

Parents don't always know best

More children in Asia and Africa die from their parents' ignorance about how and when to wean them than die from famine, according to a new study on factors affecting child health by the Washington, D.C.-based Worldwatch Institute. Similarly, the report says, more children die because of their parents' ignorance in managing diarrhea than because of epidemics. In fact, says William Chandler, the study's author, roughly two-thirds of the 17 million children who die annually from the effects of poor nutrition, diarrhea, pneumonia, tetanus and several childhood diseases — mostly in the poorest, developing countries — might have been saved if their parents had received a better basic education, access to primary health care (including low-cost vaccinations against childhood diseases), guidance in family planning and better agricultural tools.

For example, though weaning should begin by the time a child is 6 or 7 months old, Chandler notes that in Africa many women wait until the child is 18 months or older. Then, at weaning, many of these children receive only adult food that is hard to chew or that offers insufficient nourishment. He says the resulting malnutrition each year kills 10 times as many children as does famine.

Spacing and timing of pregnancies is also an important factor in infant survival, and one where family planning would offer the greatest benefit, Chandler says. Data he cites suggest that avoiding age-related high-risk pregnancies — those in women under 20 or over 35 — would reduce infant mortality 5 percent. Maintaining an interval of at least two years between births might reduce infant mortality by 11 percent, he says.

Chandler also points to a relationship between numbers of births and infant mortality. Pan American Health Organization data from El Salvador, for instance, show that the infant mortality rate among third births there is only about half that for fourth births. Depletion of a mother's nutritional reserves and overall health are generally held as the reason for higher risks associated with these later births and short intervals between births.

According to Chandler, the investment necessary to protect those children at highest risk in the developing world is relatively low considering the numbers of individuals involved. For example, extending primary education to the 100 million children who now lack it would cost \$5 billion per year, he says. Extending primary health care, family planning guidance, clean water and sanitation to the world's 1.5 billion poorest would cost another \$35 billion to \$50 billion a year. Finally, he estimates that providing agricultural loans for 150 million subsistence farmers could cost \$5 billion to \$10 billion annually. However, most countries where the investments are needed most — such as Africa — can also least afford to make them. That's why Chandler believes the money must come primarily from developed countries like the United States.

A healthy investment

Administering a combined measles, mumps and rubella vaccine costs U.S. recipients an estimated \$100 million annually. But according to a new study by the Centers for Disease Control in Atlanta, that program provides \$14 worth in benefits for every \$1 that's spent — as measured in health-care cost savings from cases of disease and disease complications that were avoided.

Focusing on 1983, the researchers compared actual and estimated deaths, illnesses and costs attributable to each disease against what historical data indicate would have occurred in an unvaccinated population. Their report, published in the *JULY AMERICAN JOURNAL OF PUBLIC HEALTH*, notes that the combined vaccine reduced measles incidence to 2,872 cases from the 3,325,000 that probably would have occurred, reduced mumps to 32,850 cases from a possible 2.1 million and limited rubella to 3,816 from the likely 1.5 million cases.

JULY 6, 1985

High-stepping walking machines

Like a monstrous mechanical beetle, a giant, six-legged walking machine will early next year crawl out of a university laboratory and begin learning how to scramble across rough terrain. Built by researchers at Ohio State University in Columbus with funding from the Department of Defense, the "adaptive suspension vehicle" eventually should be able to step over embankments and across ditches while ambling along at up to 8 miles per hour — treading where no tracked or wheeled vehicle can go.

The 3-ton aluminum machine, 17 feet long and 8 feet tall, is powered by a motorcycle engine and carries a driver. A bank of 16 onboard computers translates the movements of the driver's joystick into the complicated maneuvers needed to keep the vehicle's 7-foot-long legs from tripping over one another.

This summer, as a first step toward the machine's initial foray into the rugged outdoors, a research team led by Robert B. McGhee and Kenneth J. Waldron will mount the vehicle on a raised platform to begin coordinating the motions of the individual legs. Later, tethered like a huge pet insect to a large overhead crane, the machine will take its first tentative steps.

One walking machine that's already on its feet is a gangly robot called Odex I, made by Odetics, Inc., of Anaheim, Calif. Designed for surveillance and maintenance work in nuclear power plants and other hazardous environments, this battery-operated, microprocessor-controlled machine weighs 370 pounds but can lift the back end of a pickup truck. The robot can use up to three of its six legs as manipulators to reach into mazes of pipes and valves. Its jointed legs allow it to stretch to a height of more than 6 feet or collapse into a low squat to thread its way through a plant's internal obstacle course.

Odetics is now developing a more advanced experimental walking machine for the Department of Energy's Savannah River Laboratory in Aiken, S.C. This model will include a TV camera and an additional jointed manipulator on a rotating turret.

Switching fuels at campus reactors

After a one-year delay, the Nuclear Regulatory Commission (NRC) last month ordered its staff to prepare a final version of a rule requiring university and industrial research reactors to switch from using highly enriched uranium to a nuclear fuel with a much lower proportion of the uranium isotope U-235 (SN: 4/7/84, p. 213). The new rule is likely to be approved later this month. NRC intends to ask Congress for funds to help cover the cost of the conversion.

The commissioners also told their staff to prepare an order requiring the transfer of any unused, weapons-grade fuel that may be stored at a research reactor to a Department of Energy facility. In NRC's view, such a move would make the fuel less vulnerable to theft by terrorists.

The glow of delivered heat

The bright red glow of a metal pipe, carrying energy from an intense heat source down the narrow tube's 12-foot length, recently signaled the highest power output ever achieved by a heat pipe. This pipe, made from molybdenum and partially filled with liquid lithium metal, survived a temperature greater than 2,200°F.

In the test, conducted in a vacuum chamber at the Los Alamos (N.M.) National Laboratory, special coils wrapped around one end of the pipe generated enough power to heat a small house. This energy turned the lithium into a vapor that sped down the heat pipe. When the vapor condensed, it released its energy.

Los Alamos researchers hope that such heat pipes may be useful in space-based nuclear power systems for operating satellites, space stations or orbiting instruments. The next step involves testing these pipes to see how long they last.

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