# Flood control embankments contribute to the improvement of the health status of children in rural Bangladesh

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*Every year, Bangladesh experiences major floods that inundate about one-third of the country. Therefore, flood control projects that comprise earthen dikes and irrigation / drainage systems are built along the major rivers to protect the people living in low-lying areas, stabilize the river banks and improve agricultural productivity. However, the adverse effects of these projects are regularly emphasized, such as environmental degradation and reduction of fishing supplies.*

*The Demographic Surveillance System of the International Centre for Diarrhoeal Diseases Research, Bangladesh (ICDDR,B) was used to assess the effect of a flood control programme on the mortality of 0–4-year-old children residing in the Matlab study area. Adjusted mortality rates were used in comparing four adjacent child populations residing either inside or outside a flood-control embankment and according to the type of health services provided in this area.*

*Between the periods 1983–86 and 1989–92, the crude child mortality in the total study area decreased by 37%, from 185.9 per 1000 live births to 117.9 per 1000 live births. Following the construction of the embankment, death rates outside were up to 29% higher in 1–4-year-old children and 9% higher for 0–4-year age group compared to the flood-protected area ($P < 0.001$). Simultaneously, in the same study area, health interventions contributed to a 40% reduction in mortality among children less than 5 years of age in all causes of deaths ($P < 0.001$). Migration patterns and the effect of distances to the hospital are discussed.*

## Introduction

Child mortality is an appropriate indicator for measuring the impact of interventions on health and for monitoring the health status of populations (*1*, *2*, *3*). Although widely used as a primary objective for health and development programmes in developing countries estimations of mortality patterns are often impossible to obtain, and therefore rarely included in project evaluations. Moreover, few studies have assessed the impact of environmental changes on the health status of populations.

Bangladesh is mostly a low-lying deltaic flood plain at the confluence of three of the world's major rivers. Between July and September, these rivers frequently overflow their banks and inundate about a third of the land surface, depositing silt on the flood plains and thus maintaining soil fertility (*4*). Besides the "normal" seasonal floods, the country regularly experiences severe floods and cyclones that cause widespread damage to crops and property (*5*, *6*). Flood control projects have been undertaken in many areas exposed to the floods. These projects protect low-lying land through the construction of earthen embankments, usually in combination with irrigation and drainage components. The aims are to increase agricultural production by year-round cultivation of high-yielding varieties of rice using modern methods of cultivation and to protect the beneficiaries against extensive floods (*7*). However, such projects are criticized for many adverse effects (*8*), for example:

- restricting the seasonal deposit of sediment reduces soil fertility and leads to an intensive use of fertilizers and to further environmental degradation;
- the absence of "flushing action" by receding flood water results in contamination of surface water by fertilizers and agrochemicals;
- small fisheries are destroyed and new farming technologies are introduced which benefit wealthy farmers at the expense of poorer ones; and
- many farmers lose their land by the transfer of cultivated land to embankment infrastructure development.

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