outcomes are associated with externalities as is often claimed,¹³ increasing female schooling above the levels that would be chosen by households under full social marginal cost pricing is likely to increase efficiency.

1.3 The impact of schooling quality on labour market outcomes in some cases appears to be considerable; The evidence on its impact on non-market outcomes is very limited: There are relatively few studies of the impact of schooling quality on subsequent outcomes in developing countries, but those that exist suggest the possibility that the effects are considerable and that the rates of return to improving schooling quality are at least of the same magnitude as are those to expanding school systems of existing quality. These results raise questions about the efficiency of the current allocation of resources between quality and quantity and about a possible equity-productivity tradeoff, since the productivity gains may be larger from concentrating schooling resources among fewer individuals rather than spreading them broadly in low-quality schools.

1.4 There appear to be some positive effects of better health and nutrition on schooling performance and labour productivity, though they may differ substantially from those suggested by associations that do not control for simultaneity and unobserved family characteristics: Very few studies in this area are available that attempt to control for the simultaneity problems that are noted above. Studies of labour productivity of which we are aware tend to find as strong or stronger effects of longer-run health status with control for simultaneity than suggested by the asso-

¹²That is, controlling for other factors, including experience, the gender wage differential tends to decline enough with more schooling so that the estimated private rates of return are as high or higher for investing in females than in males.

¹³However, often the claims of externalities just seem to refer to effects on outcomes such as health and nutrition of other family members, not effects that are external to the household. Whether there are externalities or not in such cases depends upon whether one thinks that the basic unit for such considerations is the individual or the family.

ciations that are often cited as if they represented causality. But results for schooling performance suggest that parents who have strong interests in child health or low prices of child health inputs also have strong interests in child schooling or face low prices for child schooling. Therefore, if there is control for the unobserved preferences that the parents have and for the prices that the family faces, the estimated impact of child health and nutrition on child schooling success is much smaller than it appears without such controls.

1.5 Preventive and basic health care seem to have higher returns than case-management curative health care in the initial stages of development characterised by the dominance of communicable child diseases and malnutrition, but with development there is an epidemiological transition towards diseases of adults and the elderly which results in more complex patterns of relative returns: The general tendency for fertility rates to decline in the developing world¹⁴ in itself implies a shift in the age structure of populations towards older individuals, with substantial impact on the patterns of morbidity. Such shifts are intensified by urbanisation, industrialisation, adoption of new techniques, and behavioural changes – for example, increases in motor vehicle injuries, industrial accidents, exposure to toxic chemicals such as pesticides, smoking, cardiovascular disease, cancer, ischemic heart disease, and sexually-transmitted diseases. Looking forward, the most dramatic increases in the causes of mortality in developing countries are likely to be adult chronic, non-communicable diseases; as these diseases increase, infant and child infectious and parasitic diseases decline. These shifts, together with technological changes in treatment (e.g., oral rehydration therapy (ORT);¹⁵ short-course multiple-drug chemotherapy for tuberculosis and leprosy; population-wide antihelminth therapy; new vaccines for measles, hepatitis B and polio; simplified surgery) and in epidemiological monitoring capacities, cause changes in the relative returns to different health interventions that are likely to depend substantially on particular details of each country.

1.6 There is little systematic empirical evidence on the possible importance of externalities or public good characteristics: Even though the importance of externalities and public good characteristics may be critical for deciding on the merits of many policy interventions, there is little empirical evidence on their magnitudes. Sometimes there are references to the non-market effects on health, nutrition, and

¹⁴But Pakistan is a notable exception to this tendency. While the average annual population growth rate in all low-income countries declined from 2.3 percent in 1965–80 to 2.0 percent in 1980–9, that for Pakistan increased from 3.1 to 3.2 percent.

¹⁵However, [Jamison and Mosley (1990), p. 32] note that the efficacy of ORT in field settings is subject to a great deal of uncertainty: “Given the importance that aid agencies in particular have accorded this intervention, and its dramatic potential ..., it is noteworthy how little evidence there is for cost-effectiveness (or even effectiveness) in practical application at the household or community level.”

fertility as being externalities. As noted above, some of these effects may include technological externalities if they pertain to cross household transmission of knowledge or contagious diseases without market intermediation. But most of the available studies relate to the impact of adult schooling on outcomes that are internal to the households or the families in which these adults reside. One widespread exception to this last statement is that, given public subsidies for health and schooling, lessened fertility is likely to have external benefits through lessening the pressure on public resources to provide these services; this externality (as well as some others) depends on the pricing system, not reflecting true marginal social costs because of policy. Perhaps the most important public goods phenomenon related to human capital investments is thought to relate to the collection, analysis, and dissemination of information, which is discussed at the end of Section 2. As noted there, since it is difficult for private entities to capture the marginal social returns to information preparation and dissemination, the incentives are for private entities not to disseminate information sufficiently from a social perspective. But much of the present advocacy of human capital investment-related policy interventions on the grounds of externalities or public goods characteristics is based on speculation and *a priori* reasoning, not on systematic analysis.

2. The Determinants of Human Capital Investments

2.1 Intergenerational associations between human capital investments such as schooling and health are strong, but in substantial part parental human capital investments represent not the investments themselves but family background characteristics: Intergenerational associations between parental schooling and health and child schooling and health usually are strong, probably somewhat stronger for mothers' than for fathers' human capital and perhaps within than across sexes. However, these estimated effects weaken substantially with control for usually unobserved family background characteristics related to abilities, motivations, and habits. In substantial part, parental schooling and health represent more the general family background and not the effects of schooling and health themselves.

2.2 Family income regularly has a significant though not a huge effect on human capital investments, suggesting that capital market access and discount rates that are inversely associated with income may be significant factors: Within the framework of Section 2, income enters into human capital investment determination only if capital market access is positively associated with income or if household discount rates are negatively associated with income (because the pressure of poverty means that immediate survival takes precedence over investments). That income often is significant in estimated household human resource demand relations suggests that at least one of these factors is relevant. However, the income

effects are not huge, reflecting in part the nature of household choices. For example, for very poor households, the food expenditure response to income changes usually implies an elasticity close to 1.0, but the nutrient intake response to income has an elasticity of about 0.2 to 0.3, or possibly less. That is, if such households obtain more income, they increase their food expenditures almost proportionately, but spend much of the additional expenditures on food characteristics other than basic nutrients are allow greater leakages to guests, workers, animals, and waste. Therefore, their basic nutrient intakes increase much less than proportionately, despite the emphasis on the critical role of income in improving nutrition in World Bank (1981) and a number of other studies.

2.3 Price responses appear to be fairly substantial and probably, if anything, larger for poorer than for richer households: Such results contribute to studies of other outcomes that suggest that most people, particularly poorer people, respond to price and other incentives. This means that the incentives that are created by pricing policies and by institutional arrangements are likely to have important effects on the behaviour of demanders, as well as of suppliers, of goods and services related to human capital investments. It also means that if some prices or user fees are increased as part of price reforms, the poor are likely to reduce their use of the related services relatively more than do those who are better off. If there are distributional reasons for which society wishes to assure that the poor utilise such services then, it may be necessary to target some subsidies related to the services to the poor in order to induce the desired level of use.

2.4 Human capital investments seem responsive to the quality of the social services that are available: The limited available evidence on this question suggests that human capital investments increase with better quality of educational and health services, as suggested by the framework in Section 2. Quality improvements in such services, therefore, may be a major means of increasing human capital investments. As is discussed in Section 5, however, substantial and widespread quality improvements may occur at a reasonable cost only with institutional and price reforms.

2.5 Human capital investments seem responsive to expectations regarding the rates of return on such investments: Testing the response to expectations concerning the rates of return to investments is difficult because it is difficult to know what expectations people have. Therefore, empirical tests of such effects are combined tests of how such expectations are formed and what the responses to such expectations are. Nevertheless, the limited available evidence is consistent with responses to such expectations that are large. This means that human capital investment choices are likely to be responsive to the nature of labour markets (including any discriminatory factors therein) and to the perceptions regarding the general development of the economy.

3. The Supply Side for Human Capital Investments

3.1 The current quality of public supplies of related services varies substantially but, on average, is often low; and the specific dimensions of inputs that determine quality are only poorly identified: Institution-specific effects seem important. Some schools and some health services, for example, seem to perform well even though many do not. But careful estimation of educational production functions that control for the selectivity of students into different schools do not indicate that some of the inputs that often are emphasised in public discussion (e.g., students per teacher over a considerable range)¹⁶ regularly have important effects, though teachers' education, availability of books, and adequate facilities often appear important in developing country contexts. Allocation of resources to different forms of health improvement often does not seem to reflect careful consideration of the relative effectiveness of various activities. Thus, these studies of schooling and health service production suggest that generally such production is inefficient, and that many of the past and ongoing debates have been on very poor or misleading indicators (e.g., student/teacher ratios that, over a wide range, are not significantly related to improvements in student performance).

3.2 Incentives for creating value-added in the provision of such services seem quite limited: Monitoring of value-added is rare, and tying compensation of staff to performance is almost non-existent. Pricing seems usually to be weakly related to marginal social benefits and marginal social costs, at best. Often regulations and control are fairly centralised, with fairly limited responsiveness to local conditions. Much of technical education, for example, does not appear to have very high returns, but there are exceptions in which there are close ties to potential employers, perhaps because of the much greater awareness in such cases to the nature of the demands of the users. As a result of the general weak links to the marginal benefits of the service being produced, and to the opportunity costs of resources that are used in the production of these services, the provision of such services seems to be quite inefficient.

3.3 Subsidised human capital investment-related education and health services tend to encourage overuse and low quality in order to keep benefits widespread, increase pressures on governmental deficits, and benefit primarily middle- and upper-income classes: In summary, the present organisation of the provision of such services – often with government monopolies under centralised control, with pricing that bears little or no relation to marginal social costs and benefits, and with large subsidies that benefit primarily the middle- and upper-income classes who

¹⁶However, recent estimates of cognitive achievement production functions for girls in rural Pakistan do suggest in that context that teachers per student play an important role. See [Alderman, Behrman, Khan, Ross and Sabot (1992)].

have more access to the more heavily subsidised higher education and specialised health care – seems lacking in terms of efficiency/productivity and equity, and increased governmental deficits.

4. COMPARISON OF PAKISTANI HUMAN CAPITAL INVESTMENTS WITH CROSS-COUNTRY EXPERIENCE

In this section, we use data primarily from the World Bank (1990)¹⁷ to attempt to place recent Pakistani human capital investments in a cross-country perspective. The indicators that are examined are all those for which data are available in this source, but readers should keep in mind that there are other indicators (e.g., for training programmes, for the quality of human capital investments and related social services) for which it would be very useful to have similar information, but unfortunately such information is not readily available. The characterisation in this section basically suggests whether Pakistan is above or below the cross-country experience with regard to various indicators of human capital investments that are readily available for a large number of countries. Of course, there is nothing magical or ideal about the cross-country experience. It merely is the average experience. Nevertheless, if for some indicators Pakistan differs substantially from the cross-country experience, such differences raise the following question: Why are there such differences? Are they warranted because of the special conditions of Pakistan? Or might they indicate that Pakistani human capital investments in some respects had better be changed?

Table 1 summarises the data that are the basis for these comparisons. These data are divided into three groups of indicators: schooling, health and nutrition, and fertility and mortality. In most cases, the indicators are for a relatively recent year such as 1987 or 1988, a previous year such as 1965 or 1972, and for the difference between the two years. The comparison for a given year for a given indicator, of course, indicates how the Pakistani value differs from the cross-country experience for that year. The comparison for the change between two years, likewise, indicates how the change in the Pakistani value differs from the change in the cross-country experiences between those two years. The latter comparison, moreover, controls for fixed effects that are not controlled in the cross-country comparisons for a given year, such as natural conditions and culture. Some of the estimates for a given year are for the difference between variables for males versus females; these estimates also control for unobserved country effects such as natural conditions and culture.

¹⁷The earlier adult literacy data are from UNESCO (1965, 1970). Also some of the indicators were constructed by manipulating the World Bank and UNESCO data to obtain gender and time differences and to construct expected years of school for synthetic cohorts (see note d in Table 1).

Table 1

*Pakistani Aggregate Indicators of Human Capital Investments and Stocks
in Comparison with Low- and Middle-Income Means and
Cross-Country Regressions^a*

Indicator of Human Capital Investment	Pakistan	Low-Income Countries	Middle-Income Countries	Pakistani Residual ^b		
				Income	Income and Literacy	
1. Schooling						
1.1 Enrolment Rates (%) ^c						
1965:						
Primary	(Total)	40	73	92	-24.5	-21.8
	(Female)	20	-	86	-34.2	-30.1
	(Male-female)	40	-	12	20.6	16.8
Secondary	(Total)	12	20	26	2.7	8.0
	(Female)	5	-	22	-0.8	4.9
	(Male-female)	14	-	8	7.7	6.5
Tertiary	(Total)	2	2	6	0.0	1.1
1987:						
Primary	(Total)	52	104	104	-27.9	-11.2
	(Female)	35	95	101	-37.4	-16.1
	(Male-female)	34	18	6	19.2	10.4
Secondary	(Total)	19	37	54	-5.9	3.6
	(Female)	11	29	54	-9.9	1.5
	(Male-female)	16	24	0	8.2	4.0
Tertiary	(Total)	5	-	17	-1.8	3.7
1987-1965:						
Primary	(Total)	12	31	12	-6.5	-1.0
	(Female)	15	-	15	-6.0	1.3
	(Male-female)	-6	-	-6	0.2	-5.3
Secondary	(Total)	7	17	29	-12.6	-14.0
	(Female)	6	-	32	-13.6	-15.2
	(Male-female)	2	-	-8	1.9	2.5
Tertiary	(Total)	3	-	11	-1.2	-1.5
1.2 Persistence to Grade 4 (% of Cohort)						
1970:	(Female)	50			-12.2	-7.3
	(Male)	60			-11.4	-9.5
	(Male-female)	10			0.8	-2.2
1984:	(Female)	-			-	-
	(Male)	-			-	-
	(Male-female)	-			-	-

Continued -

Table 1 – (Continued)

1984–1970: (Female)	–	–	–	–	–
(Male)	–	–	–	–	–
(Male-female)	–	–	–	–	–
1.3 Expected Years of School for a Synthetic Cohort ^d					
1965:					
Total	3.2	–	–	–1.3	–0.9
Female	1.6	–	–	–2.0	–1.5
Male-female	3.2	–	–	1.5	1.2
1987:					
Total	4.5	–	–	–1.9	–0.1
Female	3.0	–	–	–2.7	–0.6
Male-female	3.0	–	–	1.6	0.9
1987–1965:					
Total	1.3	–	–	–1.3	–1.5
Female	1.4	–	–	–1.4	–1.3
Male-female	–0.2	–	–	0.3	–2.0
1.4 Primary Pupils/Teacher					
1965	42	–	36	–1.5	–2.7
1987	41	–	29	0.0	–2.1
1987–1965	–1	–	–7	1.1	–4.1
1.5 % Central Government Expenditure on Schooling					
1972	1.2	–	12.6	–15.2	–15.1
1988	2.6	–	–	–10.6	–10.9
1988–1972	1.4	–	–	5.1	6.9
1.6 % GNP that Central Government Expenditure on Schooling					
1972	0.2	–	2.3	–2.7	–3.1
1988	0.6	–	–	–2.7	–3.0
1988–1972	0.4	–	–	0.6	0.8
1.7 Adult Literacy Rates (%)					
1965:					
Female	12	–	–	–21.9	
Male	25	–	–	–25.1	
Male-female	13	–	–	–3.1	
1985:					
Female	19	–	–	–26.1	
Male	41	–	–	–19.9	
Male-female	22	–	–	6.1	

Continued –

Table 1 – (Continued)

Indicator of Human Capital Investment	Pakistan	Low-Income Countries	Middle-Income Countries	Pakistani Residual ^b	
				Income	Income and Literacy
1985–1965:					
Female	7	–	–	–15.5	
Male	16	–	–	–5.0	
Male-female	9	–	–	10.5	
2. Health and Nutrition					
2.1 Life Expectancy at Birth (Years)					
1965:					
Female	45	50	59	–3.8	–0.2
Male	47	48	55	0.9	4.1
Male-female	2	–2	–4	4.7	4.2
1988:					
Female	55	60	68	–1.7	3.5
Male	55	60	63	1.3	5.9
Male-female	0	0	–5	3.0	2.3
1988–1965:					
Female	10	10	9	0.5	1.8
Male	8	12	8	–0.7	1.2
Male-female	–2	2	–1	–1.2	–0.6
2.2 Infant Mortality per 1000 Live Births					
1965	149	124	98	12.1	–4.6
1988	107	72	52	14.1	–8.6
1988–1965	–42	–52	–46	7.0	1.4
2.3 1988 Risk of Dying by Age 5 per 1000 Births					
Female	139	89	59	13.0	–21.9
Male	128	97	69	–11.9	–48.8
Male-female	–11	8	10	–24.9	–26.9
2.4 Maternal Mortality per 100,000 Live Births in 1980					
	600	–	–	95.9	–68.3
2.5 Population per Physician					
1965	4800	9760	4060	–	–
1984	2910	5580	2520	–10563	–15007
1984–1965	–2360	–4180	–1540	–	–

Continued –

Table 1 – (Continued)

2.6 Population per Nursing Person					
1965	9910	6010	2190	4752	4719
1984	4900	2200	980	2922	2771
1984–1965	-5010	-3810	-1290	-1732	-1254
2.7 Births in 1985 (%) Attended by Health Staff					
Staff	24	-	-	-17.3	-5.1
with Low Birth Weight	25	-	-	10.2	8.5
2.8 Daily Calorie Supply					
1965	1761	1993	2458	-352	-176
1986	2315	2384	2846	42	117
1986–1965	554	391	388	276	171
2.9 % Central Government Expenditure on Health					
1972	1.1	-	6.1	-4.7	-4.1
1988	0.9	-	-	-3.7	-3.2
1988–1972	-0.2	-	-	0.5	-2.1
2.10 % GNP that is Central Government Expenditure on Health					
1972	0.2	-	1.1	-0.9	-0.8
1988	0.2	-	-	-0.9	-0.9
1988–1972	0.0	-	-	-0.1	-0.9
2.11 % Central Government Expenditure on Housing, Emenities, Social Security and Welfare					
1972	3.2	-	16.7	-4.1	0.6
1988	8.7	-	16.6	1.1	5.2
1988–1972	5.5	-	-0.1	5.3	-1.1
2.12 % GNP that is Central Government Expenditure on Housing, Emenities, Social Security and Welfare					
1972	0.5	-	3.1	-1.0	0.3

Continued –

Table 1 – (Continued)

Indicator of Human Capital Investment	Pakistan	Low-Income Countries	Middle-Income Countries	Pakistani Residual ^b	
				Income	Income and Literacy
1988	1.9	–	3.3	–0.0	1.2
1988–1972	1.3	–	0.2	1.1	–0.4
3. Fertility and Mortality					
3.1 Crude Birth Rate per 1000					
1965	48	42	38	2.3	–1.7
1988	46	31	29	4.7	–1.2
1988–1965	–2	–11	–11	4.2	–3.9
3.2 Crude Death Rate per 1000					
1965	21	16	13	2.5	0.9
1988	13	10	8	–0.3	–2.6
1988–1965	–8	–6	–5	–2.2	–2.7
3.3 Total Fertility Rate					
1965	7.0	6.3	5.6	0.5	–2.0
1988	6.6	4.0	3.8	0.9	–0.0
1988–1965	–0.4	–2.3	–1.8	0.7	0.6

^aSource for data and for country groups: World Bank (1990). Means generally are weighted by population.

^bBoth regressions control for a cubic in per capita income measured in constant United States dollars. The second regression controls in addition for adult male and female literacy rates. The Pakistani residual indicates whether the Pakistani value is above (+ sign) or below (– sign) the cross-country experience for the variable indicated on the left of the row and by how much. The regressions are given in the appendix.

^cThe enrolment rates are defined as the ratio of students enrolled to the population in the relevant age group (i.e., 6–11 years old for primary school, 12–17 years old for secondary school, and 20–24 years old for tertiary school). If there are students younger or older than the age ranges, percentages greater than 100 can result.

^dThe expected years of schooling for a synthetic cohort summarises the enrolment rates for the three school levels by calculating how many years of schooling an individual would have if s/he had the country average enrolment rates for the three school levels. For example, the expected years of schooling for a synthetic cohort with Pakistan 1987 enrolment rates is $4.5 - 0.52 * 6 + 0.19 * 6 + 0.05 * 5$ where the 6s and 5 refer to the age ranges in note c. The expected years of schooling for male and females separately are calculated under the assumption that the total tertiary enrolment rates apply to each gender, which probably understates somewhat the gender gap (but not much for Pakistan and for other countries of similar per capita incomes because the tertiary enrolment rates are relatively low in comparison with those for primary and secondary school).

Those who know well how these indicators are constructed for the Pakistani case know that there are substantial measurement errors in many of them (e.g., the school enrolment number overstates actual school attendance, literacy rates overstate substantially functional literacy). However, similar measurement problems exist for many other countries, and it is not clear that the net result of these measurement errors is to bias such comparisons regarding Pakistan versus other countries. We discuss some of these measurement problems below.

For each indicator, the first column gives the Pakistani value. The second and the third columns give the weighted country group means for the 42 low-income countries and the 54 middle-income countries for which data are available in World Bank (1990), using the country grouping in that source.¹⁸ According to the same source, in 1987 Pakistan was in the low per capita income country group, and was 23rd from the bottom in terms of GNP per capita in that year (out of a total of 121 countries). In terms of the annual growth rates in GNP per capita for the 1965-1988 period, Pakistan (with 2.5 percent) ranked fifth among the 30 current low-income countries for which such rates are reported (below China, Lesotho, Indonesia, and Burundi) and 35th among all 101 countries for which such rates are reported.

The fourth and fifth columns give the residuals for Pakistan from cross-country regressions that control for a cubic in per capita income (column four) and a cubic in per capita income plus male and female adult literacy rates (column five). Income is included in a cubic form in the regressions underlying both columns to allow for the possibility of non-linear effects; for instance, income might have an increasing effect that diminishes with higher income. Though, typically, in such cross-country regressions a quadratic in per capita income is included to represent such a possibility, in initial explorations we found that there are non-linearities in the income effects beyond those captured by a quadratic in a number of relations. So we include a cubic in per capita income. The control for literacy rates in the regressions underlying the residuals in the fifth column is to control crudely for the price of skilled labour that is thought to be a critical input into many human capital investments, under the assumption that this price is likely to be inversely associated with the stock of literate adults (separately for males and females because of gender specialisation in many tasks related to human capital investments in many developing countries). The appendix gives the cross-country regressions from which the Pakistani residuals were calculated. These regressions were estimated from the cross-country data for the indicated year or for the changes between the indicated

¹⁸The weights are population weights, so the Chinese and Indian experiences account for about two-thirds of the low-income country means, since they have about two-thirds of the population of the 42 countries in that category.

years¹⁹ for as many of the 121 countries for which the necessary data are available in World Bank (1990). A positive residual means that the Pakistani value is above the predicted line from the cross-country experience, and vice versa for a negative value. A positive value is “good” if a higher value of the dependent variable is good in the sense that more of it *ceteris paribus* is thought to be better (e.g., schooling, life expectancies). But for some of the indicators, such as mortality rates, positive values implying higher actual values than predicted from the cross-country regressions are “bad” since higher values of the indicator are thought to be bad *ceteris paribus*. In our summary of the residuals, we focus on those from column five (i.e., with the control for adult literacy) since they tend to be more consistent with the cross-country experiences; but we note cases in which the residuals in column four are much different.²⁰

Data Considerations for Right-side Variables

Before examining these tables it is useful to discuss the data that are used on the right side of these regressions and, to the extent possible, the implications of these data for our estimates. (We discuss the left-side variables below when we turn to the three groups of regressions.) Our right-side variables are per capita income in all of our regressions and, in alternative regressions, adult literacy rates.

World Bank (1990) presents estimates of per capita GNP data transformed into 1988 US\$ at official exchange rates (using the weighted average over three years to lessen the impact of transitory fluctuations, with adjustments for relative inflation, as is described in some detail in the World Bank source) that we use to represent per capita income. There are a number of problems in comparing these data across countries because of differences in data quality (including the extent of quantification), coverage, definitions, and valuation. For example, Srinivasan (1992) provides details regarding changes in some important dimensions of Indian national accounts over time (e.g., “eye-estimation” of crop yields has been replaced by sample surveys; the quality of the sample for such crop yield surveys probably has deteriorated over time since they are based on land revenue administrations that have been declining in quality in part since land revenue has become less important; conventions assigning crops to fiscal years have not changed even though the relative importance of the seasons has changed; average farm harvest prices are used even though the marketed surplus has changed over time; fixed coefficients

¹⁹For the estimates with the changes in indicators between two years as dependent variables, all of the right-side variables also represent the changes between the two years.

²⁰For the cases in group 1.7 in which the literacy rates are the dependent variables, of course, it does not make sense to include the literacy rates as right-side variables. So there only are residuals in column four.

based on dated sample surveys are used for such measures as “feed, seed, and wastage” and milk yield per animal, even though crop composition and technology have changed; the incentives for and the extent of tax evasion with its effects on reported industrial data have varied over time). Srinivasan emphasises that there is no reason to think that there are greater problems with Indian national accounts data than with data from other developing countries. To the contrary, he claims that “India has one of the better statistical systems in the developing world” (p. 7). But, despite the relatively high quality of the Indian statistical system, the national income data is subject to potentially large errors that may change over time. This fact, together with similar problems in other developing countries, means that both comparisons across countries and comparisons over time for a given country are subject to potentially large and changing errors of unknown magnitude.

Purchasing-power-parity (PPP)-based measures of per capita income, for further illustration, might be preferable to standard national accounts measures translated into a common currency at official exchange rates since they better capture actual purchasing power, but they are available in World Bank (1990) only for 15 of the 42 low-income countries and for 20 of the 54 middle-income countries. A comparison of the PPP income measures with those based on official estimates suggests that income differences are less across broad country groups than indicated by official exchange rates due to relatively low prices for non-tradeables in low-income countries, which implies that, in the regressions below, the estimated income coefficients would tend to be larger than reported if purchasing-power-parity income measures were used. For all 15 low-income developing countries for which purchasing-power-parity estimates are available in World Bank, the ratio of the PPP estimate to the World Bank estimate based on official exchange rates ranges from 1.9 to 5.2, with a median of 3.1. For Pakistan the value is relatively high at 4.6. This suggests that, if the only problem with international comparisons was the use of official exchange rate-based income instead of PPP, the true income in Pakistan would tend to be relatively understated. Therefore, for this reason, if some outcome is positively associated with income (e.g., education, life expectancy, health), the use of the World Bank income measures instead of the PPP ones tends to make the Pakistani outcomes appear better than they would if the PPP income was used.²¹

Adult literacy rates that are presented in the World Bank are from UNESCO, which collects and/or estimates such data based on national and regional sources. The annual data are estimates based on extrapolations and interpolations from periodic censuses and surveys for years that are not census years. Since the underlying concept of interest for our purpose is a stock concept – the literacy of the stock of

²¹For further discussion of the nature of national income data, see Ahmad (1992); Heston (1992) and Srinivasan (1992).

adults over age 15 typically – the extrapolated and interpolated estimates may not be too misleading for the purpose of representing longer-run developments and changes in such developments over about two decades, though they clearly are not likely to represent well the shorter-run fluctuations. The underlying data on which these estimates are made are available more frequently and for more years for countries with higher per capita income. Also the literacy rates based directly on census data are more strongly associated with the World Bank-reported per capita incomes than are the estimates reported by the World Bank for a given year – many of which, as noted above, are extrapolations or interpolations, though it is not clear what effect this relation is likely to have on the estimates presented here.²² Further, different definitions of literacy are used across countries which may be viewed as measurement error, though it is not clear that such measurement error is random (with the impact of reducing the absolute value of estimated coefficients). Finally, literacy represents only one dimension of skills, and not quantitative skills nor advanced knowledge. The latter point means that it is likely to provide a much better indicator of differences in the stock of educated adults among countries with relatively low stocks (generally less developed countries) than among countries with relatively high such stocks (and therefore almost universal literacy).²³

The net effect of these data problems on characterising how Pakistan fares relatively to other countries with similar per capita income and stocks of educated adults is difficult to assess. As we note above, the use of official exchange rate-based national income probably tends to make the Pakistani performance appear better than it would were purchasing-power-parity estimates used. But there are other problems of unknown magnitude in the data, so it is hard to know if this particular bias is relatively large. Because of such data problems, international comparisons must be made with more than a grain of salt. But because they still may educate crudely our understanding of the human capital investments in Pakistan relative to other countries, we proceed.

With such caveats, we now turn to the three groups of indicators in Table 1 to characterise the Pakistani human capital investment experience.

Schooling

The most used data for investigating schooling are the enrolment rates for

²²Since the covariance between the literacy estimates based directly on censuses and the World Bank per capita incomes is greater, in the estimates without the adult literacy rates income will represent more the effect of census-based literacy rates (i.e., the coefficient estimates will be biased more due to the omitted variable if the true relation should have such literacy rates included) than would appear to be the case from the estimates that include the World Bank-reported literacy rates that include a number of extrapolations and interpolations.

²³This paragraph draws on Behrman and Rosenzweig (1992) to which the interested reader is referred for more details.

primary, secondary, and tertiary schooling that are compiled by UNESCO primarily from annual reports of the Ministries of Education from various countries, though apparently other sources also are used. There are four principal problems with such data. First, enrolment rates may reflect opening-day enrolment rates, and not regular attendance. Second, for many countries only gross enrolment rates (i.e., enrolments in a school level of individuals of all ages relative to the census-estimated population for the age range thought appropriate for that school level) are available rather than net enrolment rates in which the age range for the numerator is the same as for the denominator; for countries for which both the gross and the net enrolment rates are available, the ratios of the two vary considerably because of considerable differences across countries in late starting of school and in grade repetition. Third, different starting ages for school and different durations of schooling levels further make cross-country comparisons more difficult. Fourth, enrolment rates address only the quantitative, not the qualitative, dimension of schooling investments.²⁴ If the errors that are introduced into the analysis by such variables are independent of the right-side variables in our regressions, they do not cause any biases in the estimates of the regression coefficients. However, it would seem likely that these errors are likely to overestimate schooling investments for lower per capita income countries with lower adult literacy. If so, then the cross-country estimates are likely to yield coefficients that understate the impact of these right-side variables. We cannot assess, however, whether this is likely to result in a bias of where Pakistan stands relative to the international regression line.

We summarise the enrolment data for a particular year by the expected schooling for a synthetic cohort based on the enrolment rates for that year (see note d in Table 1). In 1965 Pakistani expected schooling for a synthetic cohort (estimated from the enrolment rates indicated in the table) was 3.2 years, 0.9 years less than predicted by the cross-country experience. For females the value was 1.6 years, 1.5 years less than the cross-country experience, implying a gender gap of 3.2 years favouring males and 1.2 years greater than the cross-country experience. Most of these differences between Pakistani and the cross-country experience originated at the primary school level, with total primary school enrolment rates 21.8 percent below and the gender gap for primary school enrolment 16.8 percent above the respective cross-country experiences.²⁵ Pakistani secondary school enrolments were 8.0 percent above the cross-country experience (4.9 percent for females, so there was a gender gap 6.5 percent above the regression line) and tertiary enrolments

²⁴This description draws on Behrman and Rosenzweig (1992), to which the interested reader is referred for more detail.

²⁵Another way to characterise this experience is with respect to persistence rates to grade four (variables 1.2). In 1970 Pakistani persistence rates were only 50 and 60 percent for females and males, both of which were about 10 percent below the international experience.

were 1.1 percent above. Thus, the post-primary enrolments partially compensated for the relatively low primary schooling enrolments in comparison with the international experience.²⁶

Between 1965 and 1987, Pakistani expected schooling increased by 1.3 years overall, with a 1.4 years increase for females. Both of these changes were below the cross-country regression lines (by 1.5 and 1.3 years, respectively), as was the resulting reduction in the gender gap (by 2.0 years). Between these two years overall enrolment rates increased by 12 percent at the primary level (15 percent for females), 7 percent at the secondary level (6 percent for females), and 3 percent at the tertiary level. The total primary, secondary, and tertiary enrolment changes were all below the cross-country experiences (by 1.0, 14.0, and 1.5 percent, respectively) – especially at the secondary school level. At the primary school level, this shortfall was for males, and the gender gap declined relative to the cross-country experience.²⁷ At the secondary level the shortfalls relative to the cross-country experience were large for both males and females but somewhat larger for females. The locus of the Pakistani gender gap in expected years of schooling relative to those in other countries, thus, shifted somewhat from primary to secondary school enrolments.

In 1987, as a result of these changes, Pakistani overall expected schooling had increased to 4.5 years. With the control for literacy this was slightly below the cross-country experience, but less so than in 1965 (0.1 versus 0.9 years below).²⁸ For females, the larger increase (from a smaller base) lessened slightly the gender gap from 3.2 to 3.0 years, which remained above the cross-country experience by 0.9 years. For both primary and secondary enrolments the overall Pakistani rates moved towards the cross-country experience (–11.2 and 3.6 percent, respectively) in comparison with 1965 (–21.8 and 8.0 percent). For females there also was a tendency towards convergence with the cross-country experience (i.e., –16.1 and 1.5 percent in 1987 in comparison with –30.1 and 4.6 percent in 1965). But for tertiary enrolments the rate of 5 percent was 3.7 percent above the regression line, a larger deviation than the 1.1 percent for 1965. Therefore, in 1987 Pakistan had expected schooling below that predicted by cross-country experience, with a gender gap about a year larger than the cross-country experience, and with investments skewed (relative to the cross-country experience) to favour post-primary schooling.

Upto this point we have focused on the quantity of schooling investments and their changes in 1987 and the preceding two decades. But the quality of school-

²⁶Though less so for the residuals in column four.

²⁷Though this result is conditional on the control for the change in literacy rates; see column four.

²⁸But without the control for adult literacy, the Pakistani value was 1.9 years below, which is larger than the 1.3 years below in 1965.

ing investments also may be important. Unfortunately, the available index of such quality is limited to the number of primary pupils per primary teacher. These estimates depend heavily on the enrolment estimates, and thus are subject to similar measurement problems as are discussed above for enrolments. Pakistan reported 42 primary students per primary teacher in 1965, and 41 in 1987. Both of these values and the change between them were below the cross-country experiences (2.7, 2.1, and 4.1 below, respectively), suggesting relatively high quality by this index in both years and a relatively large improvement over the intervening two decades). However, as discussed in Section 3, available school production function estimates generally do not find that there is an important significant relation between students per teacher and student performance over a wide range for the student/teacher ratio. Therefore, the Pakistani performance may reflect a misallocation of educational resources to keep class sizes relatively small without there being much in the way of benefits.

The other indicators of current schooling investments that are available relate to central governmental provision of resources for schooling (whether devoted to quantity or quality). These data have the same limitations as the income/GNP data discussed above with respect to appropriate exchange rates and price deflators. In addition, they refer to only part of even public expenditures on schooling since there also are regional and local governmental expenditures, quite aside from private expenditures – and the relative importance of such expenditures apparently varies substantially across countries. But it should take much more information than is available to issue more than a caveat about interpreting such data across countries. Given such a caveat, in 1972, 1.2 percent of Pakistani central governmental expenditures were devoted to schooling, which was 15.1 percent below the cross-country experience. In the same year, Pakistani central governmental expenditures on schooling were 0.2 percent of GNP, 3.1 percent below the cross-country experience. Between 1972 and 1988 Pakistani central government expenditures on schooling increased relative to the total central governmental expenditures by 1.4 percent (6.9 percent more than the cross-country experience) and increased relative to the GNP by 0.4 percent of the GNP (0.8 percent more than the cross-country experience). As a result, in 1988, Pakistani central governmental expenditures were 2.6 percent of the total central governmental expenditures (10.9 percent below the cross-country experience) and 0.6 percent of GNP (3.0 percent below the cross-country experience). As a share of the total central governmental expenditures or of the GNP, thus, Pakistani central governmental expenditures on schooling have been relatively low (though less so over time). Unfortunately, there does not seem to be any basis for comparing other governmental and private expenditures on schooling across countries.

The proximate impact of the various investments in schooling is to change

the stock of educated adults. Unfortunately, indices for comparing such stocks across countries are limited to adult literacy rates, the limitations of which are discussed above. Nevertheless, it is of interest, particularly for countries with smaller stocks of educated adults, to make cross-country comparisons of adult literacy rates. In 1965, Pakistani adult literacy rates were 12 percent for females and 25 percent for males, both below the cross-country experience (21.9 and 25.1 percent, respectively) and implying a gender gap of 13 percent that was 3.1 percent below the cross-country experience. Therefore, Pakistan started the period for which we characterise the recent experience with a relatively uneducated stocks of adults.²⁹ The educational investments between 1965 and 1985 that are partially described above increased the adult literacy rate for females by 7 percent (15.5 percent below the cross-country experience) and for males by 16 percent (5.0 percent below the cross-country experience), so that the male-female gender gap increased by 9 percent (10.5 percent above the cross-country experience). The results in 1985 were the adult literacy rate for females of 19 percent (26.1 percent below the cross-country regression) and for males of 41 percent (19.9 percent below), with a gender gap of 22 percent (6.1 percent above).

Health and Nutrition

Data for cross-country comparisons of direct indicators of health and morbidity are not readily available. What are readily available, and what have been used regularly for such comparisons, are data on estimated life expectancies and on infant and child mortality rates. However, these data are subject to problems of comparability. One problem is the use of different definitions. For example, the definitions used in some countries require that an infant survive at least 24 hours before being counted as a live birth rather than a late foetal death, which causes a reduction in the reported birth rate and a greater reduction in the reported infant mortality rate in such cases than would occur if the 24-hour restriction was replaced by a zero-hour restriction. Since the use of the 24-hour restriction is more common for poorer countries, this difference in definition tends to result in a less strong estimated inverse relation between per capita income and fertility and between per capita income and mortality than would occur if all countries used status at birth to define births and deaths. A second major data problem is that there are different

²⁹In the cross-country regressions for the residuals that are in the fifth column, we include adult literacy rates as inverse proxies for the scarcity values of the time of skilled school teachers and staff, as noted above. Because Pakistan had relatively low adult literacy and, presumably, relatively high prices of skilled labour, Pakistan's predicted human resource investments at a given per capita income level are lower than would be obtained with higher adult literacy rates or with no control for adult literacy as in the fourth column.

degrees of completeness of population data collection. For most more developed countries, for example, death rates and life expectancies are based on national registered deaths and official population estimates, which are believed to be virtually complete in the sense that the information on deaths, and on infant deaths in particular, represents at least 90 percent of the events occurring during the year. In the beginning of 1992, in contrast, registered data on deaths and infant deaths are estimated to be complete in approximately 70 percent of Latin American countries, 18 percent of African countries, and 21 percent of Asian countries. The countries with incomplete, defective or non-existent vital registration data generally are countries with higher mortality and lower per capita income. For these countries mortality parameters are estimated by using estimation techniques with incomplete vital registration data or with other mortality data collected in censuses or sample surveys. Since censuses are held infrequently, most of the values cited in World Bank (1990) for these countries in the mid-1980s are, in fact, extrapolations from previous censuses rather than direct observations. Such estimated and extrapolated data have obvious limitations that would be much greater for efforts to characterise short-run changes for such variables than for our use as representing longer-run changes.³⁰ But it is not clear, nevertheless, how such procedures for calculating such variables affect our estimates of how Pakistani values differ from international values since such biases depend in part on what are errors in the Pakistani estimates relative to those for other countries, particularly other low-income countries. A long life is not identical to a healthy life, moreover, though micro studies indicate that in the developing country context there is fairly strong positive association [e.g., see survey in Behrman and Deolalikar (1988)]. We first consider such indicators and then turn to indicators of inputs related to health and nutrition.

In 1965 Pakistani life expectancies at birth were 45 years for females and 47 years for males, with that for females 0.2 years below and that for males 4.1 years above the respective cross-country experiences, which implies a gender gap of 2.0 years, favouring males, that is, above the cross-country experience by 4.2 years.³¹ Between 1965 and 1988, life expectancies at birth increased by 10 years for females (1.8 years above the cross-country experience) and by 9.0 years for males (1.2 years above), so the gender gap favouring males in these changes was 0.6 years below the regression line. As a result, in 1988 Pakistani life expectancies at birth were 55 years for both females and males, both above the cross-country regressions (by 3.5 and 5.9 years, respectively), more so than in 1965. The gender gap of 0.0 years

³⁰See Chamie (1992) for more discussion of these and other population data problems.

³¹Without the controls for adult literacy, that for females is further below and that for males less above the respective cross-country experiences, but the gender gap remains about the same above the cross-country prediction.

favoured males by 2.3 years in comparison with the cross-country experience.³²

A major factor underlying the changes in life expectancies has been changes in infant and child mortality rates. In 1965 the Pakistani infant mortality rate per 1000 live births was 149, 4.6 below that predicted by the cross-country regression. Between 1965 and 1988 this rate fell by 42, slightly less (by 1.4) than predicted by the cross-country changes. The 1988 value, therefore, was 107, 8.6 below the cross-country experience, more so than in 1965.³³ In 1985 25 percent of births were reported to be of low birth weight, 8.5 percent higher than predicted by the cross-country experience. Also in that year the risks of dying by age five per 1000 live births were 139 for females and 128 for males, with each of these substantially below cross-country experience (more so for males). In 1980 Pakistani maternal mortality per 100,000 live births was 600, 68.3 below the cross-country experience.³⁴

Thus, health and nutrition outcomes, as represented by these indicators, have been relatively good in absolute terms, though with relatively large gender gaps favouring males in most respects over the past two or three decades. The substantial improvements during this period in the Pakistani indices have been above average for cross-country changes and apparently have reduced somewhat the gender gap favouring males over females.

The physical input measures that affect health and nutrition that are readily available for the cross-country comparisons are limited indicators of the availability of health personnel and of calories. The health personnel measures are from censuses and surveys, and thus again the values for particular years are often extrapolations or interpolations. Because these are stocks, however, this is likely to be less of a problem for our concerns with broad associations or changes over fairly long periods than it would be for analysis of shorter-run variations. Nevertheless, there are differences across countries and possibly over time within countries in the definitions of such categories as "physicians" and "nursing persons." The availability of calories is based on the FAO balance sheet calculations that have varying errors across countries and over time as a representation of actual caloric inputs, because of their focus on basic calorie sources and because of differences in losses due to waste, insects, and rodents. While we could speculate on the possible implications of such data problems for estimates of our cross-country regressions, once again it

³²Without the controls for adult literacy rates, Pakistani female life expectancy was below and Pakistani male life expectancy was less above the cross-country experience, with a somewhat greater gender gap relative to that experience.

³³Without the controls for adult literacy rates, in both years the infant mortality rates were above those predicted.

³⁴Though 95.9 above, if there is no control for adult literacy.

is difficult to be sure about what the implications for our evaluation of Pakistan's performance relative to other countries are.

In 1965 Pakistani population per physician was low (and, therefore, physicians relatively available) in comparison with the international experience. But the population per nursing person was relative high, thus suggesting a composition of medical personnel relatively skewed towards physicians. There were substantial changes in each between 1965 and 1984, with smaller reductions than predicted by the cross-country experiences for population per physician and larger for population per nursing person. The result in 1984 was 2,910 people per physician (still far below the cross-country prediction) and 4,900 people per nursing person (still above the cross-country regression), with some convergence towards the international composition of medical personnel. In 1985 24 percent of births were attended by health staff, which was 5.1 percent below the international experience. Thus, physicians appear to have been relatively available throughout this period, but nursing persons have been relatively less (though increasingly) available (in comparison with the international experience). The composition of health services personnel was much more dominated by physicians than in the cross-country experience. For instance, in 1984 in Pakistan there were 0.6 nursing persons per physician, in comparison with 2.5 at the mean for all low-income countries and 2.6 for the mean of all middle-income countries. Also, the mean population per physician in Pakistan of 2910 was only 52 percent of the mean for all low-income countries, and only 15 percent above the mean for middle-income countries with their much greater resources per capita. Such comparisons raise the question of whether Pakistani health personnel are not too dominated by physicians and whether Pakistani health practices are not too dominated by expensive curative care rather than perhaps higher-return preventive care (for further discussion, see Sections 3 and 5).

In 1965 daily calorie supply per capita was 1,761 – 176 calories or about ten percent below the predicted value based on the cross-country experience. Between 1965 and 1986 there was an increase of 554 calories, or about 30 percent, which was 171 calories above the predicted value based on the cross-country experience. As a result, the 1986 value of 2,315 was about 5 percent above the predicted value based on the cross-country experience. Therefore, there had been substantial gain relative to the cross-country experience over the 1965–1986 period.

The last set of available indicators for cross-country comparisons related to health pertain to central governmental expenditures on (i) health and (ii) housing, amenities, social security, and welfare as percentages of (i) the total central governmental expenditures and (ii) the GNP. These measures are subject to limitations parallel to those discussed above for central governmental expenditures on schooling. In 1972 Pakistani central governmental expenditures on health were 1.1 percent of the total governmental expenditures and 0.2 percent of the GNP (4.1 and 0.8

percent below, respectively, the values predicted from the cross-country regressions). In the same year, Pakistani central governmental expenditures on housing, amenities, social security and welfare were 3.2 percent of the total governmental expenditures and 0.5 percent of the GNP (0.6 and 0.3 percent above the predicted values). Between 1972 and 1988 the Pakistani share of the total governmental expenditures on health declined by 0.2 percent (a 2.1 percent greater decline than predicted) and on housing, amenities, social security and welfare increased 5.5 percent (an increase 1.1 percent below the prediction). With regard to the share in the GNP, the two respective changes were 0.0 and 1.3 percent respectively (0.9 percent and 0.4 percent below the respective regression lines). As a result, in 1988 central governmental expenditures on health were 0.9 percent of the total governmental expenditures and 0.2 percent of the GNP (3.2 and 0.9 percent below the respective regression lines). Central governmental expenditures on housing, amenities, social security and welfare were 8.7 percent of the total governmental expenditures and 1.9 percent of the GNP (5.2 and 1.2 percent above the respective predicated values). Taken at their face values, it appears that central governmental expenditures on health were low in 1972 and became lower over the 1972–1988 period relative to central governmental expenditures on housing, amenities, social security, and welfare in comparison with the international experience. However, possibly there just has been a reclassification from health to housing, amenities, social security, and welfare. In addition, it is useful to remind readers that central governmental expenditures on health typically are but a part of the total expenditures on health (e.g., World Bank (1991), Table 3.4, suggests an average of 40 percent for the low-income countries for which data are available, and 36 percent for the middle-income countries for which data are available).

Fertility and Mortality

Fertility and mortality data, as noted above, basically come from censuses or surveys that often are infrequent, which means that for a given year the estimates are likely to be extrapolations or interpolations. The more such rates change slowly and predictably, the better are such estimates likely to be for the longer-run relations of interest in this paper. In 1965 the Pakistani crude birth rate per 1000 was 48 (1.7 below the cross-country regression line), the crude death rate per 1000 was 21 (0.9 above),³⁵ and the total fertility rate was 7.0 (2.0 below).³⁶ Between 1965 and

³⁵But see the discussion above about infant and child mortality rates and life expectancies at birth, which indicate Pakistani mortality values below the regression lines (in total and at least for males).

³⁶If there is no control for adult literacy, both the crude birth rate and the total fertility rate were above the respective regression lines.

1988 the Pakistani crude birth rate fell by 2 (3.9 below the cross-country experience), the crude death rate fell by 8 (2.7 below), and the total fertility rate fell by 0.4 (0.6 above).³⁷ The result in 1988 included a Pakistani crude birth rate per 1000 of 46 (1.2 below the cross-country experience), a crude death rate per 1000 of 13 (2.6 below), and a total fertility rate of 6.6 (basically at the predication).³⁸ Thus, the cross-country decline in fertility has been more rapid than that for Pakistan in the 1965–1988 period. This relatively slow decline in the population growth may place relatively great pressure on given resources and on governmental subsidised physical and social infrastructure and services.³⁹ Mortality in recent decades has fallen more than the cross-country experience. This probably is desirable *ceteris paribus* since it implies relatively great success in improving health. But it also implies more rapidly increasing population and population pressures than if mortality was falling at the rate predicted by the cross-country experience.

5. REFLECTIONS ON CONSIDERATIONS FOR POLICY REFORMS RELATED TO HUMAN CAPITAL INVESTMENTS

Hopefully the international perspective in this paper raises some useful questions and observations despite the limitations that are discussed above with respect to the available data. Perhaps in some cases these observations are somewhat new, though more likely in many cases they already are under discussion.

Level of Pakistani Human Capital Investments

The international comparisons in Section 4, subject to the caveats discussed in that section about these data comparisons, suggest that Pakistani aggregate human capital investments in terms of measured schooling outcomes are low relative to other countries, controlling for per capita income. Pakistani aggregate human capital investments in terms of measured health outcomes, in contrast, tend to be high relative to other countries. Empirical results from throughout the developing world that are summarised in Section 3 suggest that there are fairly high returns to schooling investments. Therefore, there may be substantial costs in terms of growth

³⁷Since being above or below the regression lines for variables such as these three for which the values are negative may be confusing, we here clarify that being above the regression line for the changes in the crude birth rate and total fertility rate means that Pakistan had smaller declines (i.e., more positive values of such declines) than predicted by the cross-country experiences (and the negative residual for crude death rates implies larger declines than predicted).

³⁸If there is no control for adult literacy once again, the crude birth rate and total fertility were above the respective regression lines.

³⁹The pressure on government-subsidised social services is often emphasised as a negative externality of high population growth. But, as discussed below in Section 5, this is an externality only because of the pricing policy. If prices were set at the social marginal costs, this externality would be internalised.

and distribution goals of the relatively low Pakistani schooling investments. Likewise, there may be potential gains in terms of policy objectives related to productivity/efficiency/growth and distribution of opportunities and outcomes from policy changes that induce greater schooling investments. Such policy changes may involve shifting governmental resources towards schooling investments even though, in the present conditions, the aggregate resource constraint on governmental resources is seen as relatively tight. But they also may involve changes so that the present public sector resources devoted to schooling are used to pursue policy objectives more effectively.

Composition of Pakistani Human Capital Investments

The international comparisons in Section 4 suggest that Pakistani human capital investments are relatively skewed towards higher rather than basic education, towards physician-intensive curative rather than basic preventive health care, towards males relative to females,⁴⁰ and towards middle- and upper-income groups that tend to benefit more from post-secondary schooling and from physician-related health services. These dimensions of the composition probably are inefficient because the rates of return generally are thought to be larger for basic schooling than for higher schooling (though there may be some exceptions in the technical and scientific areas) and for preventive and basic health care (at least for basic immunisation for measles and tetanus, antenatal and delivery care, and vitamin A supplementation) than for curative health care (though, as noted in Section 3, curative care for some diseases, such as tuberculosis and acute respiratory infections, seems quite cost-effective and the relative returns towards investing in controlling or curing various diseases are likely to change substantially over time). There also does not seem to be a rationale for policies favouring the present composition in terms of externalities.⁴¹ Moreover, the present patterns seem to increase some dimensions of inequality rather than reduce them.

Rationale for Policy Interventions Related to Human Capital Investments

As discussed in Section 2, the government should consider interventions related to human capital investments for efficiency/productivity reasons if there are

⁴⁰The gender gaps favouring males are large for both schooling and health, even if for the latter there was more of a reduction in this gap between 1965 and 1988 than predicted by the international experience, and for 1988 female life expectancy at birth exceeded that indicated by the international experience if there is control for per capita income and adult literacy (though not without the latter control).

⁴¹Though, as noted in Section 3, systematic information on externalities seems very limited.

market failures and for opportunity/outcome distributional reasons. There may be efficiency reasons if there are externalities (e.g., prevention and cure of communicable diseases, information and knowledge) or economies of scale (e.g., many vector control operations, specialised hospital procedures and education) or public goods characteristics (e.g., information). There may be distributional reasons related to opportunities if such opportunities are not sufficiently equal and related to outcomes, if there are some members of the population who do not attain what society has decided are basic needs. Recent estimates for Pakistan indicate that household headcount measures of poverty in 1984–5 were from 8 to 25 percent in rural areas and from 7 percent to 20 percent in urban areas, with the ranges reflecting alternative assumptions about the appropriate poverty lines [Ahmad and Ludlow (1989)]. Thus, there seem to be reasons for concern about a considerable number of Pakistanis who probably are not attaining what society considers to be basic needs.

Information Collection and Provision

Information is not likely to be provided adequately by private entities because information has important public goods/externalities characteristics. Therefore, there is likely to be an important role for the governmental provision of information, perhaps in collaboration, in some cases, with NGOs and with private entities. There are a number of examples of such activities that may have high returns. Given the change in morbidity patterns and techniques and the complexities and wide variance in cost-effectiveness of health interventions depending on local conditions noted in Section 3, for example, private information based on past experience is likely to be outdated in many instances. Also periodic systematic reviews of national health policy are likely to be valuable, with both comparisons made with international experience and careful analysis of Pakistani survey data. Mass mobilisation programmes also may be effective in support of immunisation campaigns, improved maternal weaning practices, family planning options, and home identification and care of morbidity problems such as diarrhea. Information about different educational and health options also probably will have high social returns, particularly if there are institutional reforms in the provision of related services (see below). From a social perspective, information about work-related accidents and exposure to carcinogenic and other health-threatening materials also is likely to be under-available from private sources. Information about the nature of labour markets also may improve private decisions regarding investments in human capital through such means as education and migration. Information about the incidence of diseases is likely to be critical for determining the relative cost-effectiveness of preventive versus curative programmes, and towards which diseases such programmes should be directed. For such reasons, governmental "information,

education, and communication” programmes about the changing health environment and options, therefore, are likely to have high social returns if the information is well-based. Important sources of information are likely to include experiences in other similar countries and ongoing Pakistani data collection and analysis.

Taxes, Subsidies, Prices of Human Capital-Related Social Services and Targeting

The results that are summarised in Section 3 suggest that the effective prices (including travel and time as well as monetary prices) that individuals pay for health and education services affect importantly their investments in human capital. From the point of view of efficiency, it is sensible to have high taxes on behaviour that has negative externalities (e.g., smoking, alcohol consumption, fatty meats, pollution associated with production and transportation) and to subsidise activities that have positive externalities (e.g., family planning, vaccinations against communicable diseases, perhaps some types of education, and spread of information) and significant economies of scale over relevant ranges or public goods characteristics (e.g., vector control programmes, some specialised health and education, collection and dissemination of information). It probably is useful to emphasise, however, that the extent of such externalities depends importantly on the nature of other prices. If health care is subsidised, for example, any behaviour that increases the probability of use of subsidised health care resources through illness or injury has externalities. If health care is priced at the social marginal costs, however, behaviour that increases one's own and only one's own probabilities of morbidity or injury does not have externalities. Many of the externalities that usually are emphasised in regard to fertility, as noted above, also reflect below-cost pricing of other resources – such as subsidised education and health and “common” problems of natural resource use arrangements. Therefore, the more that prices are “right” throughout the economy, the less are some of these externalities. It is also useful to emphasise, as is suggested in Section 3, that the systematic available information about the extent of most of these externalities is very limited, so policy formation must proceed on the basis of considerable speculation.

Equity and political considerations may conflict with efficiency considerations regarding the pricing of governmental provision of health and education-related social services. Some equity-efficiency conflicts can be limited by effective targeting of subsidies in regions (e.g., parts of rural Sindh and the NWFP, some urban slums) in which equity considerations suggest that more human capital investment than would be undertaken would be socially desirable if prices reflected true social marginal cost. Targeting by other than location is often difficult because of the problems of monitoring access, though in some cases – such as scholarships

for tertiary education – the information requirements do not appear prohibitive. But successful targeting raises the problem of losing political support from critical constituencies which have a vested interest in the present system, such as the middle and upper class recipients of most present subsidies and the staff involved in running the present system. The more that such constituencies can be persuaded that price reforms are in the national and their own interests because of greater efficiency and improved quality of the relevant services and the opportunity to participate in the development of and improved system, the more easily such changes can be made politically. Nevertheless, a balance has to be struck among the efficiency, equity, and political goals and pressures.

Pricing issues are also important with respect to payments for the factor inputs, primarily staff, that are used in the social sectors related to human capital investments. Wages and salaries that are too low discourage effort and full-time work even by the most dedicated of health and education personnel. Wage and salary structures that are unrelated to productivity do not reward the better staff, but may discourage them and cause them to reduce their efforts below what they otherwise would be and to seek employment elsewhere.

Regulation and Institutional Reforms

A major dimension of governmental policies concerns which human capital-related services can be provided in part or in whole by private entities and which exclusively by the state.⁴² The nature of the institutions allowed and the regulatory environment that they face determines in substantial part the efficiency and the quality of the provision of these services. There are some cases for which the economies of scale may argue for governmental provision or substantial regulation. These include specialised education and health services, but also perhaps more general service provision in sparsely settled areas or in areas in which transportation costs lead to isolation.⁴³ There are cases in which the externalities may require substantial public involvement; information acquisition and dissemination noted above is a leading example, and there are likely to be high returns to the government providing resources to build or to strengthen existing institutions concerned with demographic analysis, epidemiological surveillance, economic and financial analysis, health and education technology assessment and control, environmental monitoring and control, and occupational safety. But there is a growing perception that improved provision of education and health services generally depends on

⁴²Pakistan has private and mixed providers of human capital investment-related services, in addition to state providers, at least for some services.

⁴³But in such cases it is important that there not be over-regulation that precludes the kind of flexibility needed in such locales.

institutional reforms that create incentives for better provision of such services through compensation more closely tied to performance and better information about performance, with greater decentralisation of decisions so that they are more responsive to the perceived needs of users. The sensitivity to the perceived needs of the users can be obtained through markets or, if society thinks that certain services should be subsidised by the state because of externalities or because of distributional concerns, by empowering potential users to allocate resources effectively through their choices (e.g., through vouchers or through directly crediting institutions that users select). One of the reasons for this perception that such institutional reforms are warranted is our limited knowledge about exactly what makes some institutions so much better than others in the provision of such services (as noted in Section 3), which may reflect the substantial inefficiencies in the production of such services due to the nature of present incentive systems. This limited knowledge suggests that there may be considerable advantages to a wide range of experiments with different forms of service delivery and with different incentive systems in hopes of learning what works better in the Pakistani context. Such exploration of institutional alternatives requires other policy changes noted above, including possible price reforms for both the services and for the personnel to allow efforts to tie compensation more closely to performance and better information about the value-added of various institutions. There certainly are possible problems with decentralised decision-making and with private provision of such services. But the better is the information collected and provided to potential users and the more directly are incentives tied into the desired products of such systems (e.g., gains in cognitive achievement in school systems, not just levels of cognitive achievement nor enrolments), the more likely that some of these experiments will work well. And the present, much more centralised system with limited information about performance, low quality, tight budgetary constraints, and limited incentives to provide the services desired by users suggests that there are possibilities of substantial improvements.

If Pakistan is to increase growth and poverty alleviation, major reforms in policies related to human capital investments along the lines discussed in this section may be critical. To implement such reforms, substantial commitments are required. If a central government commitment is made,⁴⁴ there may well be released much broader support than currently anticipated not only among the populace in general, but also among the workers in the public human capital investment-related health and education sectors. If there are complementary policies that help to create the right market and institutional environment [e.g., World Bank (1991)], the

⁴⁴But, as discussed above, such a commitment does not mean an increase in *dirigiste* behaviour by the government. To the contrary, it means creating conditions in which a much more decentralised and demand-responsive behaviour will flourish.

payoffs from such a commitment are likely to be considerable in terms of medium-term growth/efficiency and poverty alleviation, as well as in terms of the immediate much broader involvement in and identification with the Pakistani development process.

Appendix Table

Regressions Underlying Regression Estimates in Table 1

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
1. Schooling									
1.1 Enrollment Rates (%)									
1965:									
Primary (Total)									
A	61.7 (16.0)	0.0 (5.2)	-0.000012 (-4.0)	2.4*10 ⁻¹¹ (3.6)			0.3	96	13.4
B	43.5 (6.2)	0.0 (1.8)	-5.0 (-2.2)	1.1*10 ⁻¹¹ (2.4)	0.8 (3.2)	-0.2 (-1.1)	0.5	64	13.3
(Female)									
A	51.0 (11.8)	0.0 (5.4)	-0.000014 (-4.0)	2.7*10 ⁻¹¹ (3.6)			0.3	94	14.7
B	32.0 (4.5)	0.0 (1.3)	-4.6*10 ⁻⁷ (-1.9)	1.1*10 ⁻¹¹ (2.2)	0.6 (2.4)	0.1 (0.5)	0.6	62	20.7
(Male-female)									
A	20.2 (8.2)	-0.0 (-2.3)	2.9*10 ⁻⁷ (1.5)	-4.7*10 ⁻¹² (-1.1)			0.1	94	4.2
B	22.9 (5.9)	0.0 (2.0)	-1.2*10 ⁻⁷ (-1.0)	1.6*10 ⁻¹² (0.6)	0.3 (2.3)	-0.7 (-5.4)	0.6	62	20.8

Continued -

Appendix Table - (Continued)

Secondary (Total)									
A	6.8 (3.5)	0.0 (9.0)	-8.6*10 ⁻⁷ (-5.5)	1.5*10 ⁻¹¹ (4.5)	0.7	94	65.3		
B	-6.7 (-1.4)	0.0 (4.4)	-4.9*10 ⁻⁷ (-3.2)	8.9*10 ⁻¹² (2.8)	0.8	62	38.3	0.0 (2.2)	0.0 (2.2)
(Female)									
A	3.3 (1.7)	0.0 (9.4)	-9.1*10 ⁻⁷ (-5.9)	1.6*10 ⁻¹¹ (4.8)	0.7	93	68.1		
B	-7.4 (-1.7)	0.0 (4.4)	-5.0*10 ⁻⁷ (-3.5)	9.4*10 ⁻¹² (3.2)	0.8	61	48.9	0.1 (0.6)	0.3 (2.1)
(Male-female)									
A	6.4 (5.5)	-0.0 (-0.9)	7.6*10 ⁻⁸ (0.8)	-1.3*10 ⁻¹² (-0.6)	0.0	93	1.2		
B	2.1 (0.7)	0.0 (1.1)	-1.6*10 ⁻⁹ (-0.0)	-5.4*10 ⁻¹³ (-0.3)	0.4	61	8.6	0.5 (4.5)	-0.5 (-5.7)
Tertiary (Total)									
A	1.6 (1.8)	0.0 (2.3)	-5.1*10 ⁻⁸ (-0.4)	-1.5*10 ⁻¹² (-0.3)	0.5	88	30.6		
B	-1.6 (-0.7)	-0.0 (-1.1)	3.4*10 ⁻⁷ (1.9)	-1.4*10 ⁻¹¹ (2.2)	0.5	61	14.1	0.1 (1.2)	0.0 (0.4)
1987:									
Primary (Total)									
A	75.0 (18.1)	0.0 (4.2)	-0.0000017 (-3.4)	4.9*10 ⁻¹¹ (2.9)	0.2	91	8.4		

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	21.9 (2.8)	-0.0 (-0.9)	1.8*10 ⁻⁷ (0.4)	-4.5*10 ⁻¹² (-0.3)	1.0 (4.3)	0.0 (0.1)	0.6	81	30.2
(Female)									
A	66.5 (14.0)	0.0 (4.4)	-0.0000020 (-3.5)	5.8*10 ⁻¹¹ (2.9)			0.2	87	10.0
B	12.8 (1.6)	-0.0 (-1.2)	2.9*10 ⁻⁷ (0.7)	-7.8*10 ⁻¹² (-0.6)	0.8 (3.2)	0.4 (2.1)	0.7	77	41.8
(Male-female)									
A	16.8 (8.2)	-0.0 (-3.5)	6.2*10 ⁻⁷ (2.5)	-1.8*10 ⁻¹¹ (-2.1)			0.2	87	9.3
B	16.5 (4.2)	0.0 (0.6)	-8.9*10 ⁻⁸ (-0.4)	2.9*10 ⁻¹² (0.4)	0.5 (4.4)	-0.8 (-8.0)	0.7	77	33.6
Secondary (Total)									
A	18.1 (6.1)	0.0 (8.0)	-0.0000018 (-5.3)	5.2*10 ⁻¹¹ (4.2)			0.7	90	89.3
B	-8.6 (-1.2)	0.0 (4.5)	-0.0 (-3.1)	2.9*10 ⁻¹¹ (2.6)	0.5 (2.1)	0.0 (0.2)	0.9	80	92.4
(Female)									
A	13.4 (4.0)	0.0 (7.9)	-0.0000021 (-5.3)	5.8*10 ⁻¹¹ (4.2)			0.8	84	85.6
B	-6.1 (-0.9)	0.0 (4.8)	-0.0000012 (-3.5)	3.3*10 ⁻¹¹ (2.9)	0.1 (0.3)	0.4 (2.5)	0.9	74	118.0

Continued -

Appendix Table - (Continued)

(Male-female)									
A	9.0 (5.5)	-0.0 (-2.4)	3.2*10 ⁻⁷ (1.7)	-9.3*10 ⁻¹² (-1.4)		0.2	84	6.8	
B	-4.8 (-1.5)	-0.0 (-0.9)	1.6*10 ⁻⁷ (1.0)	-4.5*10 ⁻¹² (-0.9)	0.8 (7.9)	0.7	74	32.3	
Tertiary (Total)									
A	5.3 (3.0)	0.0 (3.5)	-2.6*10 ⁻⁷ (-1.6)	2.8*10 ⁻¹² (0.4)		0.5	88	32.2	
B	3.1 (0.6)	0.0 (0.7)	1.8*10 ⁻⁸ (0.1)	-1.8*10 ⁻¹² (-0.5)	-0.2 (-1.6)	0.6	78	29.4	
1987-1965:									
Primary (Total)									
A	19.1 (9.1)	-0.0 (-2.6)	3.0*10 ⁻⁸ (0.3)	3.6*10 ⁻¹² (1.9)		0.2	89	7.0	
B	7.7 (1.6)	-0.0 (-2.2)	9.9*10 ⁻⁸ (1.1)	4.3*10 ⁻¹² (2.2)	0.2 (0.7)	0.4	54	7.0	
(Female)									
A	21.7 (9.9)	-0.0 (-2.4)	2.6*10 ⁻⁸ (0.3)	3.3*10 ⁻¹² (1.7)		0.2	83	6.8	
B	7.4 (1.5)	-0.0 (-2.0)	10.0*10 ⁻⁸ (1.1)	4.0*10 ⁻¹² (2.0)	0.2 (0.7)	0.4	49	7.8	
(Male-female)									
A	-2.6 (-4.5)	0.0 (0.3)	7.7*10 ⁻⁹ (0.1)	2.7*10 ⁻¹³ (0.2)		0.0	83	1.5	

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	1.5 (0.6)	-0.0 (-0.3)	1.4*10 ⁻⁸ (-0.3)	3.3*10 ⁻¹³ (0.3)	0.0 (0.1)	-0.4 (-2.2)	0.2	49	3.7
Secondary (Total)									
A	18.5 (11.8)	0.0 (5.7)	-2.8*10 ⁻⁷ (-1.4)	-7.3*10 ⁻¹² (-5.1)			0.3	86	12.0
B	23.2 (5.6)	0.0 (2.9)	-1.9*10 ⁻⁷ (-2.5)	-4.9*10 ⁻¹² (-2.9)	-0.3 (-1.0)	0.2 (0.8)	0.2	53	3.0
(Female)									
A	18.2 (9.8)	0.0 (6.1)	-2.3*10 ⁻⁷ (-2.4)	-8.9*10 ⁻¹² (-5.5)			0.3	79	14.4
B	26.6 (5.5)	0.0 (2.8)	-2.1*10 ⁻⁷ (-2.4)	-5.3*10 ⁻¹² (-2.8)	-0.6 (-1.9)	0.4 (1.5)	0.2	46	3.9
(Male-female)									
A	0.6 (0.5)	-0.0 (-3.2)	7.0*10 ⁻⁸ (1.5)	2.5*10 ⁻¹² (2.6)			0.2	79	5.9
B	6.5 (2.5)	-0.0 (-0.5)	1.4*10 ⁻⁸ (0.3)	6.4*10 ⁻¹³ (0.6)	0.5 (3.1)	-0.3 (-2.0)	0.2	46	3.5
Tertiary (Total)									
A	7.9 (7.5)	0.0 (2.8)	-4.0*10 ⁻⁸ (-0.5)	-4.1*10 ⁻¹³ (-0.5)			0.2	78	8.7
B	17.1 (6.6)	-0.0 (-0.6)	8.8*10 ⁻⁸ (1.1)	-7.0*10 ⁻¹⁵ (-0.0)	-0.3 (-2.0)	0.0 (0.3)	0.2	51	3.8

Continued -

Appendix Table - (Continued)

1.1.A Persistence of Grade 4 (% of Cohort)											
1970:											
Female	A	65.8 (25.0)	0.1 (4.2)	-0.0 (2.8)	5.8*10-8 (2.1)	0.4	72	16.8			
	B	56.8 (8.0)	0.1 (2.7)	-0.0 (-1.9)	5.3*10-8 (1.6)	0.4	45	7.2	0.2 (0.9)	-0.1 (-0.6)	
Male	A	69.6 (26.3)	0.1 (3.2)	-0.0 (-2.0)	4.2*10-8 (1.5)	0.3	72	10.9			
	B	63.2 (8.5)	0.1 (1.9)	-0.0 (-1.2)	3.2*10-8 (0.9)	0.3	45	4.2	0.3 (1.3)	-0.3 (-1.4)	
Male-female	A	3.8 (2.1)	-0.0 (-1.5)	0.0 (1.1)	-1.5*10-8 (-0.8)	0.0	72	1.4			
	B	6.4 (1.4)	-0.0 (-1.1)	.0000053 (1.1)	-2.1*10-8 (-1.0)	0.1	45	1.8	0.1 (0.7)	-0.2 (-1.5)	
1984:											
Female	A	75.9 (35.2)	0.0 (4.3)	-0.0000076 (-3.2)	6.5*10-10 (2.6)	0.4	65	14.1			
	B	61.5 (11.0)	0.0 (2.0)	.0000039 (-1.5)	3.2*10-10 (1.2)	0.5	57	10.8	0.4 (2.1)	-0.1 (-1.0)	
Male	A	76.1 (32.5)	0.0 (4.2)	-0.0000085 (-3.3)	7.5*10-10 (2.8)	0.3	65	11.7			

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	61.7 (9.6)	0.0 2.0	-0.0000050 (-1.6)	4.4*10-10 (1.4)	0.4 (1.8)	-0.2 (-0.9)	0.4	57	8.2
Male-female A	2.9 (2.4)	-0.0 (-0.8)	6.0*10-7 (0.5)	-4.2*10-11 (-0.3)			0.0	64	1.0
B	2.0 (0.5)	-0.0 (-0.3)	2.8*10-7 (0.2)	-1.6*10-11 (-0.1)	0.1	-0.1	-0.1	56	0.7
1984-1970:									
Female									
A	7.8 (3.3)	0.0 (0.1)	-0.0000020 (-0.5)	1.6*10-10 (0.6)			0.0	50	1
B	12.6 (2.1)	-0.0 (0.3)	-6.9*10-7 (-0.1)	9.5*10-11 (0.3)	-0.1 (-0.3)	0.0 (0.0)	-0.0	27	0
Male									
A	6.6 (2.5)	0.0 (0.6)	-0.0000038 (-0.9)	2.5*10-10 (0.9)			-0.0	49	0
B	12.0 (2.0)	-0.0 (-0.1)	-9.7*10-7 (-0.2)	9.7*10-11 (0.3)	-0.5 (-1.2)	0.3 (0.8)	-0.0	26	0
Male-female A	-1.4 (0.7)	0.0 (0.7)	-0.0000019 (-0.5)	9.2*10-11 (0.4)			-0.0	49	0
B	-1.1 (-0.2)	0.0 (0.3)	-0.0000010 (-0.2)	4.2*10-11 (0.1)	-0.4 (-0.8)	0.3 (0.7)	-0.2	26	0

Continued -

Appendix Table - (Continued)

1.2 Expected Years of School for a Synthetic Cohort											
1965:											
Total	A	4.1 (10.7)	0.0 (5.6)	-2.3*10 ⁻⁷ (-3.7)	6.5*10 ⁻¹² (2.8)	0.5	85	34			
	B	2.3 (4.3)	0.0 (0.9)	-4.2*10 ⁻⁹ (-0.1)	-7.3*10 ⁻¹³ (-0.5)	0.8	58	45	0.1 (4.0)	-0.0 (-0.3)	
Female	A	3.0 (7.3)	0.0 (6.1)	-2.8*10 ⁻⁷ (-4.2)	8.3*10 ⁻¹² (3.3)	0.6	84	36			
	B	1.4 (2.6)	0.0 (0.9)	-1.9*10 ⁻⁸ (-0.4)	-4.7*10 ⁻¹⁴ (-0.0)	0.8	57	63	0.0 (2.6)	0.0 (2.0)	
Male-female	A	1.9 (8.2)	-0.0 (-3.0)	9.4*10 ⁻⁸ (2.5)	-3.1*10 ⁻¹² (-2.3)	0.1	84	4			
	B	1.8 (5.5)	.000017 (0.1)	2.8*10 ⁻⁸ (1.0)	-1.3*10 ⁻¹² (-1.3)	0.6	57	24	0.0 (3.8)	-0.1 (-7.1)	
1987:											
Total	A	5.5 (12.1)	0.0 (6.9)	-2.6*10 ⁻⁷ (-5.0)	7.5*10 ⁻¹² (4.2)	0.6	83	44			
	B	0.3 (0.4)	0.0 (2.7)	-8.8*10 ⁻⁸ (-2.1)	2.5*10 ⁻¹² (1.9)	0.9	73	86	0.1 (3.6)	0.0 (0.4)	
Female	A	4.7 (9.0)	0.0 (6.5)	-2.8*10 ⁻⁷ (-4.7)	8.3*10 ⁻¹² (4.0)	0.6	76	41			

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	-0.3 (-0.4)	0.0 (2.5)	-8.5*10-8 (-2.0)	2.5*10-12 (1.8)	0.1 (2.5)	0.0 (2.2)	0.9	66	112
Male-female A	1.6 (7.8)	-0.0 (-3.4)	5.6*10-8 (2.4)	-1.6*10-12 (-2.0)			0.3	76	10
B	0.9 (2.3)	.000022 (0.1)	1.2*10-9 (0.1)	-3.8*10-14 (-0.1)	0.1 (5.8)	-0.1 (-8.6)	0.7	66	39
1987-1965:									
Total	2.6 (13.0)	0.0 (2.1)	-1.5*10-8 (-0.7)	-3.6*10-13 (-0.9)			0.0	71	1
B	2.9 (5.4)	-0.000010 (-0.0)	-1.2*10-8 (-0.5)	1.5*10-13 (0.4)	-0.0 (-0.7)	0.0 (0.8)	-0.1	44	0
Female	2.8 (12.3)	0.0 (2.3)	-1.5*10-8 (-0.5)	-1.5*10-13 (-0.9)			0.0	63	1
B	3.0 (4.6)	0.0 (0.1)	-2.9*10-8 (-0.9)	4.1*10-13 (0.6)	-0.0 (-1.1)	0.1 (1.5)	-0.0	36	0
Male-female A	-0.4 (-4.0)	-0.0 (-1.1)	1.6*10-8 (1.0)	-6.8*10-14 (-0.2)			-0.0	63	0.6
B	-0.2 (-0.8)	.000051 (-0.5)	2.4*10-8 (1.7)	-3.6*10-13 (-1.4)	0.0 (2.3)	-0.1 (-3.1)	0.1	36	2.3
1.3 Primary Pupils/Teacher									
1965: A	44.6 (23.9)	-0.0 (-3.3)	4.0*10-7 (2.0)	-7.3*10-12 (-1.7)			0.3	81	14.5

Continued -

Appendix Table - (Continued)

	B	45.2 (11.1)	-0.0 (-1.3)	1.3*10 ⁻⁷ (0.7)	-2.2*10 ⁻¹² (-0.6)	0.1 (0.7)	-0.2 (-1.6)	0.5	53	9.8
1987:	A	44.6 (11.8)	-0.0 (-2.9)	.0000014 (2.0)	-5.6*10 ⁻¹¹ (-1.7)			0.5	29	9.5
	B	61.3 (7.0)	-0.0 (-1.2)	9.4*10 ⁻⁷ (1.0)	-3.8*10 ⁻¹¹ (-1.0)	-0.5 (-1.6)	0.3 (1.1)	0.6	27	8.2
1987-1965:	A	-0.4 (-0.2)	-0.0 (-3.5)	7.4*10 ⁻⁷ (2.9)	1.4*10 ⁻¹¹ (3.2)			0.3	27	4.5
	B	6.4 (1.5)	-0.0 (-3.5)	7.2*10 ⁻⁷ (2.8)	1.5*10 ⁻¹¹ (3.1)	0.1 (0.3)	-0.3 (-1.3)	0.4	16	3.2
1.4 % Central Government Expenditure of Schooling										
1972:	A	16.7 (12.0)	-0.0 (-0.9)	.000014 (0.6)	-5.7*10 ⁻⁹ (-0.5)			0.1	68	3.4
	B	18.2 (3.4)	-0.0 (-0.9)	.000020 (0.6)	-7.1*10 ⁻⁹ (-0.5)	-0.1 (-0.7)	0.2 (1.0)	0.1	47	1.8
1988:	A	13.5 (9.7)	-0.0 (-0.7)	6.8*10 ⁻⁸ (0.5)	-2.3*10 ⁻¹² (-0.5)			0.1	60	2.9
	B	12.9 (2.7)	-0.0 (-0.8)	1.4*10 ⁻⁷ (0.7)	-4.7*10 ⁻¹² (-0.7)	0.0 (0.3)	-0.0 (-0.3)	0.1	55	1.7
1988-1972:	A	-3.9 (-2.7)	0.0 (0.6)	-7.0*10 ⁻⁸ (-0.4)	1.3*10 ⁻¹² (0.3)			-0.0	50	0.4

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		N	F
					Male	Female		
B	-3.9 (-1.2)	-0.0 (-0.3)	1.2*10 ⁻⁷ (0.6)	-3.9*10 ⁻¹² (-0.7)	-0.2 (-0.7)	0.2 (0.9)	35	0.5
1.5 % GNP that is Central Government Expenditure on Schooling								
1972: A	2.9 (8.4)	0.0 (0.4)	-1.9*10 ⁻⁷ (-0.0)	-8.9*10 ⁻¹⁰ (-0.3)			68	1.0
B	3.8 (2.8)	0.0 (0.3)	.0000011 (-0.2)	-5.5*10 ⁻¹⁰ (-0.7)	-0.0 (0.6)	0.0	47	0.5
1988: A	3.2 (6.2)	0.0 (0.5)	2.3*10 ⁻¹⁰ (0.0)	-6.4*10 ⁻¹³ (-0.4)			60	1.3
B	3.4 (1.9)	0.0 (0.5)	-1.1*10 ⁻⁸ (-0.1)	-2.7*10 ⁻¹³ (-0.1)	0.0 (0.2)	-0.0 (0.5)	55	0.6
1988-1972: A	-0.4 (-0.9)	0.0 (0.8)	-2.3*10 ⁻⁸ (-0.5)	3.0*10 ⁻¹³ (0.2)			50	0.9
B	-0.4 (-0.5)	0.0 (0.8)	-2.7*10 ⁻⁸ (-0.5)	4.4*10 ⁻¹³ (0.3)	0.0 (0.1)	-0.0 (-0.6)	35	1.1
1.6 Adult Literacy Rates (%)								
1965:								
Female A	31.3 (6.2)	0.0 (4.4)	-8.1*10 ⁻⁷ (-2.6)	1.2*10 ⁻¹¹ (1.8)			65	19.6

Continued -

Appendix Table - (Continued)

	B								
Male	A	48.0 (10.5)	0.0 (3.9)	-6.7*10 ⁻⁷ (-2.3)	1.1*10 ⁻¹¹ (1.7)	0.4	65	13.7	
	B								
Male-female	A	16.7 (8.8)	-0.0 (-2.5)	1.4*10 ⁻⁷ (1.2)	-1.7*10 ⁻¹² (-0.7)	0.3	65	8.4	
	B								
1985:									
Female	A	40.3 (11.0)	0.0 (5.5)	-0.0000011 (-3.9)	2.3*10 ⁻¹¹ (2.3)	0.5	87	30.2	
	B								
Male	A	56.9 (20.1)	0.0 (6.0)	-9.3*10 ⁻⁷ (4.5)	2.1*10 ⁻¹¹ (3.7)	0.5	87	28.1	
	B								
Male-female	A	16.6 (10.1)	-0.0 (-1.9)	1.2*10 ⁻⁷ (1.0)	-2.2*10 ⁻¹² (-0.7)	0.2	87	10.6	
	B								
1985-1965:									
Female	A	22.8 (12.2)	-0.0 (-2.2)	-7.0*10 ⁻⁸ (-1.5)	1.9*10 ⁻¹³ (0.2)	0.3	60	11.4	
	B								
Male	A	21.6 (11.8)	-0.0 (-3.9)	-1.1*10 ⁻⁹ (-0.0)	1.7*10 ⁻¹² (1.9)	0.4	60	14.1	

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		N	F
					Male	Female		
B								
Male-female A	-1.2 (-1.1)	-0.0 (-2.7)	6.8*10-8 (2.4)	1.6*10-12 (2.7)			60	2.5
B								
2. Health and Nutrition								
2.1 Life Expectancy at Birth (Years)								
1965:								
Female								
A	47.5 (41.3)	0.0 (7.8)	-4.5*10-7 (-4.9)	7.7*10-12 (4.0)			98	50.2
B	38.7 (22.8)	0.0 (3.3)	-1.3*10-7 (-2.5)	2.6*10-12 (2.3)	0.2 (3.3)	0.0 (1.6)	65	90.1
Male								
A	45.0 (41.3)	0.0 (7.4)	-4.0*10-7 (-4.7)	7.0*10-12 (3.8)			98	43.9
B	37.0 (22.1)	0.0 (2.7)	-1.1*10-7 (-2.1)	2.2*10-12 (2.0)	0.2 (3.1)	0.1 (1.4)	65	72.0
Male-female A	-2.5 (-12.0)	0.0 (-4.5)	4.3*10-8 (2.6)	-7.0*10-13 (2.0)			98	20.0
B	-1.6 (2.8)	-0.0 (-1.7)	2.1*10-8 (1.1)	-3.7*10-13 (-0.9)	-0.0 (-0.7)	-0.0 (-0.6)	65	10.5

Continued -

Appendix Table - (Continued)

1988:									
Female	A	55.5	0.0	-4.7*10-7	1.0*10-11		0.7	108	70.4
	B	(53.3)	(9.0)	(-6.4)	(5.1)				
Male	A	45.3	0.0	-2.6*10-7	5.7*10-12	0.0	0.2	94	119.6
	B	(21.6)	(5.8)	(-4.6)	(3.8)	(0.5)	(4.0)		
Male-female	A	51.7	0.0	-4.1*10-7	9.0*10-12		0.6	108	64.1
	B	(55.8)	(8.6)	(-6.1)	(4.9)				
Male-female	A	42.0	0.0	-2.3*10-7	5.0*10-12	0.1	0.1	94	84.0
	B	(19.5)	(5.0)	(-3.9)	(3.3)	(1.4)	(2.3)		
Male-female	A	-2.8	-0.0	6.2*10-8	-1.4*10-12		0.3	108	18.2
	B	(-10.1)	(-4.4)	(3.1)	(-2.6)				
Male-female	A	-3.2	-0.0	3.3*10-8	-7.2*10-13	0.1	-0.1	94	22.9
	B	(-4.5)	(-2.1)	(1.7)	(-1.4)	(2.9)	(-4.8)		
1988-1965:									
Female	A	9.6	-0.0	-1.7*10-8	-1.5*10-13		0.1	98	4.2
	B	(22.0)	(-0.7)	(-1.4)	(-0.6)				
Male	A	6.8	-0.0	2.3*10-9	1.4*10-13	0.1	0.1	60	7.0
	B	(7.6)	(-1.0)	(0.2)	(0.6)	(1.2)	(1.0)		
Male-female	A	8.8	-0.0	-1.6*10-8	-1.3*10-13		0.1	98	3.6
	B	(19.8)	(-0.7)	(-1.3)	(-0.5)				
Male-female	A	5.1	-0.0	2.9*10-9	-5.4*10-14	0.1	0.1	60	7.6
	B	(5.7)	(-0.3)	(0.3)	(0.2)	(1.1)	(1.6)		
Male-female	A	-0.8	.0000032	1.2*10-9	1.5*10-14		-0.0	98	0.1
	B	(-4.4)	(0.0)	(0.2)	(0.1)				

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	-1.7 (-3.3)	0.0 (1.2)	5.8*10 ⁻¹⁰ (0.1)	-8.1*10 ⁻¹⁴ (-0.6)	-0.0 (-0.1)	0.0 (1.1)	-0.0	60	0.9
2.2 Infant Mortality per 1000 Live Births									
1965: A	142.4 (25.0)	-0.0 (-6.9)	.0000019 (4.2)	-3.3*10 ⁻¹¹ (-3.4)			0.5	98	40.6
B	185.2 (19.0)	-0.0 (-2.7)	5.6*10 ⁻⁷ (1.8)	-1.0*10 ⁻¹¹ (-1.6)	-1.1 (-3.2)	-0.1 (-0.4)	0.8	65	53.4
1988: A	101.5 (22.6)	-0.0 (-7.9)	.0000019 (5.6)	-4.0*10 ⁻¹¹ (-4.5)			0.6	108	52.9
B	150.2 (14.8)	-0.0 (-3.9)	8.4*10 ⁻⁷ (3.0)	-1.8*10 ⁻¹¹ (-2.5)	-0.5 (-1.6)	-0.6 (2.4)	0.8	94	76.2
1988-1965: A	-49.3 (-19.0)	0.0 (1.4)	1.6*10 ⁻⁷ (2.2)	7.6*10 ⁻¹³ (0.5)			0.2	98	9.9
B	-34.3 (-7.2)	0.0 (1.4)	6.6*10 ⁻⁸ (1.2)	-2.5*10 ⁻¹³ (-0.2)	-0.6 (-1.9)	0.0 (0.1)	0.5	60	12.2
2.3 1988 Risk of Dying by Age 5 per 1000 Births									
Female A	139.2 (20.0)	-0.0 (-7.9)	.0000030 (5.8)	-6.5*10 ⁻¹¹ (-4.7)			0.6	108	45.8

Continued -

Appendix Table -- (Continued)

Male	B	212.7 (13.3)	-0.0 (-3.6)	.0000013 (3.0)	-2.9*10 ⁻¹¹ (2.6)	-0.7 (-1.4)	-0.9 (-2.5)	0.8	94	64.5
	A	153.9 (20.8)	-0.0 (-7.9)	.0000031 (5.7)	-6.8*10 ⁻¹¹ (-4.6)			0.6	108	47.5
Male-female	B	232.7 (13.6)	-0.0 (-3.7)	.0000014 (3.0)	-3.1*10 ⁻¹¹ (-2.5)	-0.8 (-1.5)	-0.9 (-2.4)	0.8	94	65.4
	A	14.7 (13.7)	-0.0 (-3.0)	1.4*10 ⁻⁷ (1.8)	-2.9*10 ⁻¹² (-1.4)			0.3	108	13.5
2.4 Maternal Mortality per 100,000 Live Births in 1980	B	20.0 (6.0)	-0.0 (-1.6)	8.6*10 ⁻⁸ (0.9)	-1.6*10 ⁻¹² (-0.7)	-0.1 (-0.9)	-0.0 (-0.1)	0.3	94	10.1
	A	566.2 (10.1)	-1.5 (-4.7)	0.0 (3.6)	-1.7*10 ⁻⁷ (3.0)			0.3	89	14.4
2.5 Population per Physician	B	805.4 (5.2)	(-0.6) (-1.7)	0.0 (1.5)	-6.8*10 ⁻⁸ (-1.3)	0.8 (0.2)	-7.7 (-2.0)	0.5	79	16.4
	A	22532.8 (9.1)	-7.4 (-4.2)	0.0 (3.1)	-1.1*10 ⁻⁸ (-2.8)			0.2	94	9.9
1965:	B	23464.3 (7.0)	-0.4 (-0.4)	.000053 (0.5)	-1.3*10 ⁻⁹ (-0.6)	-342.2 (2.9)	105.4 (1.0)	0.4	61	8.4

Continued --

Appendix Table - (Continued)

Indicator of Human Capital Investment		Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
						Male	Female			
1984:	A	15370.7 (8.3)	-22.9 (-4.6)	0.0 (3.6)	-6.9*10 ⁻⁷ (-3.0)			0.2	93	10.8
	B	34085.3 (8.8)	-4.4 (-1.0)	0.0 (1.0)	-1.6*10 ⁻⁷ (-0.9)	427.8 (-3.6)	91.3 (1.0)	0.5	83	18.8
1984-1965:	A	-7624.9 (-6.1)	-2.0 (-2.3)	-0.0 (-0.9)	-3.4*10 ⁻⁹ (-0.7)			0.1	89	3.4
	B	-2608.9 (-1.4)	0.5 (-0.7)	-0.000013 (-0.1)	-2.8*10 ⁻¹¹ (-0.0)	-140.5 (-1.4)	101.7 (1.0)	0.0	55	1.0
2.6 Population per Nursing Person										
1965:	A	5471.0 (7.4)	-1.6 (-3.1)	0.0 (2.2)	-2.4*10 ⁻⁹ (-1.9)			0.1	92	5.9
	B	6669.1 (7.0)	-0.5 (-1.6)	.000044 (1.4)	-9.1*10 ⁻¹⁰ (-1.5)	-57.5 (-1.6)	5.2 (0.2)	0.4	63	9.2
1984:	A	2205.5 (9.6)	-2.7 (-4.3)	0.0 (3.3)	-7.7*10 ⁻⁸ (2.7)			0.3	86	12.0
	B	2307.0 (3.7)	-1.7 (-2.3)	0.0 (2.0)	-4.9*10 ⁻⁸ (-1.8)	8.2 (0.4)	-19.7 (-1.3)	0.3	76	8.4
1984-1965:	A	-3367.7 (-4.8)	-0.8 (-1.7)	-0.000070 (-0.6)	-1.1*10 ⁻⁹ (-0.4)			0.0	81	2.0

Continued -

Appendix Table - (Continued)

B	-2072.0 (-2.4)	-0.3 (-0.9)	.000052 (0.7)	1.3*10 ⁻⁹ (0.9)	-162.4 (-3.5)	126.4 (2.5)	0.2	52	4.4
2.7 Birth in 1985 (%) Attended by Health Staff									
A	35.5 (7.6)	0.1 (4.4)	-0.000014 (-2.8)	1.1*10 ⁻⁹ (2.1)			0.5	63	25.8
B	9.0 (0.8)	0.0 (2.9)	-0.000011 (-2.0)	8.4*10 ⁻¹⁰ (1.5)	0.3 (1.0)	0.1 (0.4)	0.7	54	23.8
With Low Birth Weight									
A	15.7 (19.5)	-0.0 (-4.9)	0.0 (3.4)	-1.1*10 ⁻¹⁰ (-2.7)			0.4	93	22.1
B	20.7 (7.7)	-0.0 (-2.9)	.00000014 (2.2)	-9.1*10 ⁻¹¹ (-1.8)	-0.1 (-1.1)	0.0 (0.3)	0.4	83	13.8
2.8 Daily Calories Supply per Capita									
1965: A	2073.6 (42.7)	0.2 (5.7)	.000011 (-2.9)	1.7*10 ⁻¹⁰ (2.1)			0.6	95	40.9
B	1717.5 (13.8)	0.1 (2.0)	-0.0000034 (-0.8)	4.6*10 ⁻¹¹ (0.6)	7.6 (1.7)	1.1 (0.3)	0.7	63	24.4
1986: A	2170.5 (39.9)	0.6 (8.2)	-0.000091 (-5.8)	3.9*10 ⁻⁹ (4.6)			0.6	95	57.6

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		N	F
					Male	Female		
B	1784.9 (10.2)	0.5 (4.8)	-0.000069 (-3.6)	3.0*10 ⁻⁹ (3.0)	10.1 (1.9)	-4.3 (-1.1)	85	30.9
1986-1965: A	276.9 (7.2)	-0.0 (-1.0)	-0.000020 (-1.2)	-1.4*10 ⁻¹¹ (-0.9)			95	0.5
B	198.4 (2.5)	-0.0 (-1.0)	-0.0 (1.1)	-5.7*10 ⁻¹² (-0.3)	13.0 (2.3)	-3.5 (-0.6)	58	3.6
2.9 % Central Government Expenditure on Health								
1972: A	5.6 (6.9)	0.0 (0.8)	-0.000056 (-0.4)	1.6*10 ⁻⁹ (0.2)			67	2.9
B	5.7 (1.6)	-0.0 (-0.1)	.0000041 (0.2)	-1.4*10 ⁻⁹ (-0.1)	-0.1 (-0.6)	0.1 (1.1)	46	1.5
1988: A	4.3 (4.1)	0.0 (1.0)	-5.6*10 ⁻⁸ (-0.5)	1.2*10 ⁻⁸ (0.3)			60	3.4
B	8.0 (2.3)	.000058 (0.0)	1.5*10 ⁻⁸ (0.1)	-7.4*10 ⁻¹³ (0.2)	-0.2 (-1.6)	0.2 (2.0)	55	2.7
1988-1972: A	-0.6 (-0.4)	-0.0 (-0.3)	6.2*10 ⁻⁸ (0.4)	-1.9*10 ⁻¹² (-0.4)			49	0.1
B	0.2 (0.0)	0.0 (0.1)	-2.2*10 ⁻⁸ (-0.1)	1.5*10 ⁻¹³ (0.0)	0.2 (0.8)	-0.2 (-1.1)	34	0.3

Continued -

Appendix Table - (Continued)

2.10 % GNP that is Central Government Expenditure on Health									
1972:	A	1.0 (4.2)	0.0 (1.8)	-0.0000031 (-0.7)	3.3*10 ⁻¹⁰ (0.2)		0.2	67	7.9
	B	1.0 (1.1)	0.0 (0.2)	.0000013 (0.2)	-1.2*10 ⁻⁹ (-0.5)	-0.0 (-0.4)	0.2	46	2.7
1988:	A	1.0 (2.4)	0.0 (1.6)	-2.1*10 ⁻⁸ (-0.5)	1.3*10 ⁻¹⁴ (0.0)		0.3	60	7.7
	B	2.1 (1.7)	0.0 (0.4)	5.3*10 ⁻⁹ (0.1)	-6.8*10 ⁻¹³ (-0.4)	-0.0 (-1.3)	0.2	55	4.4
1988-1972:	A	0.2 (0.5)	-0.0 (-0.5)	4.0*10 ⁻⁸ (0.9)	-1.4*10 ⁻¹² (-1.1)		0.0	49	1.0
	B	0.4 (0.3)	0.0 (0.5)	-2.5*10 ⁻⁸ (-0.3)	3.0*10 ⁻¹³ (0.2)	0.1 (1.0)	-0.1 (-1.6)	34	1.1
2.11 % Central Government Expenditure on Housing, Amenities, Social Security and Welfare									
1972:	A	5.9 (2.6)	0.1 (2.6)	-0.000049 (-1.2)	1.4*10 ⁻⁸ (0.8)		0.5	68	23.9

Continued -

Appendix Table -- (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		R ²	N	F
					Male	Female			
B	2.1 (0.3)	0.0 (1.1)	-.000039 (-0.7)	1.3*10 ⁻⁸ (0.6)	-0.2 (-0.9)	0.5 (2.3)	0.6	47	15.7
1988: A	5.8 (2.3)	0.0 (2.6)	-3.9*10 ⁻⁷ (-1.5)	1.2*10 ⁻¹¹ (1.3)			0.6	58	28.6
B	9.5 (1.2)	0.0 (1.0)	-1.5*10 ⁻⁷ (-0.5)	4.5*10 ⁻¹² (0.5)	-0.4 (-1.6)	0.4 (2.5)	0.7	53	25.7
1988-1972: A	0.2 (0.1)	-0.0 (-0.1)	8.3*10 ⁻⁸ (0.3)	-3.4*10 ⁻¹² (-0.4)			-0.0	48	0.4
B	-0.1 (-0.0)	0.0 (0.2)	-1.4*10 ⁻⁸ (-0.0)	-6.0*10 ⁻¹³ (-0.1)	0.7 (1.7)	-0.6 (-2.0)	-0.0	34	1.0
2.12 % GNP that is Central Government Expenditure on Housing, Amenities, Social Security and Welfare									
1972: A	1.2 (1.8)	0.0 (1.9)	-.0000018 (-0.1)	-3.0*10 ⁻⁹ (-0.6)			0.5	68	24.0
B	0.2 (0.1)	0.0 (0.6)	.0000020 (0.6)	-3.8*10 ⁻⁹ (-0.7)	-0.1 (1.8)	0.1 (1.8)	0.6	47	13.0

Continued -

Appendix Table -- (Continued)

1988:	A	1.2 (1.1)	0.0 (2.2)	-8.0*10-8 (-0.7)	8.9*10-13 (0.2)		0.6	58	28.0
	B	2.9 (0.8)	0.0 (0.7)	1.6*10-8 (0.1)	1.8*10-12 (-0.4)	-0.1 (-1.2)	0.6	53	20.5
1988-1972:	A	0.2 (0.3)	0.0 (0.1)	7.0*10-8 (0.9)	-3.0*10-12 (-1.3)		0.3	48	9.2
	B	0.3 (0.2)	0.0 (0.5)	1.4*10-8 (0.1)	-1.4*10-12 (-0.4)	0.1 (1.3)	0.4	34	4.8
3. Fertility and Mortality									
3.1 Crude Birth Rate									
per 1000									
1965:	A	46.9 (41.9)	-0.0 (-7.3)	3.6*10-7 (4.0)	-5.3*10-12 (-2.8)		0.6	98	53.9
	B	56.0 (20.9)	-0.0 (-3.3)	1.7*10-7 (1.9)	-2.2*10-12 (-1.3)	-0.2 (-2.4)	0.7	65	36.9
1988:	A	43.4 (31.8)	-0.0 (-6.5)	4.1*10-7 (4.1)	-8.6*10-12 (-3.2)		0.6	108	52.6
	B	51.3 (15.9)	-0.0 (-3.7)	2.2*10-7 (2.5)	-4.4*10-12 (-1.9)	0.1 (0.6)	0.8	94	69.2
1988-1965:	A	-6.1 (-8.2)	-0.0 (-1.3)	7.8*10-9 (0.4)	7.5*10-13 (1.7)		0.1	98	2.7

Continued -

Appendix Table - (Continued)

Indicator of Human Capital Investment	Constant	Income	Income ²	Income ³	Adult Literacy Rate		N	F	
					Male	Female			
B	-8.9 (-5.0)	0.0 (1.0)	-1.1*10 ⁻⁸ (-0.5)	-7.6*10 ⁻¹⁴ (-0.2)	0.3 (2.4)	-0.2 (-1.9)	60	2.7	
3.2 Crude Death Rate									
Period									
1965: A	19.1 (25.5)	-0.0 (-5.3)	2.3*10 ⁻⁷ (3.9)	-4.4*10 ⁻¹² (-3.4)			98	17.3	
B	24.5 (21.3)	-0.0 (-0.7)	4.6*10 ⁻⁸ (1.2)	-1.3*10 ⁻¹² (-1.7)	-0.2 (-4.4)	0.0 (0.6)	65	33.7	
1988: A	14.2 (24.8)	-0.0 (-6.5)	-2.3*10 ⁻⁷ (5.4)	-5.1*10 ⁻¹² (-4.5)			108	18.2	
B	20.5 (13.5)	-0.0 (-2.4)	1.1*10 ⁻⁷ (2.7)	-2.7*10 ⁻¹² (-2.5)	-0.1 (-2.2)	-0.0 (-0.7)	94	21.8	
1988-1965: A	-5.9 (-14.7)	0.0 (2.5)	1.7*10 ⁻⁸ (1.5)	-1.4*10 ⁻¹³ (-0.6)			98	11.1	
B	-2.9 (-3.7)	0.0 (1.5)	6.1*10 ⁻⁹ (0.7)	-1.3*10 ⁻¹³ (-0.7)	-0.2 (3.7)	0.1 (1.5)	60	13.9	
3.3 Total Fertility Rate									
1965: A	6.7 (38.5)	-0.0 (-6.2)	4.4*10 ⁻⁸ (3.2)	-6.2*10 ⁻¹³ (-2.1)			98	42.6	

Continued -

Appendix Table - (Continued)

B	8.0 (17.9)	-0.0 (-2.9)	2.5*10-8 (1.7)	-3.3*10-13 (-1.1)	-0.0 (-1.7)	-0.0 (-0.3)	0.7	65	27.9
1988: A	6.0 (26.0)	-0.0 (-5.4)	5.9*10-8 (3.5)	-1.2*10-12 (-2.7)			0.5	108	35.1
B	7.2 (13.9)	-0.0 (-3.0)	2.9*10-8 (2.1)	-5.8*10-13 (-1.6)	0.0 (0.8)	-0.0 (-3.9)	0.7	94	57.3
1988-1965: A	-1.1 (-7.5)	-0.0 (-1.6)	3.6*10-9 (0.9)	1.7*10-13 (2.0)			0.0	98	2.3
B	-1.6 (-4.7)	.0000062 (0.6)	3.4*10-10 (0.1)	2.2*10-14 (0.2)	0.1 (2.7)	-0.1 (2.4)	0.1	60	2.9

REFERENCES

- Ahmad, Ehtisham, and Stephen Ludlow (1989) Poverty, Inequality and Growth in Pakistan. Washington, D.C.: World Bank. (Mimeo.)
- Azariadis, Costas, and Allan Drazen (1990) Threshold Externalities in Economic Development. *Quarterly Journal of Economics* 105:2 501–526.
- Becker, Gary S. (1967) Human Capital and the Personal Distribution of Income: An Analytical Approach. Ann Arbor: University of Michigan, Woytinsky Lecture, republished in Gary S. Becker, *Human Capital*. New York: NBER, 2nd edition 1975, 94–117.
- Behrman, Jere R. (1987) Schooling in Developing Countries: Which Countries are the Under- and Overachievers and What is the Schooling Impact? *Economics of Education Review* 6:2 111–128.
- Behrman, Jere R. (1990) *Human Resource Led Development?* New Delhi, India: ARTEP/ILO.
- Behrman, Jere R. (1990a) *The Action of Human Resources and Poverty on One Another: What We Have Yet to Learn*. Washington, D.C.: Population and Human Resources Department, World Bank.
- Behrman, Jere R. (1990b) Women's Schooling and Nonmarket Productivity: A Survey and A Reappraisal. Philadelphia: University of Pennsylvania. Mimeo, (prepared for the Women in Development Division of the Population and Human Resources Department of the World Bank).
- Behrman, Jere R. (1991) Investing in Female Education for Development: Women in Development Strategy for the 1990s in Asia and the Near East. Williamstown: Williams College. (Mimeo.)
- Behrman, Jere R., and Nancy Birdsall (1983) The Quality of Schooling: Quantity Alone is Misleading. *American Economic Review* 73: 928–946
- Behrman, Jere R., and Anil B. Deolalikar (1988) Health and Nutrition. In Hollis B. Chenery and T.N. Srinivasan (eds) *Handbook on Economic Development* Vol. 1. Amsterdam: North Holland Publishing Co. 631–711.
- Behrman, Jere R., and Mark R. Rosenzweig (1992) The Quality of Aggregate Inter-Country, Time-Series Data on Educational Investments and Stocks, Economically Active Populations, and Employment. Philadelphia: University of Pennsylvania. Mimeo, presented at "Conference on Data Base of Development Analysis", Yale University, 15-16 May 1992.
- Chamie, Joseph (1992) Population Databases in Development Analysis. New York: United Nations. Mimeo, presented at "Conference on Data Base of Development Analysis", Yale University, 15-16 May 1992.
- Colclough, C. (1982) The Impact of Primary Schooling on Economic Development: A Review of the Evidence. *World Development* 10: 167–185.

- Corbo, Vittorio (1992) *Development Strategies and Policies in Latin America: A Historical Perspective*. San Francisco: International Center for Economic Growth. (Occasional Papers Number 22.)
- Corden, Max (1974) *Trade Policy and Economic Welfare*. Oxford: Clarendon Press.
- Fischer, Stanley (1991) Discussion on Structural Adjustment and Economic Growth. Comments presented at Seminar on Structural Adjustment and Growth sponsored by UDAPE-HIID-USAID/Bolivia, La Paz, Bolivia, 7-8 June 1991.
- Haddad, Wadi D., Martin Carnoy, Rosemary Rinaldi and Omporn Regel (1990) *Education and Development: Evidence for New Priorities*. Washington, D.C.: World Bank. (Discussion Paper 95.)
- Hanushek, Eric A. (1986) The Economics of Schooling: Production and Efficiency in Public Schools. *Journal of Economic Literature* 24: (September) 1141–1177.
- Hanushek, Eric A. (1989) The Impact of Differential Expenditures on School Performance. *Educational Researcher* May: 45–62.
- Hanushek, Eric A., and Ralph W. Harbison (1990) Education Production – What We Know. Chapter 2 in *Educational Performance of the Poor*.
- Heston, Alan (1992) A Brief Review of Some Problems in Using National Accounts Data in Level Comparisons and Growth Studies. Philadelphia, PA: University of Pennsylvania. Mimeo, presented at “Conference on Data Base of Development Analysis”, Yale University, 15-16 May 1992.
- Jamison, Dean T., and W. Henry Mosley (1990) *Selecting Disease Control Priorities in Developing Countries*. Washington, D.C.: World Bank. (Mimeo.)
- King, Elizabeth M. (1990) *Educating Girls and Women: Investing in Development*. Washington, D.C.: World Bank.
- King, Elizabeth M., and M. Anne Hill (eds) (1991) *Women's Education in Developing Countries*. Washington, D.C.: World Bank.
- Lockheed, Marlaine E., and Adriaan M. Verspoor (1990) *Improving Primary Education in Developing Countries: A Review of Policy Options*. Washington, D.C.: World Bank.
- Locas, Robert E. (1988) On the Mechanics of Economic Development. *Journal of Monetary Economics* 21: 3 – 42.
- Psacharopoulos G. (1985) Returns to Education: A Further International Update and Implications. *Journal of Human Resources* 20: 583–597.
- Psacharopoulos, G. (1988) Education and Development: A Review. *The World Bank Research Observer* 3:1 (January) 99–116.
- Rao, Vijayendra (1990) *Birth, Marriage and Death: Three Essays in Demographic Economics*. Philadelphia: University of Pennsylvania, unpublished Ph.D. dissertation.
- Romer, Paul M. (1986) Increasing Returns and Long-Run Growth. *Journal of Political Economy* 94:5 1002–1036.

- Schultz, T. Paul (1987) School Expenditures and Enrollments, 1960–1980: The Effects of Income, Prices and Population Growth. In D. Gale Johnson and Ronald D. Lee (eds). *Population Growth and Economic Development: Issues and Evidence*. Madison, WI: University of Wisconsin Press. 413–476.
- Schultz, T. Paul (1988) Education Investments and Returns. In Hollis Chenery and T.N. Srinivasan (eds) *Handbook of Development Economics*. Amsterdam: North-Holland Publishing Company. 543–630.
- Schultz, T. Paul (1991) Returns to Women's Education. In E.M. King and M.A. Hill (eds) *Women's Education in Developing Countries*. Washington, D.C.: World Bank.
- Srinivasan, T. N. (1992) Data Base for Development Analysis: An Overview. New Haven, Cn: Yale University, presented at "Conference on Data Base of Development Analysis," Yale University, 15-16 May 1992.
- UNDP (Mahboub ul Haq, Head of Research Team) (1990) *Human Development Report 1990*. New York: UNDP.
- UNESCO (1965) *Annual Yearbook*. Paris: UNESCO.
- UNESCO (1970) *Annual Yearbook*. Paris: UNESCO.
- World Bank (1980) *World Development Report, 1980*. Washington: World Bank.
- World Bank (1981) *World Development Report, 1981*. Washington: World Bank.
- World Bank (1990) *World Development Report, 1990*. Oxford: Oxford University Press for the World Bank.
- World Bank (1991) *World Development Report, 1991*. Oxford: Oxford University Press for the World Bank.