Cost of Illness Due to Typhoid Fever in Pemba, Zanzibar, East Africa

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INTRODUCTION

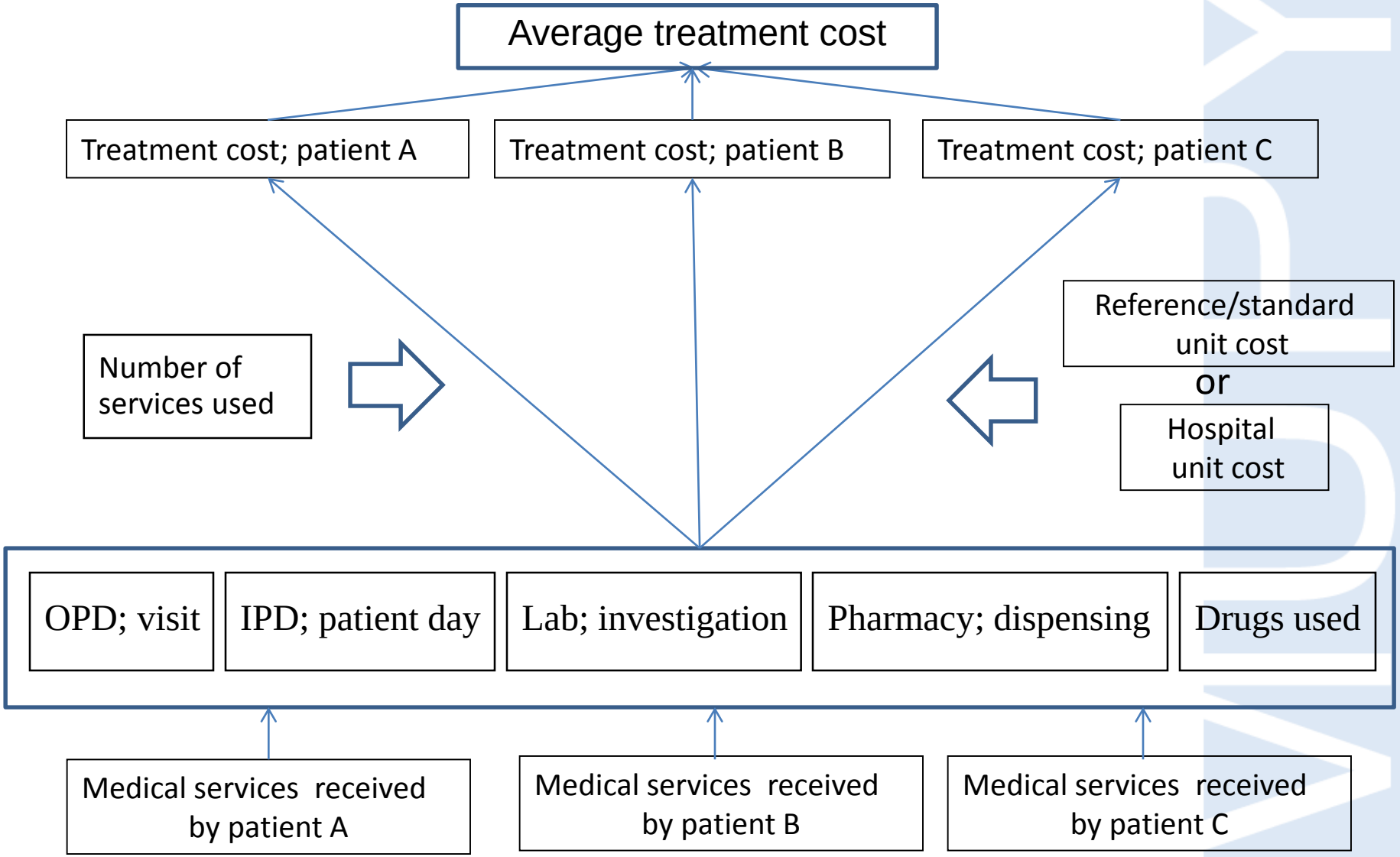
Source of maps:
http://www.bing.com/images/search?q=zanzibar&FORM=HDRSC2

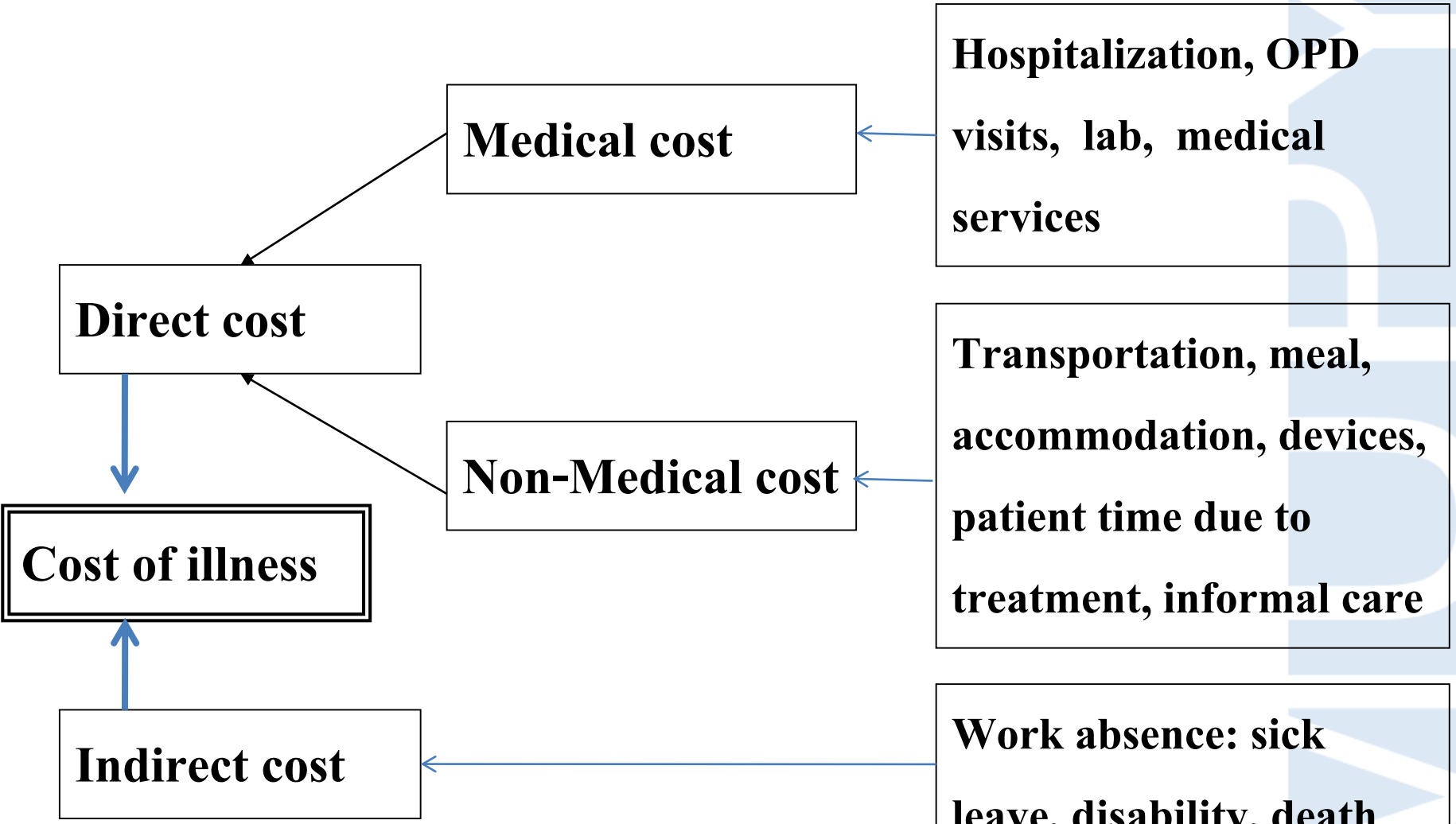
- *Salmonella enterica* serotype Typhi (*S.*Typhi) causes about 33 to 233 new cases/100,000 population/year in Africa.
- Zanzibar is a province of the United Republic of Tanzania consisting of Unguja (also known as Zanzibar) and Pemba.
- In Pemba, Zanzibar, a prospective study calculated an adjusted rate for typhoid fever of 110 cases/100,000 population/year.
- This study was conducted in conjunction with a blood culture-based passive surveillance of community-acquired bloodstream infections, set up in all three district hospitals on Pemba island (Chake-Chake, Wete, and Mkoani)
- At the time of study, based on our knowledge, this is the first cost of illness study of typhoid fever in Africa.

MATERIALS AND METHODS

- Incidence-based cost-of-illness from a societal perspective, bottom-up or micro costing approach
- **Study sample**
- Age above 2 months and a recorded temperature of ≥37.5 °C for outpatients or any history of fever for inpatients.
- Blood culture-confirmed typhoid fever
- 3 district hospitals in Pemba
- During May to December 2010 .

Bottom-up (Micro costing) approach




Medical cost
Hospitalization, OPD visits, lab, medical services
Direct cost
Transportation, meal, accommodation, devices, patient time due to treatment, informal care
Non-Medical cost
Cost of illness
Indirect cost
Work absence: sick leave, disability, death

Data collection and management

- To collect data on medical service, outpatient and inpatient records were reviewed.
- The interview was conducted to collect cost of treatment outside study sites, travel cost, meal cost, and time loss.
- Interviews were on 7, 14, 30, and 90 days after enrollment in the study.
- By two local trained interviewers.
- Productivity costs = work absence days x average income

RESULTS

Table 1 Patients' characteristics, type of treatment and outcome

Characteristics	Chake-Chake	Mkoani	Wete	p	Total
Total number (%) of patients	9 (52.94)	5 (29.41)	3 (17.65)	0.085*	17 (100)
Mean (median) age in years	19.56 (22.00)	33.40 (23.00)	14.00 (11.00)	0.474***	23 (22)
No. (%) of females	7 (77.78)	4 (80.00)	1 (33.33)	0.384**	12 (70.59)
No. (%) of patients hospitalized	4 (44.44)	0 (0)	2 (66.67)	0.297**	6 (35.29)
No. (%) of patients recovered	9 (100)	5 (100)	3 (100)	NA	17 (100)

*Chi-square test; **Fisher's exact test; ***Kruskal-Wallis test; NA=Not applicable

Table 2 Unit cost of medical services and drugs

Resource	Unit cost in US$ (TSH)
Outpatient routine service cost (per patient, per visit)	1.27 (1,817)
Inpatient hospital cost (per patient, per day)	5.12 (7,327)
Blood count	1.40 (2,000)
Blood chemistry	2.10 (3,000)
Ampicillin 500 mg vial injection	0.18 (254)
Ceftriaxone 250 mg vial injection	0.39 (557)
Ciprofloxacin 250 mg capsule	0.01 (19)
Ciprofloxacin 500 mg capsule	0.04 (53)
Glucose (5%) 500 mL	0.43 (618)
Paracetamol 120 mg/5 mL in 60-mL bottle	0.28 (404)
Paracetamol 500 mg tablet	0.01 (7)

Unit costs of outpatient and inpatient were from the WHO-CHOICE.
Drug prices were from the Medical Stores Department of Tanzania.
Unit costs of laboratory tests were the median prices from the study hospitals.

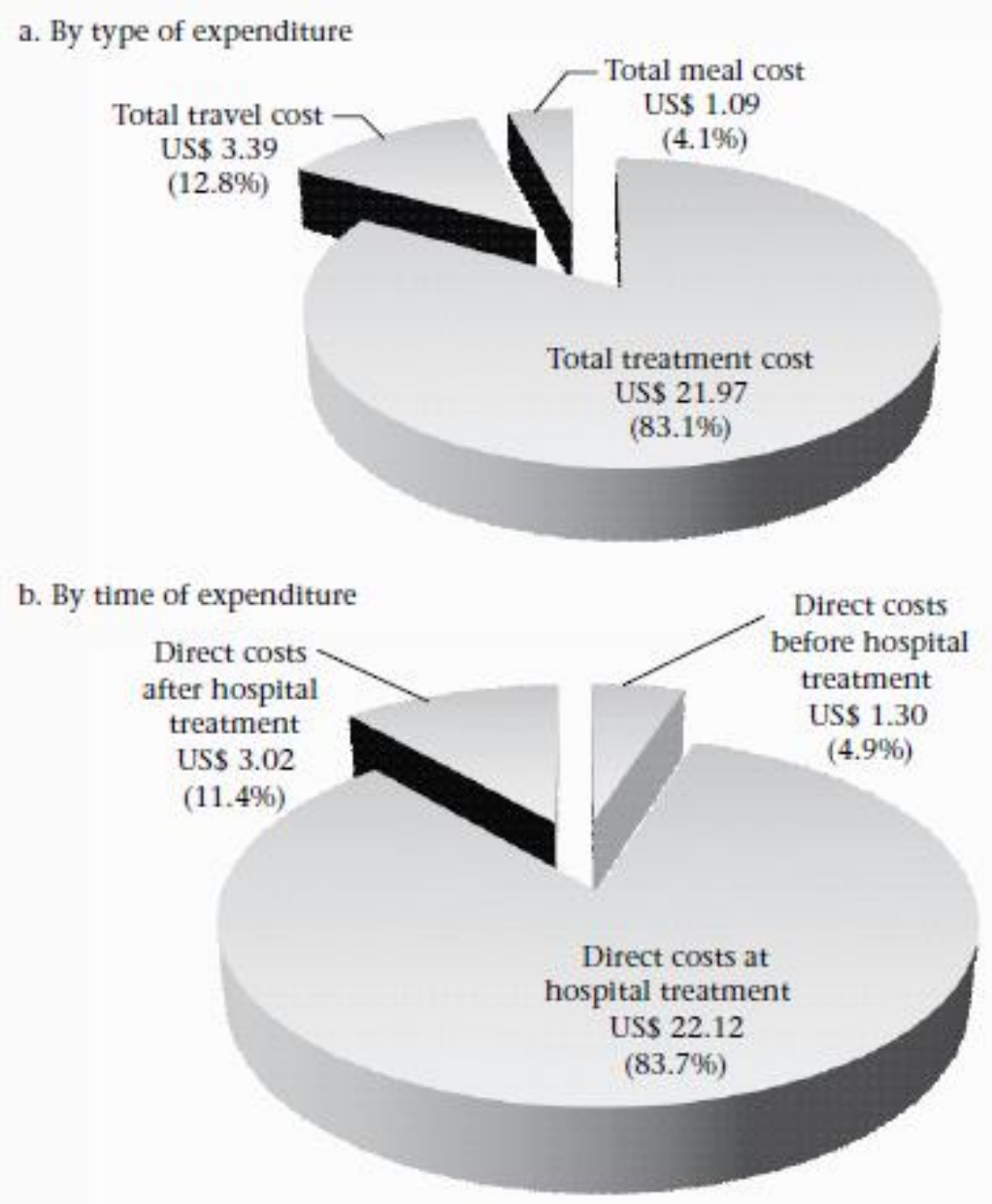
Table 3 Resource utilization and costs

Parameter	Mean	Median
Age (years)	23	22
Length of hospital stay in days (among inpatients)	4.75	4.5
Costs before hospitalization in US$ (TSH)	1.29 (1,859)	0
Treatment	1.01 (1,44)	0
Travel	0.23 (329)	0
Meal	0.86 (88)	0
Costs during hospitalization in US$ (TSH)	22.12 (31,644)	15.63 (22,354)
Treatment	19.54 (27,956)	13.70 (19,596)
Travel	1.83 (2,624)	1.40 (2,000)
Meal	0.74 (1,065)	0.07 (100)
Costs after hospitalization in US$ (TSH)	3.02 (4,326)	0.98 (1,400)
Treatment	1.42 (2,032)	0
Travel	1.32 (1,894)	0.56 (800)
Meal	0.28 (400)	0
Total direct costs in US$ (TSH)	26.44 (37,829)	22.81 (32,629)
Treatment	21.97 (31,429)	18.90 (27,034)
Travel	3.39 (4,847)	1.96 (2,800)
Meal	1.09 (1,553)	0.35 (500)
No. of days of sickness before hospitalization	12	10
Total days of sickness	21	17
Children (up to 15 years)	26	24
Adult (>15 years)	17	16
Days spent in informal care	8	4
Total productivity loss in US$ (TSH)	128.02 (183,139)	120.79 (172,787)
Children (up to 15 years)	150.28 (215,752)	123.02 (175,980)
Adult (>15 years)	112.06 (160,309)	99.54 (142,392)
Total cost of illness in US$ (TSH)	154.47 (220,969)	138.28 (197,669)
Children (up to 15 years)	183.54 (262,556)	151.24 (216,349)
Adults (>15 years)	134.12 (191,586)	119.35 (170,723)

SD=Standard deviation

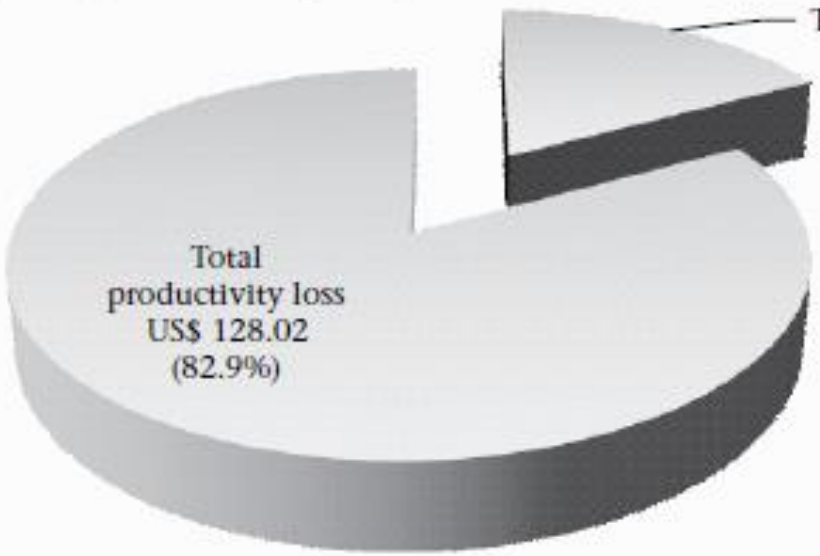
Costs were at 2010 values, (US$ 1=1,430.50 TSH).

Breakdown direct cost

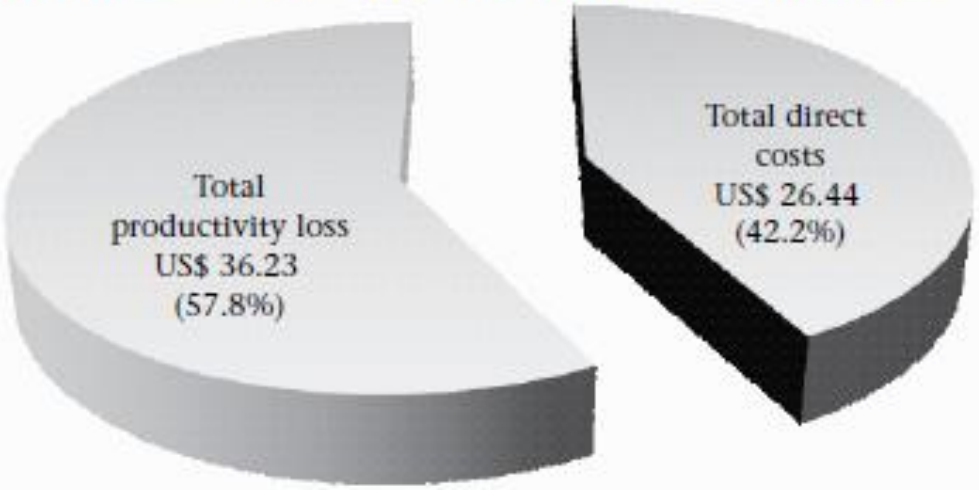


Breakdown cost of illness

a. By type of expenditure, using average income in Zanzibar (base case)



b. By type of expenditure, using country average income for productivity loss



DISCUSSION

- Treatment cost; US$ 21.97 (2010 prices) vs US$ 20.77 (2004 prices) in India.
- Productivity cost accounted for 83% of the total cost.
- Average duration of sickness was 21 days.
- **Limitations**
- Small sample-size
- Limited generalization

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