

# Health, Population, and Nutrition

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## Research on HIV/AIDS Prevention and Treatment

The World Bank has set up a series of prospective impact evaluations of programs delivering anti-retroviral treatment in countries in the Treatment Acceleration Project, as well as in Rwanda, Kenya, South Africa, and India.

The impact evaluations are measuring the impact of treatment on the welfare of patients and family members, the effects of anti-retroviral treatment on HIV transmission and prevention, the determinants of treatment success, and ways to encourage cost-effectiveness and capacity building to reinforce the sustainability of the delivery of anti-retroviral treatment. This research project is collecting longitudinal and triangulate data from biomedical records, household surveys (HIV patients and general population), as well as health facilities and surveys.

The project is helping governments and national research institutions evaluate the impact of alternative strategies for scaling up integrated AIDS treatment. The focus is on AIDS treatment outcomes, HIV transmission, preventive behaviors, and economic and health benefits in African countries. The project is helping to strengthen national capacity to carry out high quality analytical work on the determinants of the HIV/AIDS epidemic and on the impact evaluations of HIV/AIDS prevention and treatment strategies.

Preliminary findings on the impact of anti-retroviral treatment were presented at the Regional Advisory Panel meeting of the Treatment Acceleration Project, Ghana (January 2007). Preliminary results from Rwanda on the impact of AIDS prevention and treatment were presented at the HIV/AIDS Implementers Meeting, Kigali, Rwanda (June 2007).

### *Evaluation of the Impact of Anti-Retroviral Treatment*

**Responsibility:** Development Research Group, Human Development and Public Services Team—Damien de Walque (ddewalque@worldbank.org), Varun Gauri, and Mead Over. With Harounan Kazianga, Mposo Engwassa Ntumbanzondo, Laeticia Nikiema, Gifty Addico, and Sandra Muchanga.

**Project Code:** P092890.

**Completion dates:** 2010.

### *Evaluation of the Impact of AIDS Prevention and Treatment*

**Responsibility:** Development Research Group, Human Development and Public Services Team—Damien de Walque (ddewalque@worldbank.org), Mead Over, and Markus Goldstein. With Harounan Kazianga; Alok Bhargava, University of Houston; Frikkie Booysen, University of the Free State;

Sabine Musange, School of Public Health; Centre for Health Systems Research and Development of Free State University; School of Public Health Rwanda; Center for Global Development; and Institute for Economic Growth.

**Project Code:** P0100095.

**Completion date:** 2009.

## The Economics of AIDS Epidemics

This research project explored the economics of the HIV/AIDS epidemic in the developing world. It focused primarily on projecting the costs and benefits of anti-retroviral therapy in India and Thailand.

In the work on India, the project applied the tools of epidemiological projection models to predict the course of the HIV/AIDS epidemic until 2023. The projections included the rate of new infections, the number of years of orphanhood, and government financing requirements. They also included the implications of three alternative AIDS treatment financing policies for the health burden of AIDS and total health expenditures in India.

The lower prices of anti-retroviral therapy and the fact that therapy can reduce transmission by the treated patient would imply that such therapy could save healthy years of life at a cost of between \$146 and \$280 a year. Careful monitoring of the population's response to the availability of treatment should suggest how to maximize the beneficial effects of treatment on risk behavior and how to avoid potentially perverse effects.

Of the estimated 38 million people worldwide infected with HIV, the World Health Organization says 6 to 8 million could immediately benefit from ART, but fewer than 1.9 million people are being treated with the therapy. In contrast, by May 2006, Thailand was providing treatment for approximately 78,000 AIDS patients, more than 90 percent of those in need of treatment.

Thailand's ability to provide ART affordably to more than 80,000 Thais with AIDS resulted from highly effective prevention campaigns over previous years, a vast network of district level hospitals and rural health clinics with the capacity to provide widespread treatment, a strong nongovernmental organization community that has worked closely with the government on rolling out the expanded ART program, and the close involvement of people living with HIV/AIDS themselves.

The project findings have been disseminated through presentations at the World Bank, at the International AIDS Conference in Bangkok (July 2004), and at a conference on the Health Crisis in South Asia at Yale University (February 2005).

**Responsibility:** Development Research Group, Public Services Team—Mead Over (meadover@worldbank.org). With Emiko Masaki, University of California at Berkeley.

**Project Code:** P083321.

**Completion date:** June 2006.

### Publications

Over, Mead, Peter Heywood, Julian Gold, Indrani Gupta, Subhash Hira, and Elliot Marseille. 2004. *HIV/AIDS Treatment and Prevention in India: Modeling the Cost and Consequences*. Health, Nutrition, and Population Series. Washington, D.C.: World Bank.

Ana Revenga, Mead Over, Emiko Masaki, Wiwat Peerapattanapokin, Julian Gold, Viroj Tangcharoensathien, and Sombat Thanprasertsuk. 2006. *The Economics of Effective AIDS Treatment Evaluating Policy Options for Thailand*. Washington, D.C.: World Bank.

## The Role of Testing in HIV/AIDS Epidemics

This research project has two objectives. First, it models the general equilibrium effects of HIV testing. For instance, how do the incentives to test and to engage in risky sexual behavior change as an individual's potential partners become more likely to have been tested and condition their actions on their test results? And, reciprocally, how does an individual's own decision about testing affect his or her behavior? The analysis uses the techniques of micro-economic modeling and mathematical epidemiology to obtain qualitative results on the dynamics of the HIV epidemic as they depend on different policies for HIV testing.

Second, the project reviews the epidemiological literature on HIV testing. It uses Demographic and Health Surveys and field visits in Africa to provide evidence on how people make decisions about testing. In particular, the project investigates what knowledge people have about their HIV status independent of a test, the evidence on response to the price and accessibility of HIV tests, the behavioral implications of the bio-chemical properties of the tests, the role of disclosure of status to partners, and incentives for and obstacles to prevention of mother to child transmission. The analysis uses the publicly available Demographic and Health Surveys and data published in the epidemiological literature.

The project's findings will bear on the decision to set up

HIV testing facilities, how they should be designed, and whether they should be subsidized.

**Responsibility:** Development Research Group, Sustainable Development and Urban Development Team—Hanan Jacoby (Hjacob@worldbank.org). With Mark Gersovitz, Department of Economics, Johns Hopkins University.

**Project Code:** P098506.

**Completion date:** December 2007.

## Improving the Effectiveness of AIDS Treatment while Strengthening Prevention in Free State Province, South Africa

This research study has three broad objectives: to present a broader view of treatment success for human immunodeficiency virus (HIV), to develop a more complete model of the determinants of treatment success, and to understand the nature of links between treatment and prevention.

Like all governments whose populations are suffering from a severe AIDS epidemic, the Free State province of South Africa is confronting the twin challenges of maximizing the effectiveness of antiretroviral therapy for those who are already sick, while simultaneously slowing the growth of new infections. Supported by several grants, the Centre for Health Systems Research and Development of Free State University has since 2004 been documenting, monitoring, evaluating and facilitating the implementation of the National Treatment Plan in the Free State province.

This research project incorporates a survey of patients that started antiretroviral therapy in the first months of the launch of the treatment program as well as a survey of the health care facilities that deliver and monitor that therapy. The research funded under this contract with the Centre for Health Systems Research and Development builds on an existing project by expanding both the scope and depth of data collection activities. The partners in this research program are the Centre for Health Systems Research and Development of Free State University, Bloemfontein; the Free State Provincial Department of Health, Bloemfontein; and the World Bank (Development Research Group and South Africa Country Unit).

The project will collect longitudinal and triangulate data from biomedical records, household surveys (HIV patients and the general population), as well as health facilities and surveys. The baseline survey was scheduled to start in July-August 2007. The project aims to strengthen national capacity to identify the critical determinants of effective treatment outcomes and the most cost effective ways to deliver HIV/AIDS treatment.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Damien de Walque (ddewalque@worldbank.org), and Mead Over (former World Bank staff). With Alok Bhargava, University of Houston; Frikkie Booysen, University of the Free State; Center for Global Development (USA); and Centre for Health Systems Research and Development of Free State University.

**Project Code:** P090173.

**Completion date:** 2009.

## Evaluating the Impact of Antiretroviral Treatment

This project will help governments and national research institutions evaluate the impact of alternative strategies for scaling up integrated treatment of acquired immune deficiency syndrome (AIDS). The project focuses on the effects of treatment on AIDS treatment outcomes, human immunodeficiency virus (HIV) transmission, preventive behaviors, and economic and health benefits on populations in African countries.

The impact evaluations address questions in four areas. First, the project will measure the impact of treatment on the welfare of patients and family members. Second, the project will analyze the effects of antiretroviral therapy (ART) on HIV transmission and prevention. Third, the evaluations will identify the determinants of treatment success. And fourth, the findings will suggest ways to encourage cost-effectiveness and capacity building to reinforce the sustainability of ART delivery and adherence.

World Bank researchers have set up a series of prospective impact evaluations of programs delivering ART in Burkina Faso, Ghana, India, Kenya, Mozambique, Rwanda, and South Africa. This work is being carried out in close collaboration with and with the support of the Africa Region (Act Africa and MAP/TAP TTLs), the Global AIDS Program, the HD Vice-Presidency, and the World Health Organization and the United Nations Economic Commission for Africa. The project will collect longitudinal and triangulate data from biomedical records, household surveys (HIV patients and the general population), as well as health facilities and surveys.

In some countries, the project will also undertake and evaluate research experiments. These will include performance-based contracting for HIV/AIDS services in health facilities in Rwanda, food supplements and community health workers for supporting adherence to treatment in South Africa, and reminders by text messages for improving adherence in Kenya.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Damien de Walque

(ddewalque@worldbank.org), Mead Over (former World Bank staff), and Markus Goldstein. With Harounan Kazianga; Alok Bhargava, University of Houston; Frikkie Booysen, University of the Free State; Sabine Musange, School of Public Health; Centre for Health Systems Research and Development of Free State University; School of Public Health Rwanda; Center for Global Development; Institute for Economic Growth.

**Project Code:** P0100095.

**Completion date:** 2009.

## Evaluating the Impact of AIDS Prevention and Treatment Services in Four Countries

This research project had four main objectives. First, it aimed to contribute to knowledge regarding the effectiveness and costs of selected AIDS program components by applying rigorous evaluation tools to the delivery of these services to sample populations in developing countries. The project measured the impact on the labor supply of the patient and other family members, the schooling of children, and other welfare indicators in India, Kenya, and South Africa.

Second, the project complemented existing support by the World Bank's Global HIV/AIDS Program for comprehensive monitoring and evaluation activities with in-depth, prospective, randomized, or controlled study of specific program components. The project analyzed the determinants of patient care-seeking behavior and treatment adherence, and the quantity and quality and of antiretroviral treatment services in India, Kenya, and South Africa.

Third, the analysis investigated what were the most efficient approaches to deliver care and support for orphans and vulnerable children. The project collected longitudinal and triangulate data from biomedical records and household surveys in India, Kenya, and South Africa. It developed a prospective randomized study in Burkina Faso.

Analysis of the baseline surveys is ongoing. This research project provided seed-money to start additional studies. The studies will help to strengthen national capacity to identify the critical determinants of effective treatment outcomes in collaboration with leading international researchers. The studies will analyze the surveys collected to learn more about the most cost effective ways to deliver HIV/AIDS treatment in resource constrained settings, and about the most effective prevention and voluntary counseling and testing strategies. The analysis will be used to provide policy recommendations, highlighting the importance of evidence-based policy-making.

**Responsibility:** Development Research Group, Human De-

velopment and Public Services Team—Damien de Walque (ddewalque@worldbank.org) and Mead Over. With Mattias Lundberg, Harounan Kazianga, Alok Bhargava, Peter Glick Frederik le Roux Booyesen, Mposo Engwassa Ntumbanzondo, Amadou Bassiro Diallo, Sergio Bautista Arredondo, and Fei Gao.

**Project Code:** P088316.

**Completion date:** December 2007.

### **The Plight of Orphans and Vulnerable Children in Nairobi Urban Slums in the Face of HIV/AIDS**

This research project provided evidence to inform current and future policy initiatives for the welfare of orphans and vulnerable children in poor urban areas. The project sought to answer two main questions. First, should interventions be specifically targeted toward orphans and vulnerable children or their families, and if so, which types (one-parent orphans, two-parent orphans, children with one parent dying of AIDS, etc.)? Second, relative to other children, and controlling for household-specific factors such as socio-economic status, what are the main areas of vulnerability of orphans and vulnerable children (lower probability of enrolment in school, lower probability of receiving key immunizations, higher psychosocial needs etc.)?

One of the countries most affected by HIV/AIDS is Kenya, where approximately 1.7 million out of an estimated total of 15 million children have lost one or both of their parents, due largely to HIV/AIDS. Although there is overall agreement on the scope of the problem, there is little agreement on what measures should be taken to address it.

The project focused specifically on two slum areas of Nairobi (Korogocho and Viwandani), which were the focus of the Nairobi Urban Health and Demographic Surveillance System. There is ongoing and detailed household-level data collection on all residents – in some 23,000 households. This rich database includes a large amount of information that would shed light on many of the unanswered questions related to orphans and vulnerable children. The project also administered an additional module to collect additional information. Using these data, the project identified the beneficiaries and an assessment of the targeting methods to direct future research on the welfare of orphans and vulnerable children. The analysis ran regressions at the individual child level to explain child welfare indicators; and designed a reliable and valid method of proxy means testing to identify households that would qualify for interventions based on their income or other related socio-economic status indicators.

**Responsibility:** Africa Region, Human Development Unit—Mi-

chael Mills (Mmills@worldbank.org). With African Population and Health Research Centre, Nairobi

**Project Code:** P100038.

**Completion date:** June 2007.

### **Understanding Adult Mortality in Developing Countries**

This research project will shed light on three general sets of correlates and determinants of adult mortality. First, it is documenting the socio-economic gradient in adult mortality in developing countries. This effort has collected data for 45 countries on socio-economic differences in health, nutrition, and population. The data include indicators on child mortality, malnutrition, fertility, immunization coverage, treatment of diarrhea and acute respiratory infections, antenatal care visits and delivery attendance, use of modern contraception, as well as knowledge of HIV/AIDS prevention.

Second, the project is documenting mortality and the HIV/AIDS epidemic. The project will compare findings about excess adult mortality with measures of HIV prevalence. This work will take advantage of the more recently collected demographic and health sero-surveys that are nationally representative.

Third, the project is documenting the impact of conflict on adult mortality and its socio-economic distribution. By analyzing the timing of adult mortality and episodes of conflict in numerous countries, the research will aim at establishing whether the effects of those conflicts can be seen in the population structure at the country, regional, and local levels.

The project findings will help to provide a better understanding of the socio-economic gradient in adult mortality, how the HIV/AIDS pandemic affects adult mortality, and more localized shocks such as conflict and famine. The project will generate primary information that could be used in the design of projects to mitigate socio-economic inequalities in adult health, the implementation of projects that address the HIV/AIDS pandemic, and in providing better understanding of the demographic consequences of shocks.

**Responsibility:** Development Research Group, Poverty Team—Deon Filmer (dfilmer@worldbank.org) and Damien de Walque. With Shannon Allen.

**Project Code:** P104962.

**Completion date:** June 2008.

### **Long-term Consequences of Conflict**

Most of the evidence on mortality and its consequences during conflicts relies on historical or journalistic accounts and estimates. This research project uses nationally representa-

tive surveys to analyze the long-term impact of conflicts on the population's composition, health, and education in Cambodia and Rwanda.

The work on Cambodia studies the long-term impact of genocide during the period of the Khmer Rouge (1975-79). Using mortality data for siblings from the Cambodia Demographic and Health Survey in 2000, it shows that excess mortality was extremely high and heavily concentrated during 1974-80. Adult males and individuals with an urban or educated background were more likely to die. Infant mortality was also at very high levels during the period. And disability rates from landmines or other weapons were high for males who, given their birth cohort, were exposed to this risk.

The very high and selective mortality had a major impact on the population structure of the country. Fertility and marriage rates were very low under the Khmer Rouge but rebounded immediately after the regime's collapse. Because of the shortage of eligible males, the age and education differences between partners tended to decline. The period had a lasting impact on the educational attainment of the population. The education system collapsed during the period, so individuals—especially males—who were of school age during this interval had lower educational attainment than the preceding and subsequent birth cohorts.

The methodology used in this project could be expanded to include more generally the socio-economic determinants of adult mortality in developing countries.

Project findings have been presented at the Northeast Universities Development Consortium, Montreal (2004); the first workshop of the Households in Conflict Network, Berlin (2006); and the second workshop of the Households in Conflict Network, Antwerp (2007).

**Responsibility:** Development Research Group, Human Development and Public Services Team—Damien de Walque (ddewalque@worldbank.org).

**Project Code:** P096792.

**Completion date:** December 2009.

### Publications

de Walque, Damien, and Philip Verwimp. "The Demographic and Socio-Economic Distribution of Excess Mortality during the 1994 Genocide in Rwanda." World Bank, Washington, D.C. Unpublished.

de Walque, Damien. 2006. "The Socio-demographic Legacy of the Khmer Rouge Period in Cambodia." *Population Studies* 60(2): 223-31.

de Walque, Damien. 2005. "Selective Mortality during the Khmer Rouge Period in Cambodia." *Population and Development Review* 31(2): 351-68.

## Determinants of Success in Immunization Programs

This research project explored why some countries achieve successful immunization programs—and some achieve equity in the outcomes of such programs—while others do not. Through cross-country quantitative analysis, the study identified factors associated with high immunization coverage for measles and DPT-3 (diphtheria, pertussis, and tetanus) vaccines: the global policy environment, the quality of national institutions, the level of development, and contact with international agencies.

The research showed that, except in very poor countries, democracies had lower coverage rates than autocracies, perhaps because in autocracies bureaucratic elites had an affinity for immunization programs and were granted more autonomy and resources. There was no evidence that disease outbreaks or polio eradication campaigns affected immunization rates or that, at the aggregate level, education and literacy were correlated with high coverage. In other words, in the current structure of immunization programs coverage rates respond more to supply-side than to demand-side effects.

Work on the factors relating to equity in immunization outcomes is ongoing.

**Responsibility:** Development Research Group, Public Services Team—Varun Gauri (vgauri@worldbank.org) and Peyvand Khaleghian. With Baya Benhassine and Santiago Cornejo.

**Project Code:** P074573.

**Completion date:** December 2005.

## Valuing Mortality Risk Reductions

In most industrial countries, the mortality benefits of environmental programs accrue primarily to older people. In the case of air pollution controls, the age distribution of statistical lives saved parallels the age distribution of deaths, implying that in many industrial countries 75 percent of people saved are over 65 years old. Yet the most common method of valuing these risk reductions is to use compensating wage differentials from the labor market, which reflect the risk preferences of workers who are on average much younger. An important question for policy is how the value of reduced risk of death varies with age—and with health status.

This research project developed a questionnaire that asked people aged 40–75 what they would pay to reduce their risk of dying. Specifically, it asked respondents what they would pay for a drug (not covered by health insurance) that, if taken for the next 10 years, would reduce their chances of dying over this period by a stated amount. It also asked respondents whether they would pay a stated amount for a drug

that, if taken today, would reduce their risk of dying beginning at age 70.

Results from Canada and the United States suggested that the willingness to pay to reduce the risk of dying decreased only slightly with age and was unaffected by current health status. Estimates of the value of a statistical life were slightly lower than those obtained in the labor market literature.

The survey instrument was also administered in France, Italy, Japan, the Republic of Korea, and the United Kingdom.

The project results have been presented at the Universidad de los Andes, Bogotá (June 2003); the University of California at Santa Barbara (October 2003); York University (October 2004); and Rice University, Houston (October 2004).

**Responsibility:** Development Research Group, Rural and Urban Team—Maureen L. Cropper (mcropper@worldbank.org). With Anna Alberini, University of Maryland; Alan Krupnick, Resources for the Future; and Nathalie Simon, U.S. Environmental Protection Agency.

**Project Code:** P087587.

**Completion date:** June 2005.

### Publications

Alberini, Anna, Maureen Cropper, Alan Krupnick, and Nathalie Simon. 2006. "Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?" *Journal of Risk and Uncertainty* 32(3): 231-45.

Alberini, Anna, Alan Krupnick, and Nathalie Simon. 2004. "Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?" NCEE Working Paper 2004-01. U.S. Environmental Protection Agency, National Center for Environmental Economics, Washington, D.C.

Krupnick, Alan, Anna Alberini, and Nathalie Simon. 2004. "Does the Value of a Statistical Life Vary with Age and Health Status? Evidence from the U.S. and Canada." *Journal of Environmental Economics and Management* 48(1): 769-92.

## Community Nutrition and Evaluation of Impacts in Africa

Community-based nutrition projects have been advocated as a cost-effective approach to addressing child health issues. This research project assessed the impact of community-based nutrition projects on malnutrition in Madagascar and Senegal and investigated the determinants of any such impact.

The Madagascar research used monitoring data from the nutrition project along with data on the nongovernmental organizations involved in implementation. A follow-up survey of households and workers in nongovernmental organizations gathered data on knowledge about nutrition. The Sen-

egal research used a randomized comparison of communities with and without the intervention. The baseline/re-survey approach allowed for difference-in-difference analysis.

The Madagascar case study found positive returns to exposure to the project. Communities with an additional year or two of exposure to the project had malnutrition rates 7-9 percentage points lower than communities with less time in treatment. The impact was larger in the poorest communities.

The randomization of the treatment for the Senegal case study was partially compromised of 30 percent of the treatment groups not receiving the program and nearly 10 percent of the control included in the program. Thus, the analysis could not use a simple randomized comparison. However, there were robust behavioral changes regarding care giving and utilization of health services based on intention to treat as well as treatment on the treated comparisons as well as difference-in-difference comparisons using household characteristics. The results also showed improvements in malnutrition based on difference-in-difference regressions.

The preliminary results for Madagascar were presented to staff in the project office, and in Madagascar (April 2005 and June 2006). Project findings were presented at a workshop on Nutrition in Central America in Tegucigalpa, Honduras (November 2006). Results for Senegal were discussed in Dakar (November 2005 and July 2007).

**Responsibility:** Africa Technical Families, Regional Human Development—Harold Alderman (halderman@worldbank.org), Claudia Rokx, and Emanuela Galasso. With Jeffrey Yau, University of Pennsylvania; Hernan Gonzales, University of Maryland; Judith McGuire; Guy Dejongh; and Sebastian Linnemayr, Paris-Jourdan Sciences Economiques.

**Project Code:** P087558.

**Completion date:** June 2007.

### Publications

Alderman, Harold, and Patrice Engle. 2007. "The Synergy of Nutrition and ECD Interventions in Africa." In Marito Garcia, Alan Pence, and Judith Evans, eds. *Africa's Future—Africa's Challenge: Early Childhood Care and Development (ECCD) in Sub-Saharan Africa*. Washington, D.C.: World Bank.

Alderman, Harold, Biram Ndiaye, Sebastian Linnemayr, Abdoulaye Ka, Claudia Rokx, Khadidiatou Dieng, and Menno Mulder-Sibanda. 2007. "Effectiveness of a Community-based Intervention to Improve Nutrition in Young Children in Senegal: A Difference in Difference Analysis." World Bank, Washington, D.C.

Galasso, E., and N. Umaphathi. 2007. "Improving Nutritional Status through Behavioral Change. Lessons from Madagascar." World Bank, Washington, D.C.

Galasso, E., and J. Yau. 2005. "Improving Nutritional Status through Behavioral Change: Lessons from the SEECALINE Program in Madagascar." World Bank, Development Research Group, Washington, D.C.

Linnemayr, Sebastian, Harold Alderman, and Abdoulaye Ka. 2006. "Determinants of Malnutrition in Senegal: Individual, Household, Community Variables, and Their Interaction." World Bank, Washington, D.C.

## Valuing Improvements in Road Safety in Delhi, India

Each year more than 1 million people die in road crashes. More than 75 percent of these deaths occur in developing countries, where vulnerable road users (pedestrians, motorcyclists, and cyclists) constitute the majority of fatalities. To monetize and compare the benefits of road traffic improvements with the costs requires estimates of the value of reductions in risk of death. Since estimates of individual willingness to pay to reduce the risk of death do not exist for most developing countries, foregone earnings—the human capital approach—is used instead to value lives lost. The concern is that this may understate the value of improvements in road safety.

This research project conducted a stated preference survey in Delhi, India, to provide estimates of the value of mortality risk reductions in a traffic safety context. The survey was administered to 1,200 commuters sampled at random. Respondents were asked, using a payment card, what they would pay to reduce their risk of death as a pedestrian (by using a pedestrian subway), what they would pay for a safer helmet to use when riding a two-wheeler, and what they would pay to live in a city with a lower death rate due to traffic crashes. Risk reductions were represented visually using a grid of 100,000 squares.

The results suggested that willingness to pay to reduce the risk of death in a traffic crash increased with exposure to risk (measured by length of commute) and income. It was also higher for persons who drove motorcycles (two-wheelers) than for those who did not. Finally, sensitivity to the size of the risk reduction increased with education.

**Responsibility:** Development Research Group, Rural and Urban Team—Maureen L. Cropper (mcropper@worldbank.org). With Anna Alberini, University of Maryland; and Soma Bhattacharya.

**Project Code:** P093247.

**Completion date:** June 2006.

### Publication

Bhattacharya, Soma, Anna Alberini, and Maureen Cropper.

2006. "The Value of Mortality Risk Reductions in Delhi, India." Policy Research Working Paper 3995. World Bank, Washington, D.C. and *Journal of Risk and Uncertainty* 34(1): 21-47 (2007).

## Reproductive and Child Health and Human Development

Most previous research has focused on how poverty and socio-economic conditions affect reproductive choices, rather than the reverse direction. This research project is gathering evidence-based research on how reproductive choices and demographic changes affect poverty and socio-economic outcomes in developing countries.

The project is using a variety of analytical methods, including econometric techniques, macro-modeling, and some qualitative data analysis. The data sources include the Demographic and Health Surveys, a large multi-country dataset assembled for a study on "Demographic trends, economic growth, and distribution dynamics," secondary data sets, and specific data sets collected for this research.

Preliminary results have been used in project preparation in two health sector reform projects in India, in the states of Karnataka and West Bengal. The emphasis on neglected aspects of public health constitutes a new departure in the policies and strategies of both the government as well as the World Bank.

**Responsibility:** Development Research Group, Public Services Team—Elizabeth King (eking@worldbank.org), Deon Filmer, Berk Ozler Damien de Walque, Kathleen Beegle, Jed Friedman, Halsey Rogers, Norbert Schady, Nistha Sinha, Maurizio Bussolo, Dominique Van Der Mensbrugge, and Mattias Lundberg. With Hai-Anh Dang, David Horowitz, Natsuko Kiso, Rafael E. De Hoyos Navarro, and Maria Porter.

**Project Code:** P097557.

**Completion date:** August 2008.

## Public Health and the Environment

The goal of this research project was to help improve health outcomes through better environmental management. First, the project distilled lessons from other countries on the management of environmental hygiene and vector control. Second, it designed projects for applying these lessons in India. In particular, the focus was on issues of drainage, waste management, and water management, which are essential for controlling malaria and gastro-intestinal diseases.

The project analyzed a mixture of quantitative and qualitative data that had been collected in the field. The findings

have been operationalized in two health sector reform projects in India, in the states of Karnataka and West Bengal.

The results were used in project preparation in two health sector reform projects in India, in the states of Karnataka state and West Bengal. This emphasis on neglected aspects of public health constitutes a new departure in the policies and strategies of both the government as well as the World Bank. By working closely with our two collaborating institutions in India, the project has contributed to research and policy-making capacity in India.

The project findings were presented at a series of workshops in the Karnataka and West Bengal states of India; the Global Forum for Health Research (2003); Brown University (2006); and at the conference on Fiscal Decentralization and Local Governance in India (2006).

Tools for assessing the strengths and gaps in the Essential Public Health Functions, originally developed by the US Centers for Disease Control for use in the US and Latin America, were adapted for use in India.

**Responsibility:** Development Research Group, Public Services Team—Monica Das Gupta (mdasgupta@worldbank.org) and Peyvand Khaleghian. With the Institute for Social and Economic Change, State Institute for Panchayats and Rural Development.

**Project Code:** P079785.

**Completion date:** April 2006.

## Publications

Das Gupta, Monica. 2005. "Public Health in India: Dangerous Neglect." *Economic and Political Weekly* (December).

\_\_\_\_\_. 2007. "Public Health in India: An Overview." In Kaushik Basu, ed. *Oxford Companion to Economics in India*. Oxford University Press; and Policy Research Working Paper 3787. World Bank, Washington, D.C.

\_\_\_\_\_. Forthcoming. "How Well Does India's Federal Government Perform Its Essential Public Health Functions?" *Health Policy*; and Policy Research Working Paper 3447. World Bank, Washington, D.C.

Das Gupta, Monica, and Peyvand Khaleghian. 2005. "Public Management and the Essential Public Health Functions." *World Development* 33(7): 1083-99; and Policy Research Working Paper 3220. World Bank, Washington, D.C.

## Reaching the Poor with Health, Nutrition, and Population Services

The project objectives were to determine how well health services in developing countries reach poor people; and, more importantly, how such services can do so more effectively.

In recent years, evidence has been accumulating that government health services, including those funded by the World Bank and other donors, have disproportionately benefited upper-income groups, rather than the poor people whom they were intended to help. This has resulted in a need to understand these largely unexpected findings more fully, and to use this understanding to identify ways to overcome the problem that they represent.

This research project follows two earlier research projects. One consisted of studies using household data sets and an "asset" or "wealth" approach to the determination of economic status to show the distribution of health service coverage across economic groups. The second used a benefit-incidence approach to assess the distribution of public expenditures across economic classes.

The analytical approach this project used was a modified variant of benefit-incidence analysis, as adapted to fit the needs of the health sector.

Two types of data were used: primary data collected through original household and/or facility studies; and secondary data drawn from existing data sets created by household surveys dealing with health.

The principal finding of the research was the identification of numerous exceptions to the rule: health programs that did reach the poor effectively. These were found to be frequent enough to support the belief that better performance is possible, and their features provided valuable guidance for the design of future initiatives.

Project findings were presented at the Reaching the Poor Conference, Washington, D.C. (February 2004).

**Responsibility:** Human Development Network, Health, Nutrition and Population Team—Davidson R. Gwatkin (Dgwatkin@worldbank.org), Adam Wagstaff, and Abdo S. Yazbek. With Sebastian Galiani, Mercedes Fernandez, and Ernesto Schargrotsky, Universidad Torcuato di Tella; Leonardo Gaspirini and Monica Panadeiros, Fundacion de Investigaciones Economicas Latinoamericanas; A.T.M. Iqbal Anwar and Japhet Killewo, International Centre for Diarrhoeal Disease Research; Aluisia J.D. Barros, Cesar G. Victora, Juraci A. Cesar, and Nelson A. Neumann, Fundacao de Apoio Universitario; Christy Hanson and G.N.V. Ramana, World Bank; Lia Selig, Government of Brazil; Diana Weil, World Health Organization/World Bank; J. Brad Schwartz and Indu Bhushan, Asian Development Bank; David Peters, Krishna Rao, and D.S. Misra, Johns Hopkins University; Anju Malhotra, Sanyukta Mathur, and P.L. Mohan, International Center for Research on Women; Martin Valdivia, Grupo de Analisis para el Desarrollo; Michael Thiede and Sandi Mbatsha, University of Cape Town; Natasha Palmer, London School of Hygiene

and Tropical Medicine; and Viroj Tangcharoensathien and Chutima Suraratdecha, Health Systems Research Institute.

**Project Code:** P083938.

**Completion date:** September 2005.

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Davidson, R. Gwatkin, Adam Wagstaff, and Abdo S. Yazbeck, eds. 2005. *Reaching the Poor with Health, Nutrition, and Population Services: What Works, What Doesn't, and Why*. Washington, D.C.

Yazbeck, Abdo S., and Davidson R. Gwatkin, eds. 2005. "Reaching the Poor with Health Services." Special issue of *Development Outreach*. Washington, D.C.: World Bank Institute.

## Health Care Financing and Delivery

This research project is focusing on a variety of issues in health finance and delivery, with a strong emphasis on health insurance issues and evaluation. The project seeks to determine how best to raise health care revenues, and how to ensure that insurance coverage affords financial protection, but also ensures access to needed services, including the organization and financing of service delivery.

The project is analyzing labor market and financial protection aspects of health insurance, with a strong focus on impact evaluation of programs and reforms. It is also examining how insurance interacts with other risk management strategies in dealing with health shocks.

The analysis is based on a variety of methods, including impact evaluation methods for program and health reform evaluation, regression analysis for analysis of the impacts of shocks, and critical reviews of existing studies. Data include household surveys and health facility datasets.

One important finding is that insurance sometimes affords limited financial protection and may actually increase financial risk. This is especially likely to be the case if providers primarily recommend sophisticated services to those with insurance, and providers are paid fee-for-service and subject to limited regulation and oversight. In such settings, any extra care delivered as a result of having insurance may not be especially necessary from a medical perspective. Thus, reforms to the way providers are paid and regulated may do a better job of reducing financial risk than expanding or deepening insurance coverage.

This finding makes a case for focusing less on insurance as being a silver bullet to the problem of financial protection in health, and broadening out the dialogue and range of interventions to include "the supply side" and in particular how insurance interacts with it. The work being done on social

health insurance is likely to clarify further the problems associated with social health insurance, and the options to get around them.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Adam Wagstaff (awagstaff@worldbank.org ) and Magnus Lindelow.

**Project Code:** P091397.

**Completion date:** Ongoing.

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Eggleston, K., Li Ling, Q. Meng, M. Lindelöw, and A. Wagstaff. Forthcoming. "Health Service Delivery in China: A Literature Review." *Health Economics*; and Policy Research Working Paper 3978. World Bank, Washington, D.C.

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Lindelow, M., and A. Wagstaff. 2006. "Health Facility Surveys: An Introduction." In M. Goldstein, ed. *Measurement Issues in Service Delivery*. Washington, D.C.: World Bank; and Policy Research Working Paper 2953. World Bank, Washington, D.C.

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\_\_\_\_\_. 2007a. "The Economic Consequences of Health Shocks: Evidence from Vietnam." *Journal of Health Economics* 26(1): 100; and Policy Research Working Paper 3644. World Bank, Washington, D.C.

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\_\_\_\_\_. 2007c. "Health Systems in East Asia: What Can Developing Countries Learn from Japan and the Asian Tigers?" *Health Economics* 16(5): 441-56.; and Policy Research Working Paper 3790. World Bank, Washington, D.C.

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Wagstaff, A., and M. Lindelow. 2005. "Can Insurance Increase Financial Risk? The Curious Case of Health Insurance in China." Policy Research Working Paper 3741. World Bank, Washington, D.C.

\_\_\_\_\_. 2007. "Health Reform in China: Where Next?" In L. Jiwei and W. Shuilin, eds. *China: Public Finance for a Harmonious Society*. Washington, D.C.: World Bank.

Wagstaff, A., M. Lindelow, G. Jun, X. Ling, and Q. Juncheng. 2007. "Extending Health Insurance to the Rural Population:

An Impact Evaluation of China's New Cooperative Medical Scheme." Policy Research Working Paper 4150. World Bank, Washington, D.C.

Wagstaff, A., and M. Pradhan. 2005. "Health Insurance Impacts on Health and Nonmedical Consumption in a Developing Country." Policy Research Working Paper 3790. World Bank, Washington, D.C.

Wagstaff, A., and S. Yu. 2007. "Do Health Sector Reforms Have Their Intended Impacts? The World Bank's Health VIII Project in Gansu Province, China." *Journal of Health Economics* 26(3): 535; and Policy Research Working Paper 3743. World Bank, Washington, D.C.

## Social Health Insurance and Tax-Financed Health Care in Europe and Central Asia: Spending and Labor Market Implications

The aim of this research project was to assess the impact of social insurance adoption on health spending, health outcomes, health system throughputs and productivity, and various labor market outcomes including employment, wages, and the size of the informal sector.

The research was based on a pooled time-series country-level dataset to get at the effects of country-wide reforms, albeit at different dates in different countries. It also examined labor market consequences as well as health sector outcomes.

The analysis used regression-based differences-in-differences that allowed for an unobserved country-specific time trend as well as a country-specific unobserved fixed effect. The analysis also employed instrumental variables as an alternative to overcoming the endogeneity of the adoption of social health insurance. The pooled time-series country-level dataset was assembled from a variety of country-level datasets. Country-specific institutional information on the timing of SHI adoption and provider payment methods was taken from the Health in Transition report series.

The findings showed that adoption of social health insurance in Europe and Central Asia appears to have raised health expenditures, increased hospital admissions, increased the bed-occupancy rate, and reduced average length of stay. However, it has not had any perceptible impact on health outcomes, despite the extra health spending. The results warn against the adoption of social health insurance in countries that are contemplating it, suggest that it may make sense to revert to tax-finance in countries where social health insurance is proving difficult to operate, and point to the need to find ways to counter the potentially negative effects of adoption of social health insurance.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Adam Wagstaff (awagstaff@worldbank.org). With Rodrigo Moreno-Serra, University of York.

**Project Code:** P104665.

**Completion date:** December 2007.

### Publication

Wagstaff, A., and R. Moreno-Serra. 2007. "Europe and Central Asia's Great Post-Communist Social Health Insurance Experiment: Impacts on Health Sector and Labor Market Outcomes." Policy Research Working Paper 4371. World Bank, Washington, D.C.

## The Impact of Health on Household Income Capabilities in Rural China

This research project studied the impact of health shocks on the income and consumption of rural households in China, their ability to handle the shocks, and the effectiveness of public intervention. The project addressed several questions: How well insured were rural households? What determined the consumption of insurance? Who had health insurance? And what effect did health insurance have on household welfare?

The research used a panel data approach to identify the effects of health shocks and income shocks. The data came from a retrospective survey of major diseases in about 1,500 households in eight provinces over the period 1987–2002, and an existing panel data set covering the same period, with which the survey was matched.

The research was done in collaboration with Beijing University's China Center for Economic Research.

**Responsibility:** Development Research Group, Growth and Investment Team—Lixin Colin Xu (lxcu1@worldbank.org). With Yang Yao and Mengtao Gao, Beijing University; and Li Gan, University of Texas at Austin. Beijing University contributed funding for the data collection.

**Project Code:** P087657.

**Completion date:** June 2005.

### Publications

Xu, Lixin Colin, Yang Yao, Mengtao Gao, and Li Gan. 2006a. "Health Shocks, Village Elections, and Long-Term Income: Evidence from Rural China." NBER Working Paper 12686. \_\_\_\_\_ . 2006b. "Local Elections and Consumption Insurance: Evidence from Chinese Villages." Policy Research Working Paper 4205. World Bank, Washington, D.C.

## Health Care Providers and Markets in Delhi

Little evidence exists on how the quality of medical care differs by income group, by the sector in which a doctor practices, or by the incentives facing a doctor—and ultimately how this affects health outcomes. This research project aims to shed light on these issues through novel survey methods in Delhi.

The study first carried out a household survey, interviewing 300 households in seven neighborhoods of Delhi over two years for a total of 35 observations per household. Based on the results, the study compiled a census of all health care providers in the seven neighborhoods and chose a sample of providers. To measure clinical competence, these providers were administered “vignettes” (a battery of questions on standard hypothetical cases) and later observed in practice. Finally, the data were matched so that all household visits were matched to provider competence and practice.

The research has led to several main findings. First, the quality of health care provision in Delhi is poor on average. Second, perceptions of the public and private sector in India vary substantially, and the research finds grounds for prejudice against both. Third, what doctors do in practice (as measured by a day’s direct observation) is only very weakly related to how well they do on the vignettes. Fourth, there are large disparities between poor and rich neighborhoods in access to good-quality medical care. Private doctors in poor neighborhoods are much worse than those in rich neighborhoods, and the pattern is replicated for government doctors. One repercussion of this poor medical care is poor diagnosis.

The household survey shows that when households are given the correct diagnosis, they are able to respond appropriately, even when they are poor. This suggests that poor information has an important role in explaining poor health outcomes.

Project findings have been presented at seminars at the World Bank, the Delhi School of Economics, the Center for Policy Research (Delhi), Harvard University, the NEUDC conference, Princeton University, and Johns Hopkins University.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Jishnu Das (jdas1@worldbank.org) and Jeffrey Hammer. With the Institute of Socio Economic Research on Development and Democracy, India.

**Project Codes:** P075922 and P098136.

**Completion date:** 2009.

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- Das, Jishnu, and Paul Gertler. 2007. “Practice-Quality Variation in Five Low-Income Countries: A Conceptual Overview.” *Health Affairs* 26(3): 296-309.
- Das, Jishnu, and Jeffrey Hammer. 2004. “Strained Mercy: Quality of Medical Care in Delhi.” *Economic and Political Weekly* (February 28).
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## Contracting with the Private Sector for the Delivery of Health Services: Randomized Evaluation in Cambodia

Contracting for service delivery is being implemented in many developing regions and countries as disparate as Bangladesh, Bolivia, Dominican Republic, Mozambique, and Uganda.

This research project examined the impact of a randomized, controlled experiment of contracting the private sector to deliver primary health care services in Cambodia. It analyzed data from surveys in 1997 and 2003 to compute causal estimates of the effects of the contracting treatments on health care provision in the program area, and presented new evidence on health center management, non-contracted outcomes, expenditures, and perception of the quality of care. The methodology was consistent with the cluster-randomized nature of the intervention design.

Contracting appears to have been an effective way of improving the delivery of public health services. Combining contracted management of public facilities with a shift in health spending to the public sector, the project led to increases in targeted service outcomes of about one standard deviation on average. The treatments induced individu-

als to shift curative care visits to public facilities, mostly at the expense of visits to untrained service providers such as drug sellers and traditional healers. Specifically, the project improved the management of government health centers, particularly in the availability of 24-hour service, staff attendance, and supplies and equipment. The contracting-in and contracting-out approaches produced similar results, although the greater managerial control afforded contracting-out managers appears to have enabled them to make greater strides in improving health center management. There was no evidence that contractors took advantage of the incomplete contracts, although non-targeted service outcomes did not show improvement relative to the comparison group.

**Responsibility:** Development Research Group, Human Development and Public Services Team—Elizabeth M. King (Elizabeth.King@worldbank.org) and Benjamin Loevinsohn. With David Clingingsmith, Harvard University; Rathavuth Hong, Macro International; Jennica Larrison, World Bank; and Nguyen Minh Thang, University of Washington.

**Project Code:** P085710.

**Completion date:** June 2005.

### Publication

Bloom, E., I. Bhushan, D. Clingingsmith, R. Hong, E. King, M. Kremer, B. Loevinsohn, and B. Schwartz. 2006. "Contracting for Health: Evidence from Cambodia." World Bank, Washington, D.C.

## The Demand for Sex Selective Abortions

One of the major changes that have taken place in India over the last two decades is a significant shift in the sex ratio at birth. As in other Asian countries, ultrasound and other techniques for prenatal sex determination have become more widely available and affordable in India. There has, however, so far been very little analysis of who uses prenatal sex determination to abort female fetuses and the effects of the patterns of demand, despite the obvious major impacts this practice is likely to have in the future. One reason for this is the perceived lack of suitable information.

This research project investigated whether it was possible to examine the demand for sex selective abortion even in the absence of direct information on its use by applying two different methods. The first analyzed the determinants of the probability that a child of a given parity will be a son. The second focused on the determinants of the difference between actual spacing between births when sex selective abortion is available and the predicted spacing based on information from when it was not available. The project used the

two rounds of the National Family and Health Survey from India to examine the effectiveness of these two methods.

The first study found that the use of sex selective abortion was closely related to the lowering of fertility in India. Sex selective abortion was therefore more likely to take place when the mother had a higher level of education and when the father was better educated. Furthermore, families with more land were more likely to have boys and more likely to have longer birth spacing indicating that sex selective abortion was used. Finally, residing in an urban area also increased the use of sex determination techniques.

Project findings have been presented at Brown University, the Western Economics Association, the Annual Meeting of the European Society for Population Economics, and the Economic Demography Workshop at the Population Association of America's Annual Meeting.

**Responsibility:** Development Research Group, Poverty Team—Kathleen Beegle (kbeegle@worldbank.org). With Dr. Claus Portner, University of Washington.

**Project Code:** P095699.

**Completion date:** June 2006.

### Publication

Pörtner, Claus C. 2007. "The Demand for Sex Selective Abortions." World Bank, Washington, D.C.

## Economic Costs of Mental Health Ailments

The goals of this research project were to determine the feasibility of collecting mental health data in the context of a multi-topic household survey, and to assess the link between mental health and poverty. The project studied whether mental health indicators could be collected via a national, multi-topic household survey without specially trained interviewers, and how mental health problems relate to poverty. Most studies of mental health are clinic based and/or dedicated surveys that do not contain welfare measures.

The project analysis used data from the 2001 Living Standards Measurement Study survey of Bosnia and Herzegovina. It also used data from an additional survey of health care facilities and the impact of the conflict on communities.

The main finding was that it was possible to carry out a detailed set of mental health questions (depression indicators) in a standard LSMS survey. That is, the data that were collected were valid and comparable with results that could be obtained in clinical studies, but also did not affect the quality of data in the rest of the survey. In addition, the poverty-mental health linkage was not close; other factors were more closely linked with depression.

**Responsibility:** Development Research Group, Poverty Team—Kinnon Scott (Kscott1@worldbank.org). With Aida Kapetanovic and Naunovic Miodrag, Epsilon Research, Development and Consulting.

**Project Code:** P086972.

**Completion date:** December 2007.

### Publications

Das, Jishnu, Jed Friedman, David McKenzie, and Kinnon Scott.

Forthcoming. "Mental Health and Poverty in Developing Countries: Revisiting the Relationship." *Social Science and Medicine*.

Scott, Kinnon, Michael P. Massagli, Aida Kapetanovic, Richard Mollica, and James Lavelle. 2006. "Measuring Mental Health in Post-Conflict Societies: An Assessment of the Bosnia and Herzegovina Experiment." World Bank, Washington, D.C.

## The Interaction of Health, Education, and Employment in Western China

The World Bank and other development agencies continue to finance a large number of health and education projects in developing countries. This research project used panel data methods and instrumental variables to evaluate the relationships—in some cases causal relationships—between health and education, health and labor market outcomes, and education and labor market outcomes.

A major component of the project was the completion of the second wave of a survey of 2,000 adolescents in rural China, the Gansu Survey of Children and Families. (The survey children were first interviewed in 2000.) The survey collected detailed information on physical and psychosocial health outcomes, educational attainment, and labor force participation. In addition, a randomized intervention to provide eyeglasses to primary school students with poor vision was conducted among a separate sample of children to help identify a specific connection between health and education outcomes.

The project generated results that could inform policymakers about the costs that poor health or poor educational attainment could have for labor productivity as well as for individual well-being. The results also helped to identify potential health risks and areas of educational underperformance in poor areas in China.

The results showed robust relationships between poor nutrition and education outcomes, and potentially important ties between psycho-social problems and children's academic performance. Analyses of the health clinic data suggested that the average quality of health services improved over time, even for clinics in the poorest counties, but inequality also increased.

Project results were presented at a workshop in Lanzhou, at Northwest Normal University (July 2005). Information on the project is available on the Web at <http://www.ssc.upenn.edu/china/>. Data from the first round of the Gansu Survey of Children and Families are available on request and affiliation with the project.

**Responsibility:** East Asia and Pacific Region, Rural Development and Natural Resources Sector Department—Guo Li (gli1@worldbank.org) and Alan Piazza. With Pengfei Ge, Gansu Center for Disease Control, China; Paul Glewwe, University of Minnesota; Emily Hannum, University of Pennsylvania; Albert Park, University of Michigan; Tiemin Tang, Gansu New Century Information Research Center, China; Jiayi Wang, Northwest Normal University, China; An Xuehui, Northwest Normal University, China; and Yuying Wang, China Center for Disease Control. The Fogarty International Center at the National Institutes of Health and the University of Michigan contributed funding for the research. Wave 1 of the Gansu Survey of Children and Families was funded in full by Spencer Foundation.

**Project Code:** P083112.

**Completion date:** December 2007.