II. Overview of Methods

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Overview of cost methods

- Review general concepts for costing methods

- Case study for HPV vaccination across four countries (Levin et al. 2013)

Prelude

- Bountiful costing terms and methods.

- Purpose determines the choice of methods.

- Time horizon and timing of costing matters.

- Perspective is about whose costs?

- Scale and scope will affect the total and unit costs.

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The main methodological issues
in costing health care services

A literature review

Translation

Basic approach

- Define the problem
- Identify
- Measure
- Value
- Calculate

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Identifying Costs- types of costs

- Direct Health Care costs
  - Treatment or preventative care
  - Hospital, facilities, communities, home
  - Medication, procedures, tests, equipment

- Direct Non-Health Care costs
  - Out-of pocket expenses- transportation, child care

- Productivity costs (Indirect costs)
  - Lost economic productivity due to disability or death

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Identifying costs: Basic elements to consider

For example

Costs for the health sector	←	Staff costs, drugs, supplies
Costs for patients and their families	←	Out of pocket expenses
Costs for other sectors	←	Lost production form work absenteeism
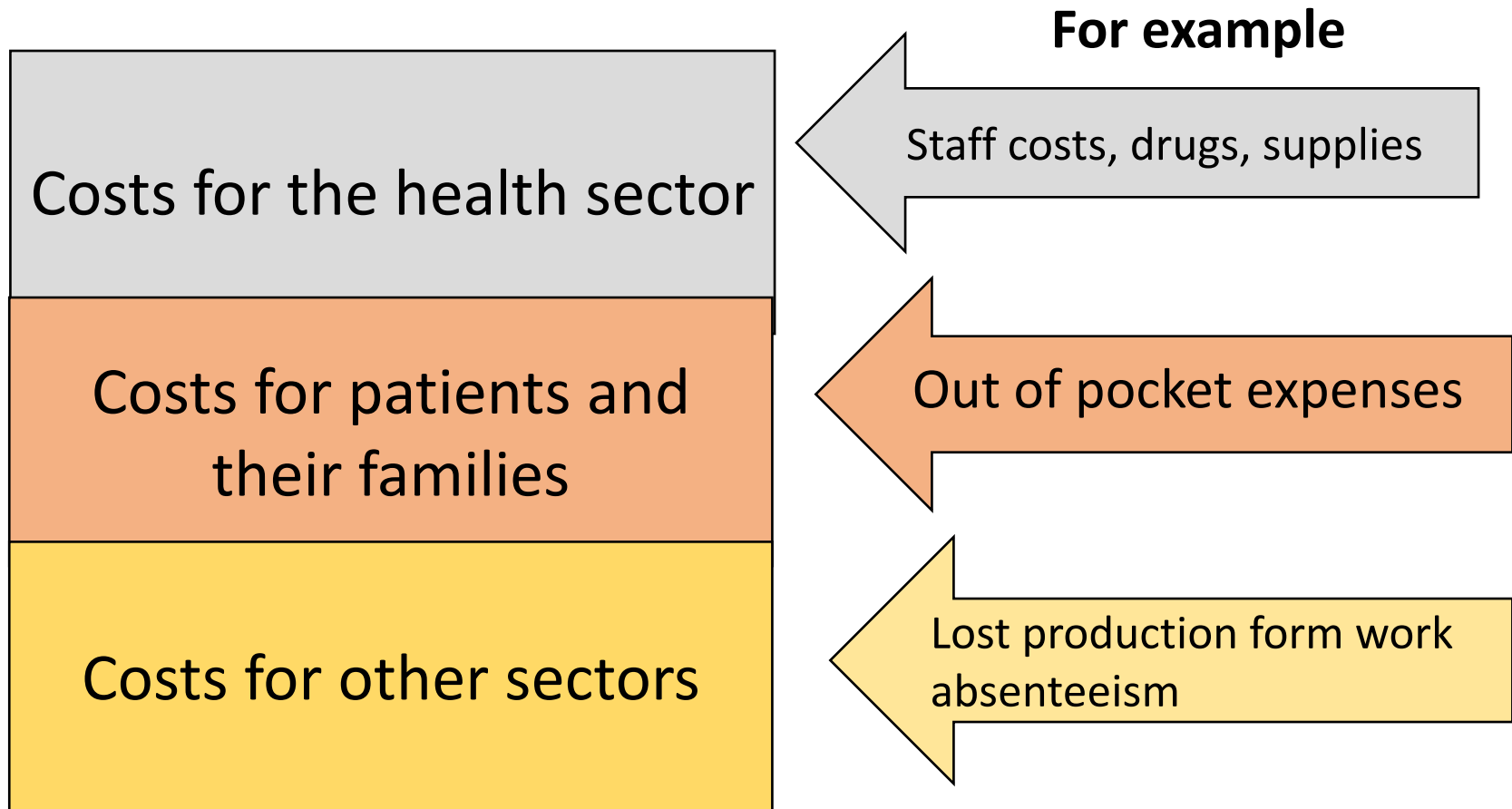
Cost methods

- Micro-costing methods
  - Bottom up costing

  - Quantify and cost out every input consumed in preventing or treating disease in an individual

- Gross costing or using average costs
  - Allocate the total budget (expenditures) to a particular department or service.

  - Top down costing

- Not mutually exclusive

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Step-down accounting

- Health facility level
- Identify major functions or cost centers of the facility

Activity based costing

An activity-based cost analysis of the Honduras Community-Based, Integrated Child Care (AIN-C) programme

John L Fiedler,[1]* Carlos A Villalobos[2] and Annette C De Mattos[1]

The Honduras AIN-C programme is a preventive health and nutrition pro-gramme of the Honduras Ministry of Health (MOH) that relies on volunteers to help mothers monitor and maintain the adequate growth of young children. A quasi-experimental, design-based evaluation found that the programme achieved near-universal coverage and was effective in improving mothers' child-rearing knowledge, attitudes and practices, including feeding and appropriate care-giving and care-seeking practices for children with diarrhoea and acute respiratory illness. The programme is widely regarded as a model. This study was undertaken to provide the first comprehensive estimates of the cost of the AIN-C programme, with the goal of providing a programme and financial planning tool for Honduras. An additional comparison of study findings was also undertaken to determine the cost of the AIN-C programme's community-based services relative to a similar facility-based service. Expressed in mid-2005 US dollars, the study found that after the programme is phased-in: (1) the annual, recurrent cost per child under 2 years participating in the programme is $6.43; (2) the annual, incremental budget requirements per child under 2 years participating in the programme are $3.90; (3) the cost of an AIN-C monthly growth monitoring and counselling session per child is 11% of the cost of a traditional MOH, facility-based growth and development consultation per child; and (4) the effect of mothers substituting AIN-C monitor care for MOH facility-based care 'saves' 203 000 outpatient visits a year, with a potential cost saving of $1.66 million, the equivalent of 60% of the recurrent cost of the programme and roughly equal to the annual incremental budget requirements of the programme.

Sensitivity analysis of the cost estimates is performed to provide insight, for countries considering introducing a similar programme, into how modifications of key characteristics of the programme affect its costs.

Keywords   Nutrition, community-based nutrition, cost analysis, health care financing, community participation, volunteer incentives

Dalaba et al. BMC Health Services Research 2013, **13**:287
http://www.biomedcentral.com/1472-6963/13/287

BMC Health Services Research

RESEARCH ARTICLE   **Open Access**

Cost of maternal health services in selected primary care centres in Ghana: a step down allocation approach

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Abstract

Background: There is a paucity of knowledge on the cost of health care services in Ghana. This poses a challenge in the economic evaluation of programmes and inhibits policy makers in making decisions about allocation of resources to improve health care. This study analysed the overall cost of providing health services in selected primary health centres and how much of the cost is attributed to the provision of antenatal and delivery services.

Methods: The study has a cross-sectional design and quantitative data was collected between July and December 2010. Twelve government run primary health centres in the Kassena-Nankana and Builsa districts of Ghana were randomly selected for the study. All health-care related costs for the year 2010 were collected from a public service provider's perspective. The step-down allocation approach recommended by World Health Organization was used for the analysis.

Results: The average annual cost of operating a health centre was $136,014 US. The mean costs attributable to ANC and delivery services were $23,063 US and $11,543 US respectively. Personnel accounted for the largest proportion of cost (45%). Overall, ANC (17%) and delivery (8%) were responsible for less than a quarter of the total cost of operating the health centres. By disaggregating the costs, the average recurrent cost was estimated at $127,475 US, representing 93.7% of the total cost. Even though maternal health services are free, utilization of these services at the health centres were low, particularly for delivery (49%), leading to high unit costs. The mean unit costs were $18 US for an ANC visit and $63 US for spontaneous delivery.

Conclusion: The high unit costs reflect underutilisation of the existing capacities of health centres and indicate the need to encourage patients to use health centres. The study provides useful information that could be used for cost effectiveness analyses of maternal and neonatal care interventions, as well as for policy makers to make appropriate decisions regarding the allocation and sustainability of health care resources.

Keywords: Cost, Step-down allocation approach, Antenatal care, Delivery, Maternal health service, Ghana

Background
Reducing maternal and under-five mortality through the use of cost-effective strategies continues to be a challenge, particularly in developing countries. The worldwide mater-nal mortality ratio (MMR), or the number of women who die during pregnancy and childbirth per 100,000 live births, declined from 299 in 1990 to 202 in 2011, representing a 1.9% average annual rate of decline. Globally, under-five mortality also declined over the past years reaching 7.2 million in 2011 [1].
In Ghana, the MMR declined from 394 deaths per 100,000 live births in 1990 to 328 deaths per 100,000 live births in 2011, a 0.9% average annual rate of decline. Also under 5 deaths in the country was estimated at 47,600 deaths in 2011 [1]. In the Kassena-Nankana and the Builsa districts, however, the MMR was high at 367 and 259 maternal deaths per 100,000 live births in 2010 respectively [2,3].
Given the limited health care resources in Ghana, coupled with the wide range of maternal and neonatal

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Empirical data collection methods

Ingredients approach

- Collect information on quantities and the prices used to value all resources.

Expenditure approach

- Use total expenditure from budget or expense reports from Ministry of Health, implementing organization (i.e. NGO), or donor.

Date	No.	Item	Amount						
08/03/11	169	Communication	5000	0	5000	0	0	0	0
10/03/11	170	Motorbike Maintenance	4000	0	0	0	0	4000	0
12/03/11	171	Safari allowance	9375	0	0	0	0	0	9375
24/03/11	172	Baseline Survey/Home visits	8000	0	0	8000	0	0	0
25/03/11	173	Quarterly Meeting	8000	0	0	0	8000	0	0
25/03/11	174	Logistical support	2325	0	0	2325	0	0	0
25/03/11	175	Safari allowance	9375	0	0	0	0	0	9375
25/03/11	176	Salaries for March	33125	33125	0	0	0	0	0
28/03/11	177	Stationery	5000	0	5000	0	0	0	0
28/03/11	178	Fuel	8000	0	0	0	0	0	8000
01/04/11	179	Training Ag Extension Officers	79320	0	0	0	79320	0	0
02/04/11	180	2nd Vine Multiplication	30000	0	0	30000	0	0	0
02/04/11	181	Purchase of Fertilizer	24500	0	24500	0	0	0	0
11/04/11	182	Communication	5000	0	5000	0	0	0	0
12/04/11	183	Fuel	8000	0	0	0	0	0	8000
14/04/11	184	Safari Allowance	9375	0	0	0	0	0	9375
14/04/11	185	Logistical Support	2325	0	0	2325	0	0	0
15/04/11	186	Follow-up Visits	5000	0	0	0	0	0	5000
19/04/11	187	Stationery	5000	0	5000	0	0	0	0
21/04/11	188	Salaries for April	33125	33125	0	0	0	0	0
21/04/11	189	Labels for beneficiaries	8000	0	0	0	0	8000	0
24/04/11	190	Stakeholders Meeting	5000	0	0	0	5000	0	0
26/04/11	191	Demo plot Establishment	89850	0	0	0	0	89850	0
TOTAL AMOUNT IN LOCAL CURRENCY (*)			682768	132500	97500	100520	152220	121153	78875
TOTAL AMOUNT IN US$ DOLLAR (**)			8753.43	1698.72	1250	1288.72	1951.54	1553.24	1011.22

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In practice, it is a combination of both methods

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Cost classification

Different way to consider costs categories

- Inputs

- Cost centers/function/activities

- Source of funding

- Level of service delivery

- Start-up costs verses recurrent

- Intervention specific costs verses joint or shared costs

- Combine categories inputs by activity

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Cost categories: Inputs

Fixed costs* - remain the same regardless of the quantity of output produced

- Equipment (Vehicles, laboratory equipment, computers)
- Development of training or communication materials
- Overhead (building, utilities, indirect expenses)

Variable costs- depend on the quantity of output.

- Personnel allowances –travel and per diems
- Supplies (IEC materials, drugs and health commodities)
- Transport costs (fuel, maintenance, taxi, public transport)

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* In the long-run there are no fixed costs

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Valuing capital costs

- Large expenditures that last over one year.

- Could be a hospital, vehicle, laboratory equipment.

- Depreciation is included in costs.

- Also often investments that must occur at the beginning of a project or program.

How to calculate depreciation?

- Equipment costs US$10,000

- Useful life years of 5 years
  - Financial depreciation is $10,000/5 = US$2000 per year
  - But this misses the opportunity cost of investing that capital elsewhere.

Economic depreciation

- Current value: US$10,000

- Useful life years

- Discount rate 5% (more challenging to calculate the real rate of interest)

- Annualizing factor (standard tables available)= 4.580

- Economic depreciation
  - $10,000/4.212=$2,183

- So, if you paid out $10,000 initially, actually paying more than US$2000 per year
  - Actual amount will depend on the interest rate.

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Valuing volunteer labor

- Community health workers (CHW) provide a lot of support at both the community and health facility level.

- Economic or opportunity cost of next best use of CHW time.

How to value volunteer time?

- Is the cost of volunteer labor zero?
  - Even if unemployed, they could be doing something else (leisure or productive) with their time
- How to value?
  - Use the value of similar employed resources
  - Use a single wage regardless of their actual employment (maybe agricultural wage rate?)

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Sources & methods for collecting quantity and price data

- Administrative data bases
  - From health facility
  - Project expense reports
  - MOH centralized records

- Standardized reporting forms

- Surveys for providers and beneficiaries

- Review of patient charts

- Observation or time-motion studies

- Expert panel

- Published price lists

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Calculate total, average and incremental costs

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Sensitivity analysis

- Process of **assessing the robustness** of an economic evaluation by considering the effects of uncertainty.

- Consists in:
  - Identifying the (uncertain) variables.
  - Specifying the plausible range over which they should vary.
  - Recalculating results, usually based on:
    - One-way analysis
    - Multi-way analysis
    - Extreme scenario analysis
    - Threshold analysis.

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