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Public health economics - an emergent subdiscipline?

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INDIVIDUAL'S HEALTH – Conceptual Papers & Research on Methods

PIH58

HEALTH AND ECONOMY: A GOVERNMENTAL PERSPECTIVE, NATIONAL ACCOUNTING MODEL FOR ASSESSING INVESTMENTS IN ROTAVIRUS VACCINATION

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OBJECTIVES: The WHO repeatedly stresses the importance of human capital and investing in health as a determinant of future economic growth. We describe a health care investment model that reflects the government perspective attributed to investing in rotavirus vaccination in Egypt, and how changes in morbidity and mortality influence government expenditure (education, health, allowances) over many generations. **METHODS:** The model applies a generational accounting approach for estimating the inter-temporal fiscal impact of policy changes. It accounts for direct fiscal transfers between age cohorts and the State during different life stages—childhood, school-age, working-age, and retirement—while simultaneously accounting for rotavirus medical costs, and how rotavirus mortality and morbidity influence government fiscal transfers. Costs are expressed in Egyptian Pounds (EGP; 1€ = 7EGP). The model is constructed using Egyptian life tables, rotavirus related and unrelated health care costs, employment earnings adjusted for age and social parameters. The model compares vaccinated and unvaccinated cohorts against rotavirus using discounted net tax revenues (gross taxes—transfers). **RESULTS:** Based on variations in rotavirus vaccine price, the model predicts health service savings mostly attributable to averting rotavirus treatment costs that could be achieved within 3–5 years and reaching EGP178 million obtained at year-5. The discounted net tax revenue between vaccinated and unvaccinated cohorts was EGP5.2 billion and EGP27.3 billion at year 25 and 50, respectively. Investing in rotavirus vaccination represented a 15% rate of return for government at year-50. Long-term government net tax revenues were insensitive to vaccine prices, although sensitive in short-term. **CONCLUSIONS:** Health investment models are complementary to conventional economic evaluations of health care technologies. But they illuminate how government accounts, tax revenues, and expenditures are influenced by investing in health care programs. Investing in rotavirus vaccination could deliver early cost-offsets associated with reduced health care expenditure. It could increase future government net tax revenue attributed to lives saved.

PIH59

PUBLIC HEALTH ECONOMICS—AN EMERGENT SUBDISCIPLINE?

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BACKGROUND: Are we witnessing the beginning of the development of a new subdiscipline of health economics? The purpose of the paper is to outline the main theoretical arguments for the establishment of a new research tradition on "public health economics" combining public economics with health economics. **METHODS:** The results from a systematic literature search in PubMed and NHSEED on the term "public health economics" were presented and discussed at a workshop at the Danish public health conference in Nyborg September 22, 2009. Among the invited participants were health economists, public health researchers, HTA-advisors, econometricians, and decision makers. **RESULTS:** Three main theoretical arguments were identified: 1) There is a need for developing new methods for the economic evaluation of public health interventions. 2) Economic evaluation of health care may be seriously misleading if public health research is ignored. 3) The entire health economic research tradition may benefit from encompassing a more socioeconomic model of health. **CONCLUSIONS:** There is limited tradition yet for health economists and researches within public health to work together and meet regularly, no scientific journal specifically oriented towards public health economics, and no textbook in health economics that include research from all these related areas. Thus, the research environment is to some extent characterised by lack of cooperation, which may constitute an obstacle for the development of a consistent and coherent line of economic research in the field of public health.

PIH60

ESTIMATING THE CROSS-SECTIONAL NUMBER AND GESTATIONAL AGE AT BIRTH DISTRIBUTION OF INFANTS FOR ECONOMIC AND HEALTH IMPACT ANALYSIS

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OBJECTIVES: In order to estimate the size of the population of infants at risk for seasonal influenza because of ineligibility for vaccination, we developed a method for estimating the cross-sectional number of infants under 6 months of age at any point in time. **METHODS:** Data on the monthly number of deliveries at gestational ages 23–42 weeks for 2006 (the most recent available) from from publicly accessible birth certificate data from the US National Center for Health Statistics (NCHS) were used. The number of deliveries at each gestational age each calendar week were derived based on the number of days in each month. Conditional probabilities for survival for each week after birth were derived from the linked birth and death certificate data set from 2006 for each gestational age. The number of infants younger than 6 months with a given gestational age at birth at any point in time was calculated using the following formula: Number of infants (gestational age) born (current week) + Number of infants (gestational age) born (current week-1)*1 week survival (gestational age) + . . . Number of infants (gestational age) born (current week-25)*26 week survival These results were then summed for gestational ages 23–42 weeks to obtain the total number of infants. Separate calculations were performed for single pregnancies, twins, and higher order multiples. **RESULTS:** In 2006, the average number of infants 0–6 months of age in any given week was 1.98 million, with seasonal variation reflecting seasonal variability in deliveries. **CONCLUSIONS:** Estimates of the number of infants within a given age range alive at a given point in time can be derived from routinely collected administrative data. These estimates, together with estimates of the number of pregnant women, can be used for evaluation of interventions targeting pregnant women and infants.

PIH61

CALIBRATION OF A DISCRETE EVENT SIMULATION MODEL OF NATURAL HISTORY OF HPV-RELATED DISEASES

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OBJECTIVES: Develop a mathematical model simulating the clinical and economic impact of different cervical cancer screening options for German females alongside HPV vaccination. **METHODS:** We developed a discrete event simulation (DES) model, describing the natural history of cervical cancer and genital warts for five categories of HPV types (HPV 16, 18, 6/11, other high risk and other low risk). To fit German epidemiological data, we manually calibrated model parameters for natural history to match a number of calibration targets including genital warts incidence by age, cervical cancer incidence and mortality by age, prevalence of HPV type by age, and distribution of HPV types by disease stage. The model also calibrates against prevalence of CIN by age as reported in previous HPV disease models. The fit of model outputs to calibration targets was represented by a calibration score computed using normalized residuals weighted by the quality of the available data (e.g., prioritizing epidemiological data over model results). Our model employs lognormal distributions for time to progression and two-piece exponential distributions for time to regression, enabling us to simulate the long separation in peak times between HPV infection, cervical cancer precursors and cancer incidence. **RESULTS:** Predicted type-specific HPV-prevalence and disease incidence are close to epidemiological data. HPV prevalence differed from reported prevalence by <1.55% for each 5 year age group for HPV 16, 18, and other high risk HPV. The model predicted genital warts incidence of 159 per 100,000 (target: 167), cervical cancer incidence of 17.7 per 100,000 (target: 15.5), cervical cancer mortality incidence of 4.3 per 100,000 (target: 4.1), and agreed well with incidence age distributions. **CONCLUSIONS:** We developed an individual-based, fully calibrated model that is ready for cost-effectiveness analysis of cervical cancer vaccination and screening strategies. Time-to-event distributions, an inherent feature of DES, facilitate realistic modelling of disease progression.

PIH62

ESTIMATING THE CROSS-SECTIONAL NUMBER AND GESTATIONAL AGE DISTRIBUTION OF PREGNANT WOMEN FOR ECONOMIC ANALYSIS

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OBJECTIVE: To develop a method for estimating the cross-sectional number of pregnant women, distributed by gestational age for cost-effectiveness and budget impact analysis. **METHODS:** We obtained data on the monthly number of deliveries at gestational ages 20–42 weeks for years 2003 through 2006 (the most recent available) from publicly accessible birth certificate data from the US National Center for Health Statistics (NCHS). Estimates of the number of deliveries at each gestational age each week were derived based on the number of days in each month, under the assumption that deliveries were randomly distributed throughout the month. Cohorts of women who became pregnant during the same calendar week were constructed using the following formula: Deliveries at 20 weeks (calendar week X) + Deliveries at 21 weeks (calendar week X+1) +. . . . Deliveries at 42 weeks (calendar week X+22). This procedure was repeated for each week from January 2003 through July 2006. Estimates of the number of pregnancies between 6 and 20 weeks were generated by applying gestational age-specific loss rates from a large prospective cohort study of early pregnancy. **RESULTS:** Over the 3.5 year period, there were approximately 2.5 million pregnant women ranging from 6 to 42 weeks gestational age in the US; the mean weekly number increased from 2.5 to 2.6 between 2003 and 2006. There was also substantial seasonal variation in singleton pregnancies, with the highest number of pregnant women observed in March and April of each year, but no seasonal variation in multiple gestations. **CONCLUSIONS:** Routinely collected data on births allows estimation of the number of pregnant women at any point in time. Such data, in conjunction with estimates of probabilities of delivery and pregnancy and neonatal complications, can be useful for cost-effectiveness and budget impact analyses of interventions during pregnancy.