HEALTH EXPENDITURES AND CHILD MORTALITY: EVIDENCE FROM KENYA

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Outline of Presentation

- Introduction
- Health inputs and Outcomes in Kenya
- Brief methodology
- Findings
- Conclusions

Introduction

- Health has been the concern of many countries. Why?
  - It is important in general human capital formation;
  - The delivery of its inputs is complicated.
- Health formation starts at birth, and so, health investments for an individual should start at birth.
- From Grossman (1972) each person is endowed with a minimum amount of health at birth.
  - However, even at birth, health is not equitably distributed among individuals due to differences in socioeconomic status of parents, particularly the status of mothers, which affect birth weight (Rosenzweig and Schultz, 1993).
- As infants grow through life to become adults, health is influenced by social, economic and political factors (income, female literacy, residence, etc;)

Introduction Cont'd

- From Grossman (1972), Health = f(healthcare + other goods and service............)

- These goods and services are provided in limited proportions;

- Govt resources have not been adequate and households have been forced to complement;

- Even with both Govt and household, health indicators have not reached the MDG targets;

- The performance of MDGs indicators in Africa, including Kenya, is wanting.

- Why?
  - low investment in MDGs-related sectors.

Introduction Cont'd

- For instance
  - The per capita expenditure on health has remained far below any world recommended levels.
  - Health inputs do not match the expected health outcomes.
  - Access to health facilities, health professionals, medical supplies, finance, and services like immunization reflects health investments that could not assist in realizing MDGs;
- However, availability of financial resources alone may not guarantee improved health if other underlying causes of poor health are not addressed.
  - For instance, to what extent does the environment under which health expenditures are made matter for child health? This includes the environment of the mother during child birth and the bringing up of the child.

Study Questions

- Do health expenditures by households and government have an independent impact on child health?

- Do health expenditures by households and government jointly influence child health?

- What other factors complement health expenditures in the production of child health?

- How do effects of health expenditures vary by different measures of child health?

Health Inputs and Outcomes in Kenya

- Pluralistic health system
- Distribution
  - Govt (pyramidal – referral system)
  - Private (catchment)
- Distribution influences distribution and access to health professionals, drugs and medical supplies
 - Hence influencing equity in access to healthcare

Description	Number
Total Health Facilities	8616
Population	40 Mn
Government owned	46%
Private sector owned (including missions)	54%
Level 1-3 per 100,000	19.9
Level 1-3 per 100,000	1.3

Health Inputs Cont'd – Medical Professionals

- 2) Medical Professionals
  - Access to good healthcare depends on availability of qualified physicians
    - 20.7 doctors and 159.3 nurses for every 100,000 persons (WHO recommends 21.7 doctors and 228 nurses) for optimal service delivery;
  - Skilled birth attendance was 44% in 2010.
    - Skilled birth assistance influences birth outcome, especially management of birth complications and observance of hygienic practices, hence health of mother and child.

Health Inputs Cont'd - Financing

- key input in health pxn function;
- Health infra, personnel, & drug and supplies, require to be financed adequately
- Per capita exp = USD 42/WHO 64
- % of govt exp = 4.6%/15%
- % of GDP = 5.4%
- OOP high
- HH diverts from food to healthcare;
- Govt is more recurrent – low on drugs/supplies hence get drugs from expensive private pharmacies
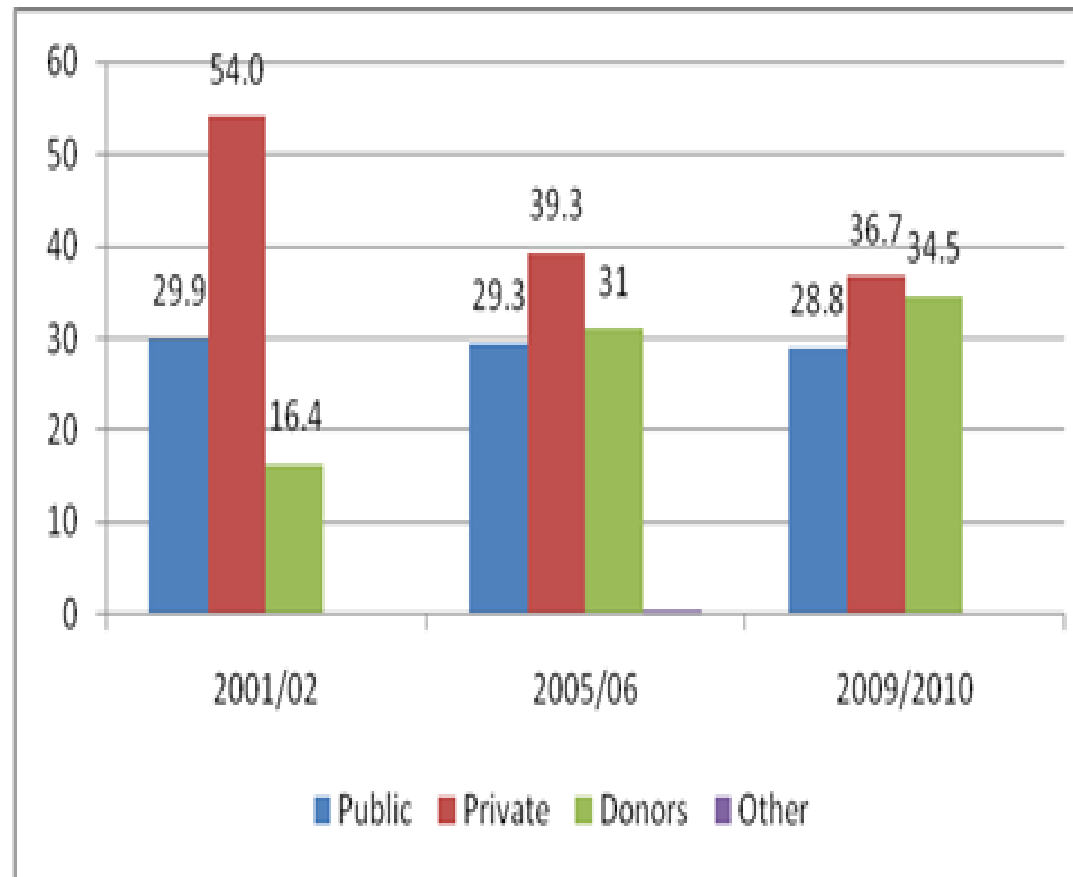
Health Inputs Cont'd - Immunization

- Full immunization coverage = 80%
  - Implication??
  - Free immunization but households refuse to immunize due to several reasons e.g. lack of money for transport; religious beliefs, etc
  - Hence, the need to realize the distinct role of government and households in health production;
  - Hence, need to investigate complementarity in health expenditure where both government and household has to spend for positive health outcomes;

Health Outcomes Indicators

- Health outcomes (HO)= f(health inputs, other inputs).

- HO indicators reflect status of health provision in a country.

- Infant mortality is affected by both quality and quantity of health available.

Indicator	Level
Life Expectancy	60, F>M
Neonatal Mortality /1000	31
Infant Mortality/1000	52
Under-5 Mortality/1000	74

Estimation:
Factors influencing health Outcomes in Kenya

- Investments in health depend on extent of an individual's health status = f(observable and unobservable factors) i.e.

$$H = H\,(Y, Z, \mu) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

- Where:

  - Y = Health inputs or behavior that yield utility to the individual and also affects health status positively (e.g. physical exercises) or negatively (e.g. smoking);

  - Z = health inputs like medical care with a direct effect on health status;

  - μ = the component of health status that depends on unobservable characteristics that influence health status (e.g. genes)

Estimation Cont'd

- From H = H (Y, Z, μ) ……………………………………(1)
- Consider the following
  i. Endogeneity of z, medical care e.g. initial health stock would determine how much you spend e.g. immunized vs non-immunized child – heavy disease burden
  ii. Heterogeneity of households characteristics μ, hence a dollar invested yields different health outcome coz of peculiar HH characteristics e.g. genetic diseases;
  iii. Independence vs interaction of household and government expenditures in health;
  iv. Predict the residuals in the error term and interact with HH expenditure;
  v. Expose the model to Kenyan data

Estimation Model

- The practical form is denoted as:

$M_i = \alpha_0 + \beta_0 W + \beta_1 HHE + \beta_2 GHE + \gamma_1 (HHE*GHE) + \gamma_2 (HHE*R\_HHE) + \gamma_3 R\_HHE + u$ ……………………………………. 10

Where

- M_i = child mortality measure (i=neonatal, infant & U5 mortality) = dummy

- W = control variables (e.g. mother's education, age, HH head education and gender and area of residence);

- HHE, GHE = are private and public health expenditures, respectively;

- R_HHE = fitted residuals of HHE, derived from a Linear Probability Model (LPM) of HHE with age structure (proportion of household aged 60 years and above is the exclusion restriction);

- u = composite error term comprising ε_1 and a predicted part of ε_2; and,

- α, β and γ = parameters to be estimated.

Estimation Cont'd

- We run three versions of equation 10:

1) A Linear Probability Model (LPM) of mortality measure regressed on all variables except the predicted residuals (R_HHE) and the interaction terms (HHE*R_HHE and HHE*GHE);

2) Control Function Approach (CFA) model where interaction terms are included.

   – CFA enabled us predict residuals and include them in our equations for estimations.

   – Using CFA, we were able to control for endogeneity using predicted residuals and at the same time, we controlled for heterogeneity by interacting the residuals with the endogenous variable, HHE.

Estimation Cont'd

3). We also estimate two versions of the CFA models,

- One including mother's level of schooling
- Another including only household's head level of schooling.

- These two variables were correlated because there are some mothers who are heads of households - could not be in the same model.

- From our equation

Mi = α0 + β0W + β1HHE + β2GHE + γ1 (HHE*GHE) + γ2 (HHE*R_HHE) + γ3 R_HHE + u

- Impact of HHE on child health outcome is given by partial derivatives:

$$\frac{\partial \text{mi}}{\partial HHE} = \beta_1 + \gamma_1 GHE + \gamma_2 R\_HHE \; \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \; 10a$$

- Impact of GHE on child health outcome is given by partial derivative

$$\frac{\partial \text{mi}}{\partial GHE} = \beta_2 + \gamma_1 HHE \; \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \; 10b$$

Estimation Cont'd

- Data

- Kenya Integrated Household and Budget Survey (KIHBS) of 2005/2006;

- Government health expenditure data from the MOH.

- KIHBS contains 13,390 households - 8,570 (rural); 4,820 (urban).

- KIHBS has information on:
  - household consumption and expenditure;
  - On occurrence of children and adult deaths in a household;
  - The neonatal, infant, and under-five mortality has been used as a measure of health outcomes for the household.

Study Findings

- The results show that on average, a household spends 2.5% of its income on healthcare;

- However, there were extreme cases where some households were not spending anything on health, whereas others spent up to 95%.

Health Expenditures and Neonatal Mortality

- A unit increase in HH Exp on health reduces probability of neonatal mortality by between 0.012 and 0.015 – though insignificant;

- A unit increase in Govt Exp on health reduces probability of neonatal mortality by between 0.0012 and 0.0014 – but insignificant;
  - Conclusion – HH and Govt health Exp matter very little for neonates

- Mother's and Household's head years of schooling is **associated** with a reduced probability of neonatal mortality;
  - The variables enter the equation as control variables - correlation

- Hence, what matters for neonates is solely due to the mother's and the household's head years of schooling- the human capital level in a household;

Health Expenditures and Neonatal Mortality Cont'd

- The highly significant effect of household head years of schooling shows that it is beneficial to have not only a household head who is more educated, but also an educated mother in the household.

  - The effects of mother's education, household head education, and gender of household show that the environment in which a mother is operating in has greater influence on neonatal mortality;

  - Results confirm that neonatal mortality is affected more by the environment created by the mother for the child, rather than by the household expenditure on healthcare.

Health Expenditures and Infant Mortality

- Increase in HH and Govt Health Exp independently reduces infant mortality but statistically insignificantly;

- Govt and HH Health Exp together (i.e. their interaction) have a negative and highly significant effect.
  - It reflects their joint impact on infant mortality.

- Their effect supports the complementarity hypothesis in household health economics that when one health risk is removed, an incentive is created to remove yet another risk (Becker, 2007; Dow *et al.*, 1999).
  - For instance, full immunization reduces disease burden
  - This implies that for household or government expenditure on health to be effective, each player has to play his/her role in health investments.

Health Expenditures & Infant Mortality Cont'd

- The control variables, mother's education, gender of household head, and mother's age have a negative coefficient – is associated with a reduction in infant mortality;

- Mother's age and education represents the human capital of the mother, whereas gender represents the environment in which the mother is bringing up her child.
  - A female-headed HH reduces the probability of infant mortality.
  - Thus, older mothers, who are more educated and women heads of households, contribute significantly to improving child health.
  - They reflect the effect of women empowerment in child health.

Health Expenditures and Under Five Mortality

- A one unit increase of HH Health Exp reduces the probability of under-five by between 0.03 and 0.06.

- The estimated effects of HH health Exp and Govt Exp shows that independently, they have insignificant effects on U5 mortality.

- However, when HHs and Govt invest in health together, the effect of their joint investments in health is significant in reducing U5 mortality;

- Mother's education and education of the HH head are negatively correlated with U5 mortality;

- Thus, more years of schooling of mother and household head, lowers the probability of experiencing U5 mortality.;

  - More educated people are associated with lower poverty levels, better nutrition, and high observance of hygiene, reducing episodes of illness, hence lowering incidences of child mortality in a HH

Conclusions

- Impact of health inputs on health outcomes depends on whether both households and government are cooperating in health investments.

  - the impact of private expenditure on child health outcomes is insignificant when it is the only source of health inputs.

  - Likewise, impact of government investment in health is insignificant if there are no complementary investments by households.

  - Hence, the households and government have to invest jointly in order to effectively reduce competing risks to child's health.

Conclusions Cont'd

- There are other important factors that influence child health apart from health expenditure.
  - For instance, gender of household head, mother's education, and household's head education, all matter importantly for child health.
- There is complementarity (in child health advancement) between health expenditures and unobservables of medical and non-medical variety - include cultural and religious influences on healthcare uptake and ineffectiveness of children's medicines when not properly administered;
- The impact of health expenditure on child health depends on age of the child. For neonates, the mortality effect of health expenditure is zero, but the effect of human capital of the mother is substantial.
- The health effect of human capital variables (education & age) of the mother is statistically significant irrespective of the age of the child.

Conclusions

- The impact of health inputs on health outcomes differ depending on the measure of health outcomes being considered.

  - HH and Govt Exp have a combined negative impact on infant and U5-mortality; mother's characteristics/environment influence on neonatal

- Generally, the status of a mother in a household is very important in the reduction of child mortality.

  - When a woman is household head or when household head is more educated, the probability of mortality is greatly reduced

  - The probability is further reduced if the woman is not only educated but is also the household head, or if a household has an educated mother.

- Thus, raising the social and economic status of the mother is a powerful strategy for improving child health in Kenya, and in other countries at a similar level of development.

The end

Thank you

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