Health Economics Research at the Centers for Disease Control and Prevention: Overview and Examples

Scott D. Grosse
Research Economist
National Center on Birth Defects and Developmental Disabilities
Centers for Disease Control and Prevention

Economic Analysis of Nutrition Interventions

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Health Economists at CDC

- ~60 PhD economists or health economics researchers
  - Most are alumni of Prevention Effectiveness Post-Doctoral Fellowship Program (9 current fellows)
    - 79 have completed 2-year fellowship since 1995
    - 42 alumni currently employed at CDC
- Economists dispersed
  - Clusters of at least 3 health economics researchers
    - National Center for Health Statistics
    - National Center for Chronic Disease Prevention and Health Promotion
      - Division of Cancer Prevention and Control
      - Division of Diabetes Translation
    - National Center on Immunization and Respiratory Diseases
    - National Center on Birth Defects and Developmental Disabilities
    - National Center for Injury Prevention and Control
      - Division of Violence Prevention
    - National Center on HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
      - Division of STD Prevention
      - Division of HIV/AIDS Prevention
    - National Institute for Occupational Safety and Health (NIOSH)
    - Center for Global Health
      - Global AIDS Program

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Health Economics Research at CDC

- Health services research
- Cost-of-Illness (COI) studies
  - Medical expenditures
  - Human capital
- Program cost studies
- Economic evaluation of interventions
  - Cost-effectiveness (CEA)
    - Health utilities
  - Cost-benefit (CBA)
    - Willingness-to-pay
- Cross-cutting evidence synthesis
- Health policy modeling
- Economic and econometric analysis

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National Center for Health Statistics (NCHS): Data Collection and Linking

- Data collection
  - Household surveys
    - National Health Interview Survey (NHIS)
    - National Health and Nutrition Examination Survey (NHANES)
  - Health care facility surveys
    - National Hospital Discharge Survey
    - National Hospital Ambulatory Medical Care Survey
    - National Ambulatory Medical Care Survey
    - National Nursing Home Survey
    - National Home and Hospice Care Survey
- Data linkages
  - NHIS, NHANES, and LSOA (Longitudinal Study on Aging) files linked to
    - National Death Index for mortality
    - Medicare enrollment and claims data
    - Social Security benefit history data
  - http://www.cdc.gov/nchs/data_access/data_linkage_activities.htm

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NCHS: Research to Inform Policy

- **Tracking Health Insurance Coverage Rates**
  - Cohen RA, Makuc DM, Bernstein AB, Bilheimer LT, Powell-Griner E. Health insurance coverage trends, 1959-2007: estimates from the National Health Interview Survey. *National Health Statistics Reports* 2009;17:1-25
- **Medicaid Policy and Health and the Use of Health Services**
  - Howell EM., Decker SL, Hogan S, Yemane A, Foster J. Declining child mortality and continuing racial disparities in the era of the Medicaid/SCHIP insurance coverage expansions. *American Journal of Public Health*, Forthcoming.
  - Decker SL. 2009. Changes in Medicaid physician fees and patterns of ambulatory care. *Inquiry* 2009; 46: 291-304.
  - Currie J, Decker SL, Lin W. Has Public Health Insurance for Older Children Reduced Disparities in Access to Care and Health Outcomes? *Journal of Health Economics* 2008; 7: 1567-1581.
- **Use of Medical Care for Chronic Conditions**
  - Decker, SL, Schappert SM, Sisk, JE. The use of medical care for chronic conditions. *Health Affairs* 2009; 28:26-35.
  - Decker SL, Burt CW, Sisk JE.Trends in treatment patterns among the primary care providers of diabetics. *Journal of Ambulatory Care Management* 2009; 32: 341-349.
  - Decker SL. Medicare and the health of women with breast cancer. *Journal of Human Resources* 2005; 40: 948-968.
- **Aging and the Use of Health Services**
  - Cai L, Lubitz J. Was there compression of disability for older Americans from 1992 to 2003? *Demography*. 2007;44:479-95.
  - Diehr P, Derleth A, Cai L, Newman AB. The effect of different public health interventions on longevity, morbidity, and years of healthy life. BMC Public Health. 2007;7:52.

Division of Cancer Prevention and Control and Economic Analysis

- Key research questions
  - Program costs for publicly funded programs
  - Health and economic impacts of cancers
  - Use of health services for cancer screening and treatment
  - Cost-effectiveness of early detection or prevention
  - Health disparities by socioeconomic status

National Breast and Cervical Cancer Early Detection Program

- Ekwueme DU, Hall IJ, Richardson LC, et al. Estimating personal costs incurred by a woman participating in mammography screening in the National Breast and Cervical Cancer Early Detection Program. *Cancer*. 2008;113:592-601.
- Ekwueme DU, Gardner JG, Subramanian S, et al. Cost analysis of the National Breast and Cervical Cancer Early Detection Program: selected states, 2003 to 2004. *Cancer*. 2008;112:626-35.
- Khan K, Curtis CR, Ekwueme DU, et al. Preventing cervical cancer: overviews of the National Breast and Cervical Cancer Early Detection Program and 2 US immunization programs. *Cancer*. 2008;113:3004-12.
- Subramanian S, Ekwueme DU, Gardner JG, Bapat B, Kramer C. Identifying and controlling for program-level differences in comparative cost analysis: lessons from the economic evaluation of the National Breast and Cervical Cancer Early Detection Program. *Evaluation and Program Planning*. 2008;31:136-44.
- Tangka FK, Dalaker J, Chattopadhyay SK, et al. “Meeting the mammography screening needs of underserved women: the performance of the National Breast and Cervical Cancer Early Detection Program in 2002-2003 (United States).” *Cancer Causes & Control*. 2006;17:1145-54.

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Other Recent DCPC Economic Analyses

- Finkelstein EA, Tangka FK, Trogdon JG, Sabatino SA, Richardson LC. The personal financial burden of cancer for the working-aged population. *American Journal of Managed Care*. 2009;15:801-6.
- Subramanian S, Tangka FK, Green J, Weir H, Michaud F. “Economic Assessment of Central Cancer Registry Operations. Part II: Developing and Testing a Cost Assessment Tool.” *Journal of Registry Management,* 2009; 36:47-52.
- Howard DH, Tangka FK, Seeff LC, Richardson LC, Ekwueme DU. The impact of detection and treatment on lifetime medical costs for patients with precancerous polyps and colorectal cancer. *Health Economics*. 2009;18:1381-93.
- Tangka FKL, Subramanian S, Bapat B, et al. Cost of starting colorectal cancer screening programs: Results From five federally funded demonstration programs. *Preventing Chronic Diseases*, 2008;5(2):1-7.
- Ross LE, Berkowitz Z, Ekwueme DU. Use of the prostate-specific antigen test among U.S. men: findings from the 2005 National Health Interview Survey. *Cancer Epidemiology, Biomarkers, & Prevention*. 2008;17:636-44.
- Richardson LC, Tangka FK. Ambulatory care for cancer in the United States: results from two national surveys comparing visits to physicians' offices and hospital outpatient departments. *Journal of the National Medical Association*. 2007;99:1350-8.

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Division of Diabetes Translation

- Main areas of economic research
  - National and state health and economic burdens of diabetes, chronic kidney diseases, and vision disorders
  - Impact of diabetes, chronic kidney diseases, and vision disorders on health related quality of life
  - Economic analysis of randomized clinical trials
  - Modeling lifetime cost of diabetes and cost-effectiveness of diabetes interventions
  - Evaluating impact of health policies related to diabetes and risk factors (e.g., mandatory insurance coverage)
  - Health service research (e.g., access to care and quality of care)

DDT Recent Economic Studies

- Hoerger TJ, Zhang P, Segel JE, et al. Improvements in risk factor control among persons with diabetes in the United States: evidence and implications for remaining life expectancy. *Diabetes Research and Clinical Practice* 2009;86:225-32.
- Ettner SL, Cadwell BL, Russell LB, Brown A, Karter AJ, Safford M, Mangione C, Beckles G, Herman WH, Thompson TJ; TRIAD Study Group. Investing time in health: do socioeconomically disadvantaged patients spend more or less extra time on diabetes self-care? *Health Economics*. 2009;18:645-63.
- Li G, Zhang P, Wang J, et al. The long-term effect of lifestyle interventions to prevent diabetes in the China Da Qing Diabetes Prevention Study: a 20-year follow-up study. *Lancet* 2008;371:1783-9.
- Li R, Zhang P, Narayan KM. Self-monitoring of blood glucose before and after Medicare expansion among Medicare beneficiaries with diabetes who do not use insulin. *American Journal of Public Health* 2008;98:358-64.
- Zhang X, Norris SL, Chowdhury FM, Gregg EW, Zhang P. The effects of interventions on health-related quality of life among persons with diabetes: a systematic review. *Medical Care* 2007; 45:820-34.

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Economics Evaluation of US Diabetes Prevention Program

- Ackermann RT, Edelstein SL, Narayan KM, et al. Changes in health state utilities with changes in body mass in the Diabetes Prevention Program. *Obesity* 2009;17:2176-81
- Hoerger TJ, Hicks KA, Sorensen SW, et al. Cost-effectiveness of screening for pre-diabetes among overweight and obese U.S. adults. *Diabetes Care* 2007;30:2874-9.
- Johnson FR, Manjunath R, Mansfield CA, Clayton LJ, Hoerger TJ, Zhang P. High-risk individuals' willingness to pay for diabetes risk-reduction programs. *Diabetes Care* 2006;29:1351-6.
- Ackermann RT, Marrero DG, Hicks KA, et al. An evaluation of cost sharing to finance a diet and physical activity intervention to prevent diabetes. *Diabetes Care* 2006;29:1237-41.
- Herman WH, Hoerger TJ, Brandle M, et al. The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. *Annals of Internal Medicine*. 2005;142:323-32.
- Herman WH, Brandle M, Zhang P, et al. Costs associated with the primary prevention of type 2 diabetes mellitus in the diabetes prevention program. *Diabetes Care*. 2003; 26:36-47.

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Division of Nutrition, Physical Activity, and Obesity (Research Contracts)

- Finkelstein EA, Trogdon JG, Cohen JW, Dietz W. Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health Affairs*. 2009;28:w822-31
- Trogdon J, Finkelstein EA, Reyes M, Dietz WH. A return-on-investment simulation model of workplace obesity interventions. *Journal of Occupational and Environmental Medicine*. 2009;51:751-8.
- Finkelstein EA, Brown DS, Brown DR, Buchner DM. A randomized study of financial incentives to increase physical activity among sedentary older adults. *Preventive Medicine.* 2008;47:182-7.
- Roux L, Pratt M, Tengs TO, et al. Cost effectiveness of community-based physical activity interventions. *American Journal of Preventive Medicine*. 2008;35:578-88.

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Immunizations Against Infectious Diseases (Multiple Centers and Divisions)

- Types of economic studies
  - Costs of vaccine-preventable diseases
  - Economic evaluations of immunizations
  - Assessments of health states preferences
  - Costs of administering vaccines
  - Supply and demand for vaccines
  - Modeling disease and health infrastructure
- Policy support
  - Advisory Committee on Immunization Practices
  - Pandemic influenza
  - Disease outbreaks

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Economic Evaluations of Immunizations

- Benefit-cost analyses
  - Zhou F, Santoli J, Messonnier ML, et al. Economic evaluation of the 7-vaccine routine childhood immunization schedule in the United States, 2001. *Archives of Pediatrics and Adolescent Medicine,* 2005; 159:1136-44
  - Meltzer MI, Neuzil KM, Griffin MR, Fukuda K. An economic analysis of annual influenza vaccination of children. *Vaccine*. 2005; 23, 1004-14
- Cost-effectiveness analyses
  - Ortega-Sanchez IR, Meltzer MI, et al. Economics of an adolescent meningococcal conjugate vaccination catch-up campaign in the United States. *Clinical Infectious Diseases*. 2008;46:1-13.
  - Zhou F, Ortega-Sanchez IR, Guris D, et al. An economic analysis of the universal varicella vaccination program in the United States. *Journal of Infectious Disease*. 2008;197:S156-64.
  - Prosser LA, Bridges CB, Uyeki TM, et al. Health benefits, risks, and cost-effectiveness of influenza vaccination of children. *Emerging Infectious Diseases*. 2006;12:1548-58.
- Other
  - Calugar A, Ortega-Sánchez IR, Tiwari T, et al. Nosocomial pertussis: costs of an outbreak and benefits of vaccinating health care workers. *Clinical Infectious Diseases*. 2006;42:981-8.

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Health State Preferences

- Joint Initiative in Vaccine Economics (JIVE), Harvard and CDC
  - Lieu TA, Ray GT, Ortega-Sanchez IR, et al. Willingness to pay for a QALY based on community member and patient preferences for temporary health states associated with herpes zoster. *Pharmacoeconomics*. 2009;27:1005-16.
  - Lieu TA, Ortega-Sanchez I, Ray GT, et al. Community and patient values for preventing herpes zoster. *Pharmacoeconomics*. 2008;26:235-49.
- Benefits and risks of new adolescent vaccines: HPV
  - RTI International and CDC
  - Brown DS, Johnson FR, Poulos D, Messonnier ML. Mothers' preferences and willingness to pay for vaccinating daughters against human papillomavirus. *Vaccine.* In press.

National Center on Birth Defects and Developmental Disabilities: COI Studies

- Shimabukuro TS, Grosse SD, Rice C. Medical costs for children with autism in a privately insured population. *Journal of Autism and Development Disorders*. 2008; 38:546–552.
- Ouyang L, Grosse SD, Kenneson A. Health care utilization and expenditures for children and young adults with muscular dystrophy. *Journal of Child Neurology*. 2008; 23:883–888.
- Boulet S, Molinari NA, Grosse SD, Honein MA, Correa-Villaseñor A. Health care expenditures for children with Down syndrome in a privately insured population. *Journal of Pediatrics*. 2008; 153:241–246.
- Boulet SL, Grosse SD, Honein MA, Correa-Villaseñor A. Children with orofacial clefts: healthcare utilization and costs in a privately insured population. *Public Health Reports*. 2009; 124:447–453.
- Ouyang L, Grosse SD, Amendah D, Schechter MS. Health care utilization and expenditures for individuals with cystic fibrosis in a privately insured population. *Pediatric Pulmonology*. 2009; 44:989–996.
- Mvundura M, Amendah D, Sprinz PG, Kavanagh PL, Grosse SD. Medical care utilization and expenditures in privately and publicly insured children with sickle cell disease in the United States. *Pediatric Blood & Cancer*. 2009; 53:642–646.

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Economic Evaluation: Folic Acid Fortification and Birth Defects

- Grosse SD, Waitzman NJ, Romano PS, Mulinare J. Re-evaluating the benefits of folic acid fortification in the United States: Economic analysis, regulation, and public health. *American Journal of Public Health*, 2005; 95:1917-1922
  - 20%–30% reduction in NTDs
  - Fortification cost $3 million per year
  - Direct costs averted $146 million per year
  - Direct and indirect costs averted $425 million per year
- Llanos A, Hertrampf E, Cortes C, Pardo A, Grosse SD, Uauy R. Cost-effectiveness of a folic acid fortification program in Chile. *Health Policy.* 2007; 83:295–303
  - 50% reduction in NTDs
  - Fortification cost $0.2 million per year
  - Direct costs averted $2 million per year
  - CE ratio using WHO-CHOICE method is $89 per DALY

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Cost Effectiveness Analysis of Targeted Folic Acid Supplementation Program

- Grosse SD, Ouyang L, Collins JS, Green D, Dean JH, Stevenson RE. Economic evaluation of a neural tube defect recurrence prevention program. *American Journal of Preventive Medicine*. 2008; 35(6): 572–577
  - Birth defects surveillance program contacted women with an NTD-affected pregnancy and offered counseling and supplements
  - 85% of women accepted
  - No recurrences vs. 3% background recurrence
  - Cost-utility analysis
    - $42,587 per QALY base-case analysis
    - $15,798 per QALY if one includes healthy births in place of terminations following prenatal diagnosis

Micronutrients, Supplements, and CDC-Sponsored Economic Analyses

- CDC Vision Health Cost-Effectiveness Study Group, Division of Diabetes Translation
  - Rein DB, Wittenborn JS, Zhang X, et al. Forecasting age-related macular degeneration through the year 2050: the potential impact of new treatments. *Archives of Ophthalmology*. 2009;127:533-40.
  - Rein DB, Saaddine JB, Wittenborn JS, et al. Cost-effectiveness of vitamin therapy for age-related macular degeneration. *Ophthalmology*. 2007;114:1319-26.
- Division of Blood Disorders
  - Cost-effectiveness of screening for iron overload and hereditary hemochromatosis – Work in progress

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Cross-Cutting Economic Evaluation Initiatives at CDC: The Community Guide

- Task Force for Community Preventive Services
  - Non-federal advisory group sponsored by CDC
  - Publishes recommendations based on systematic evidence reviews
  - Systematic reviews of economic evaluations conducted for recommended services
- Example: School-based programs promoting nutrition and physical activity
  - Review in 2004 found insufficient evidence
- Example: Worksite programs to control overweight and obesity
  - Task Force on Community Preventive Services. A recommendation to improve employee weight status through worksite health promotion programs targeting nutrition, physical activity, or both. *American Journal of Preventive Medicine,* 2009;37:358-359.
  - Anderson LM, Quinn TA, Glanz K, et al. The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: a systematic review. *American Journal of Preventive Medicine,* 2009;37:340-357.
  - Three cost-effectiveness analyses reported net costs from $1.44 to $4.16 per pound of loss in body weight.

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Cross-Cutting Economic Evaluation Initiatives at CDC: Prevention Priorities

- National Commission on Prevention Priorities
  - Convened by Partnership for Prevention
  - Sponsored by
    - CDC
    - Robert Wood Johnson Foundation
    - WellPoint Foundation
  - Analytic work by HealthPartners Research Foundation
- Projects
  - Ranking of evidence-based clinical preventive services
    - Maciosek MV, Coffield AB, Edwards NM, et al. Priorities among effective clinical preventive services: results of a systematic review and analysis. American Journal of Preventive Medicine. 2006;31:52-61
  - Ranking of evidence-based services recommended by the U.S. Task Force on Community Preventive Services – in progress

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Cross-Cutting Economic Evaluation Initiatives at CDC: The Purchaser's Guide

- Purchaser's Guide to Clinical Preventive Services
  - Published by National Business Group on Health
  - Funding and staff support from CDC
  - Cosponsored by AHRQ
- Presents business case rationale for employers to cover recommended preventive services
- Example: screening pregnant women for iron-deficiency anemia and providing iron supplements
  - Screening by hematocrit or hemoglobin count (<$20 according to claims data)
  - Insufficient information to assess return on investment (ROI)

Health Policy and Health Disparities

- Chen Z, Roy K, Haddix AC, Thacker SB. Factors associated with differences in mortality and self-reported health across states in the United States. *Health Policy*. In press.
- Roy K, Haddix AC, Ikeda RM, et al. Monitoring progress toward CDC's health protection goals: health outcome measures by life stage. *Public Health Reports*. 2009;124:304-16.
- Chen Z, Roy K. Calculating concentration index with repetitive values of indicators of economic welfare. *Journal of Health Economics*. 2009;28:169-75.
- Thacker SB, Stroup DF, Carande-Kulis V, et al. Measuring the public's health. *Public Health Reports*. 2006;121:14-22.
- Keppel K, Pamuk E, Lynch J, et al. Methodological issues in measuring health disparities. *Vital Health Statistics 2*. 2005; (141):1-16.

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Health Policy Modeling

- HealthBound simulation model
  - Milstein B, Homer J, Hirsch G. Are coverage and quality enough? A dynamic systems approach to health policy. *American Journal of Public Health,* In press.
  - Model of policy scenarios
    - Expand health care coverage
    - Improve health care quality
    - Promote healthier behaviors and build safer environments
  - Outcomes modeled over 25 year time horizon
    - Morbidity – unhealthy days
    - Mortality
    - Health care expenditures

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