

Structured Vaccines for Control of Fertility and Communicable Diseases

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In most tropical countries, a major problem is the alarming rate at which population is growing. It is estimated that the world population will increase from about 4 billion in 1980 to a little above 6 billion at the close of this century (i.e., in 20 years there will be half again as many people on the surface of the earth as had accumulated over the entire previous history of humanity). Of this increase, 90% will occur in the developing countries.

It is interesting to note that with the introduction of immunoprophylaxis and general health services, infant mortality has dropped and life expectancy risen in many countries. Figure 1, an illustrative example of this trend, is from India's census figures. The population growth rate has shown a decline over the years, but the slopes of the two curves are not parallel. The net result is an intensification of the problem. The need for aligning family planning programs with communicable disease control programs is obvious.

Given that population increase has assumed epidemic dimensions, it can be argued that the means employed in the past for combating epidemics of infectious diseases so effectively may also be serviceable for slowing the rate of population growth. Vaccines were the miraculous agents. They are cost-effec-

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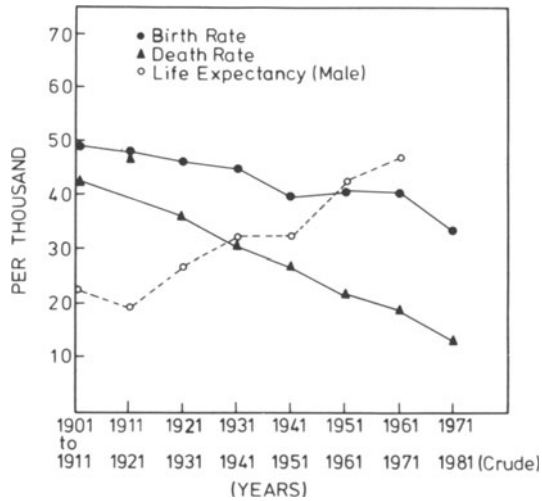


Figure 1. Census figures on birthrate, death rate, and life expectancy as recorded in India during the past eight decades of the century.

tive. They are amenable to use on a mass scale. They require periodic intake and can be administered by paramedical personnel, obviating the requirement for highly trained personnel. These traits render them particularly suitable to the conditions prevailing in the developing countries. Can vaccines be developed for the control of fertility?

1. FEASIBILITY

Over the past 30 years, a number of clinical cases have been reported in the literature (for review, see Talwar, 1980) in which infertility can be traced to immunological factors. Antibodies that reacted with sperm, egg, or reproductive hormones were observed to be present in these patients in the circulation and or in the genital tract. The manner in which sensitization occurred in these cases is not known. However, these examples of "Nature's experiments" provide concrete examples of the feasibility of immunointerception of fertility.

It is possible to immunize animals experimentally against reproductive tract antigens. The first experiments of this sort were, in fact, carried out independently by two pioneers, Landsteiner and Metchnikoff, and published in 1899. Since then, and more particularly in the last two decades, a number of papers have appeared demonstrating the blocking of fertility in animals, including subhuman primates, after immunization with appropriate reproductive system antigens.