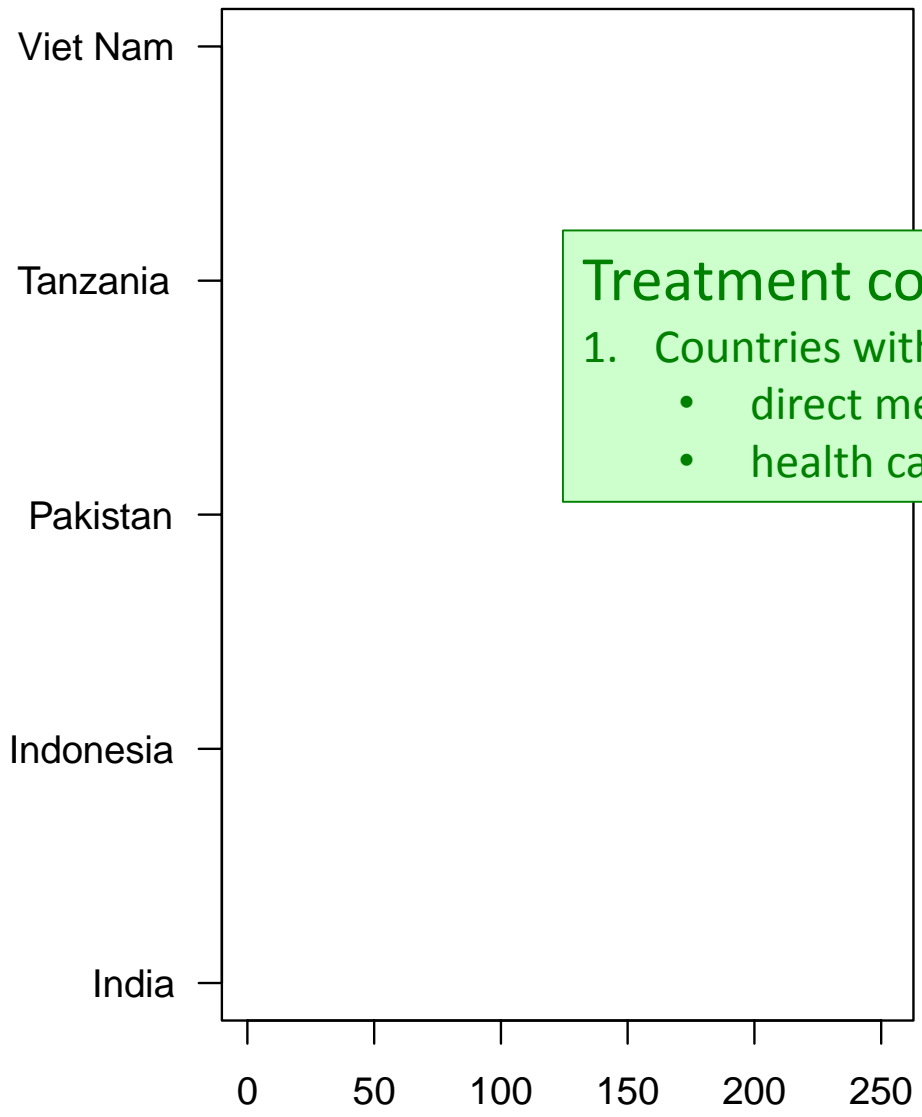


Average treatment cost for typhoid fever and average vaccine delivery cost per dose for each of the 54 GAVI-eligible countries

Joke Bilcke, Marina Antillon, Zoë Pieters, David Paltiel, Virginia Pitzer

Aim

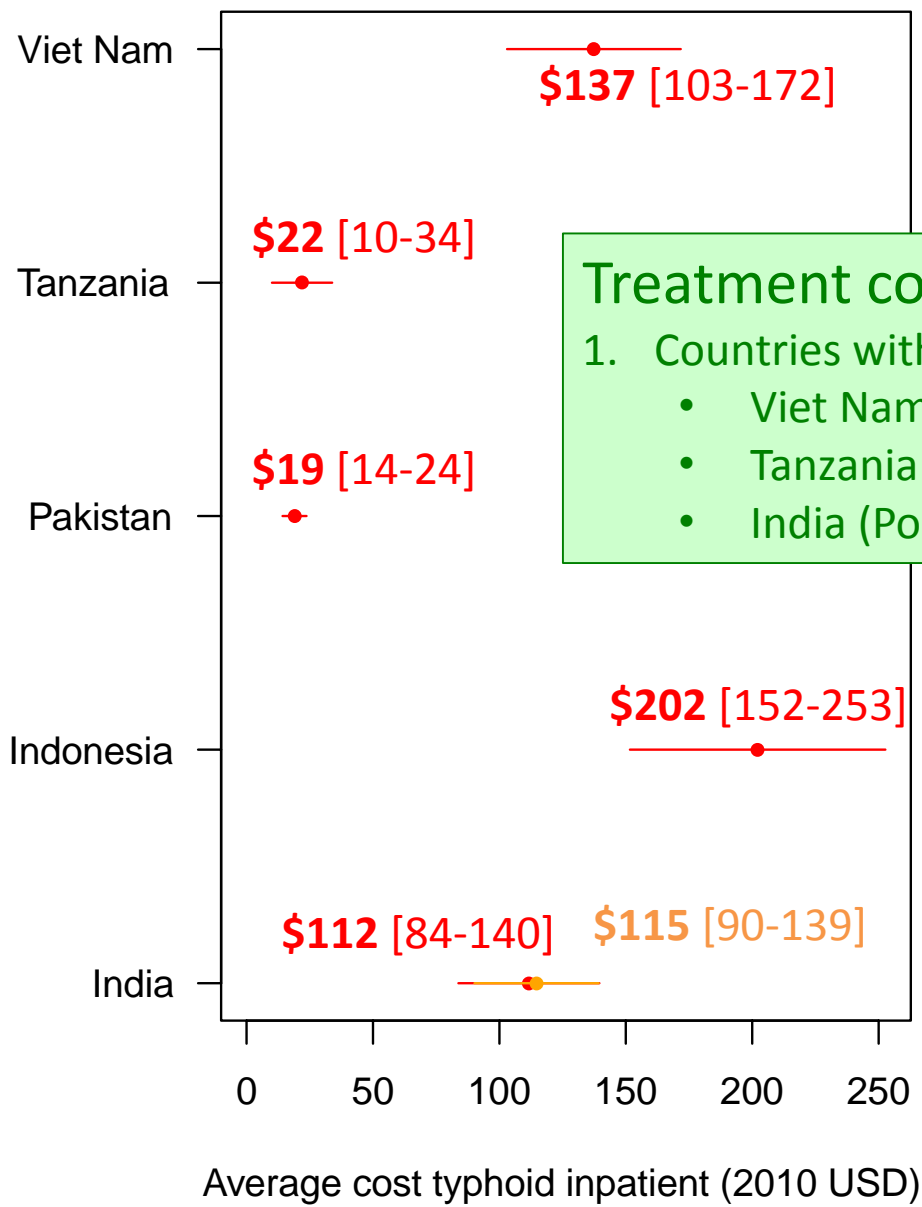
- Cost-effectiveness of conjugate typhoid vaccination strategies in 54 GAVI-eligible countries
- Identify gaps of information that should get priority for future research



Treatment cost typhoid inpatient
1. Countries with primary source data on:

- direct medical costs
- health care provider perspective

Average cost typhoid inpatient (2010 USD)



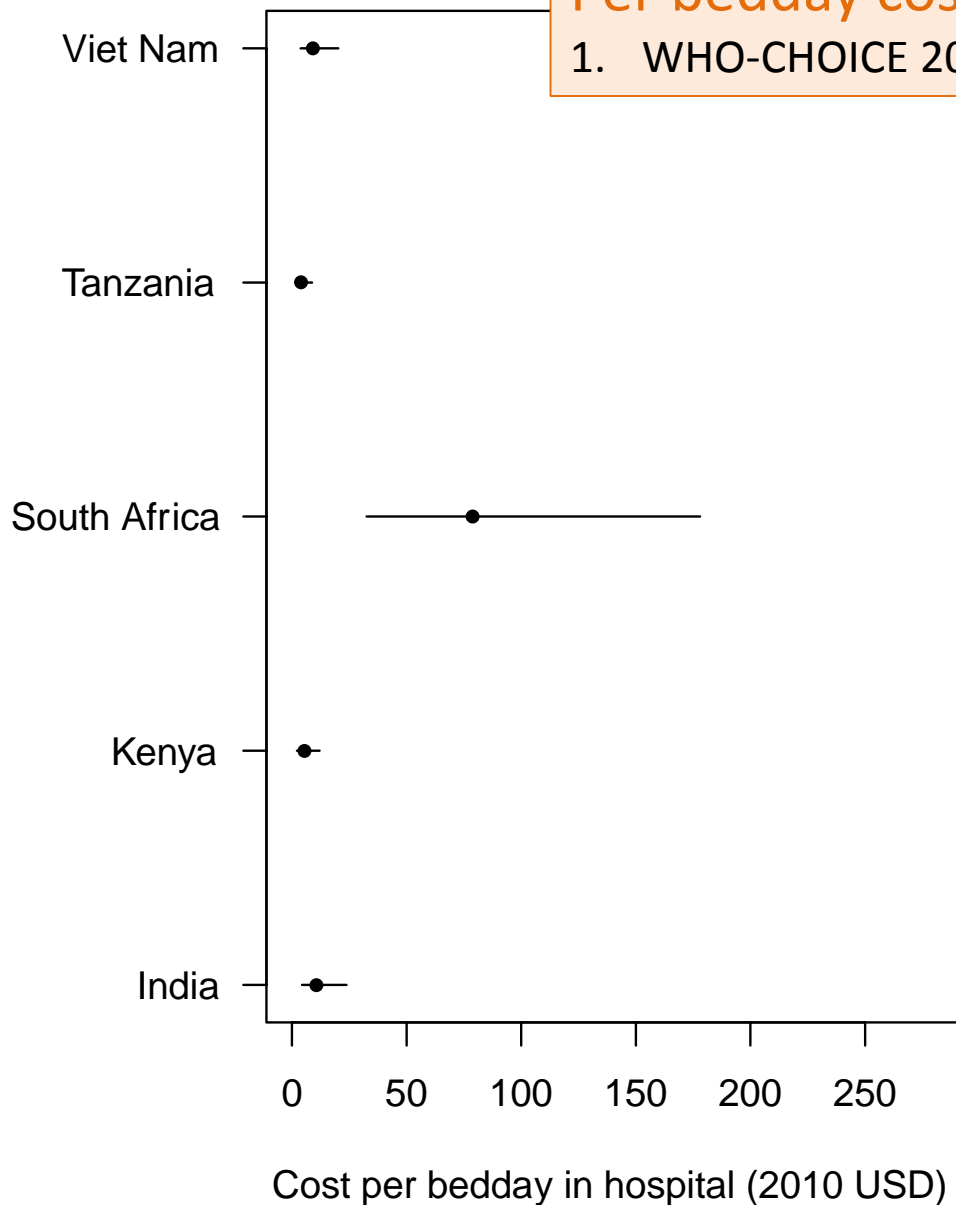
Treatment cost typhoid inpatient

1. Countries with primary source data:

- Viet Nam, Pakistan, Indonesia (Poulos et al 2011)
- Tanzania (Riewpaiboon et al 2014)
- India (Poulos et al 2011, Sur et al 2009)

Per bedday cost in primary level hospital

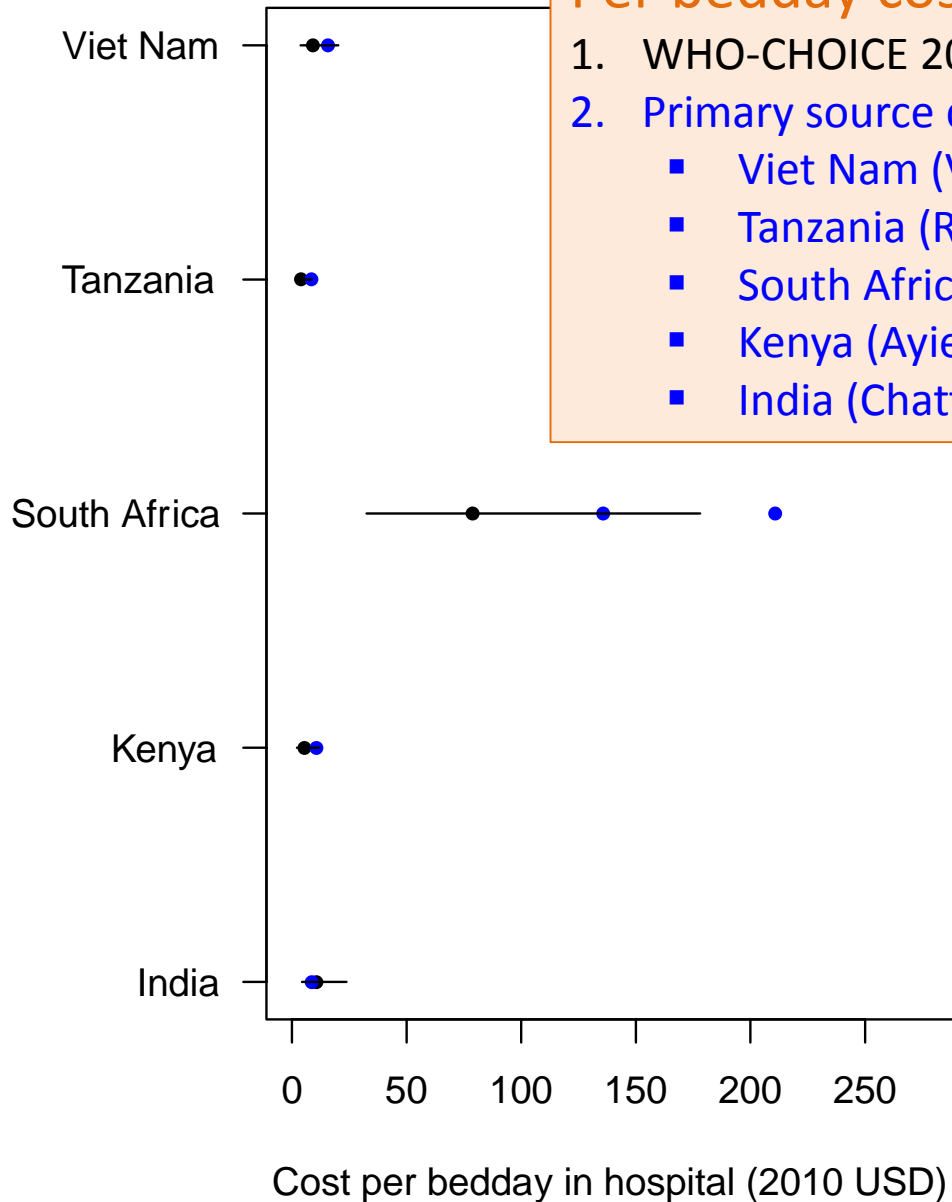
1. WHO-CHOICE 2010 unit cost data



Source: personal communication with WHO-CHOICE team at WHO-HQ

Per bedday cost in primary level hospital

1. WHO-CHOICE 2010 unit cost data
2. Primary source data district or primary referral hospital
 - Viet Nam (Vuong et al 2014)
 - Tanzania (Ruhago et al 2015)
 - South Africa (Ramjee 2013, Ataguba & McIntyre 2012)
 - Kenya (Ayieko et a 2009)
 - India (Chatterjee et al 2013)



Treatment cost typhoid inpatient

Estimates based on WHO-CHOICE 2010 data

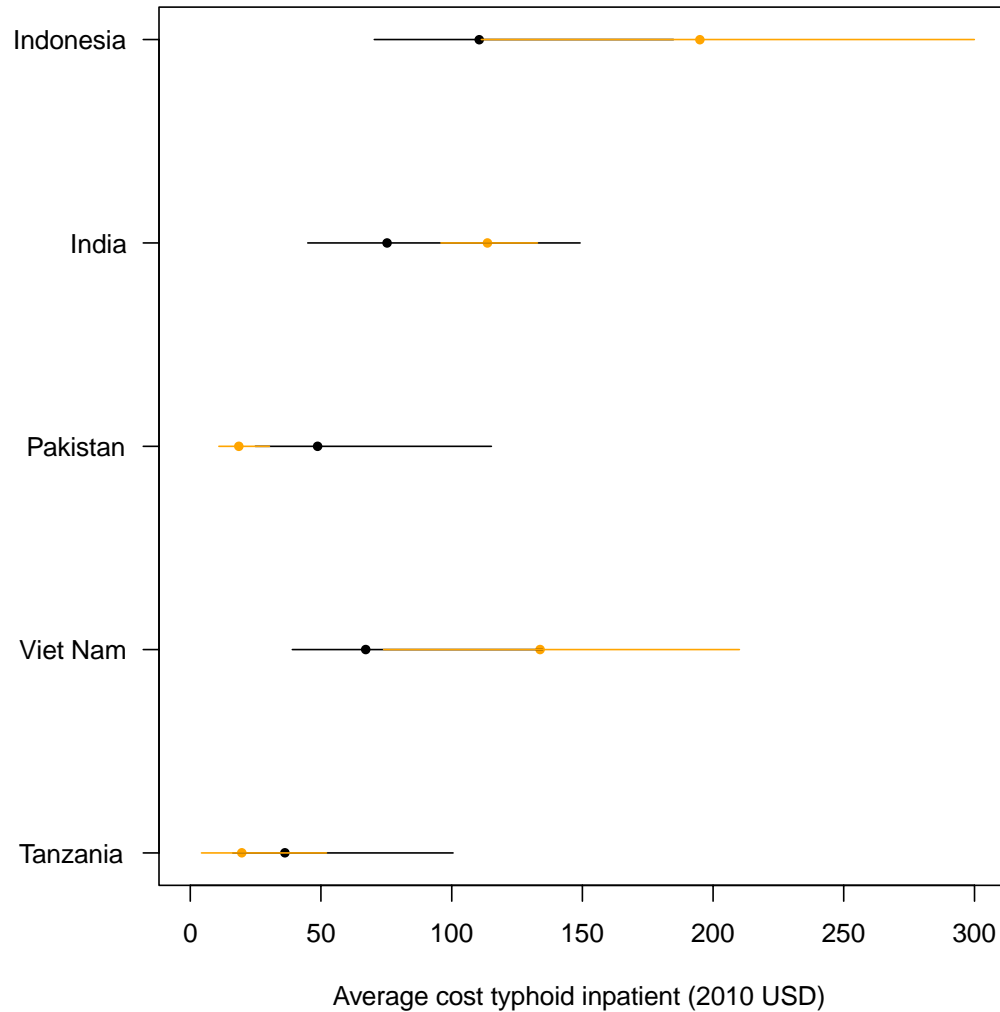
= unit cost per bedday * LOS (Sur et al, Riewpaiboon et al)
+ drugs + lab tests (Sur et al)
+ 1 outpatient visit

uncertainty:

- SE*2 because using unit cost *any disease* as proxy for unit cost *typhoid*
- SE*2 if extrapolating from single setting to country
- SE*2 if extrapolating from single country to other country

Treatment cost typhoid inpatient

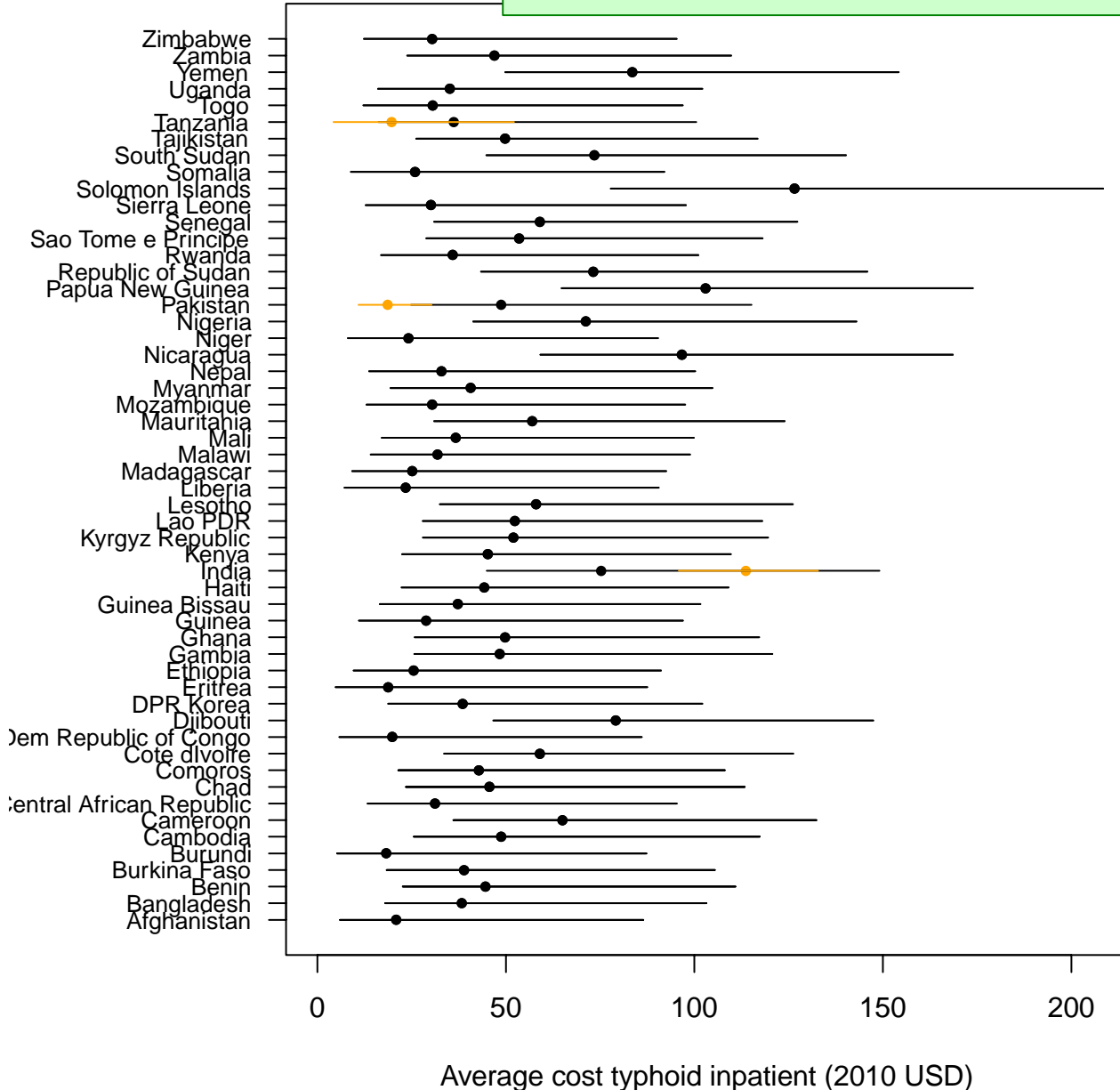
1. Countries with primary source data
2. Estimates based on WHO-CHOICE 2010 data



Treatment cost typhoid inpatient

1. Countries with primary source data

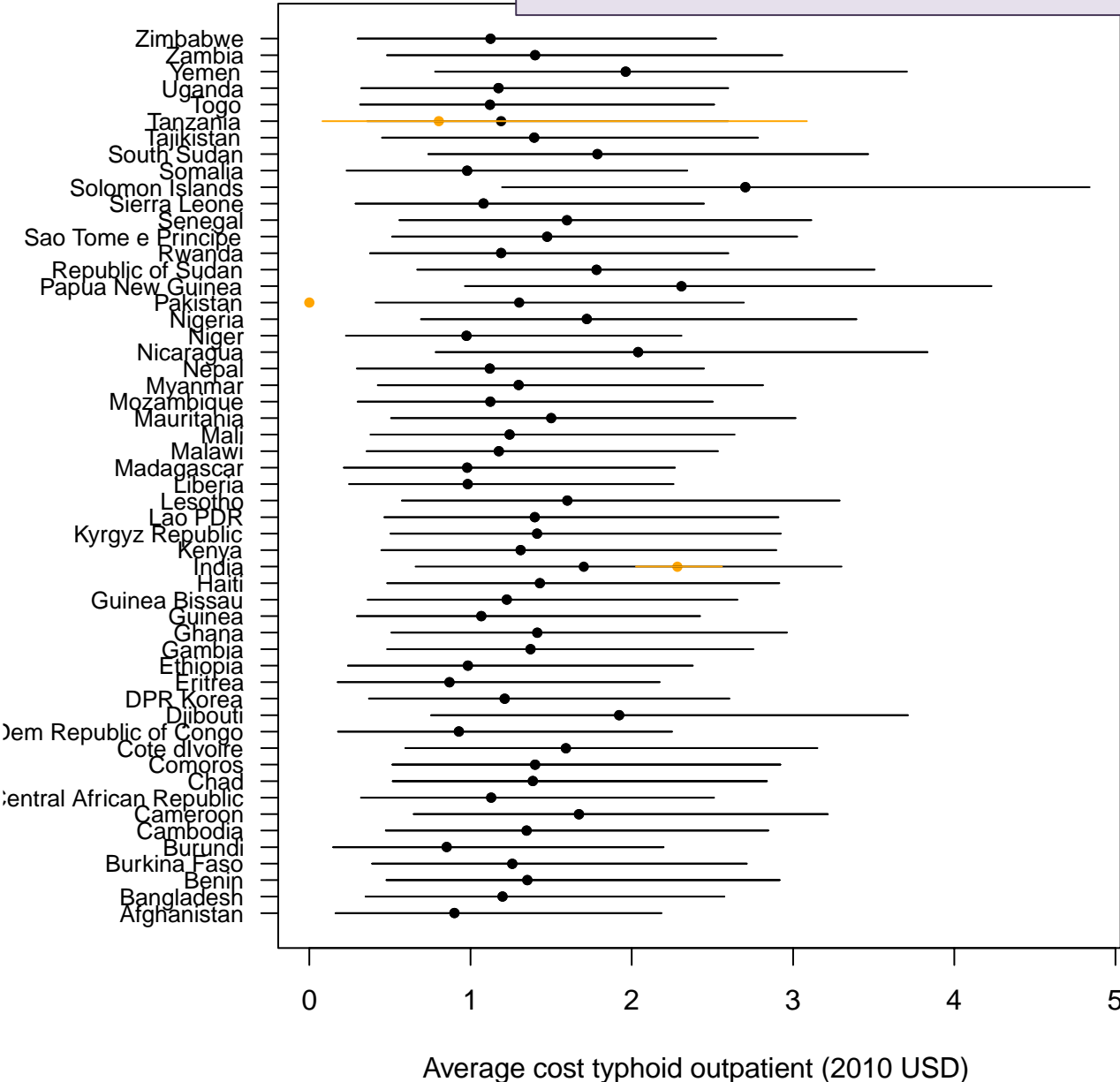
2. Estimates based on WHO-CHOICE 2010 data



Treatment cost typhoid outpatient

1. Countries with primary source data

2. Estimates based on WHO-CHOICE 2010 data



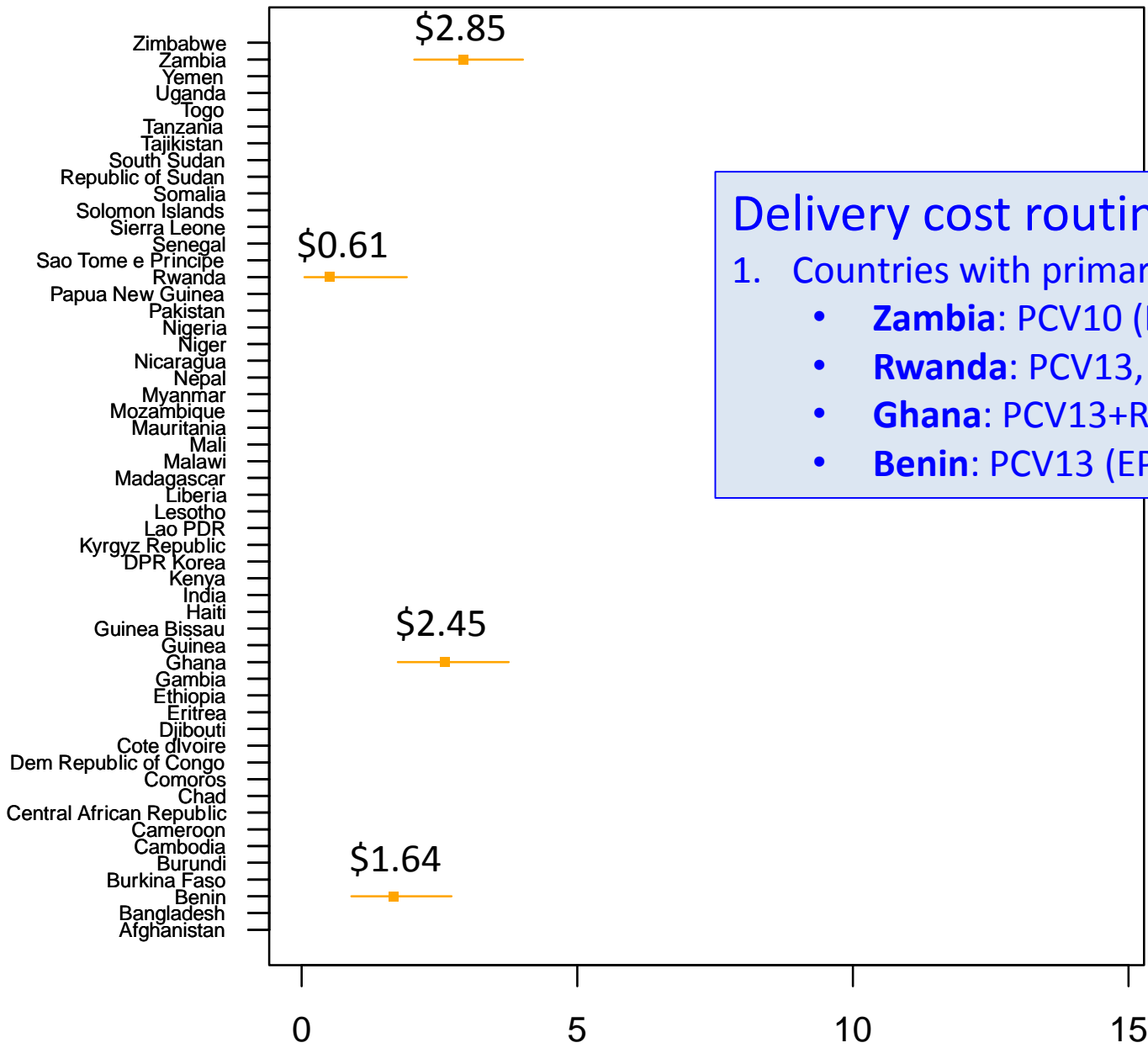
Zimbabwe
 Zambia
 Yemen
 Uganda
 Togo
 Tanzania
 Tajikistan
 South Sudan
 Republic of Sudan
 Somalia
 Solomon Islands
 Sierra Leone
 Senegal
 Sao Tome e Principe
 Rwanda
 Papua New Guinea
 Pakistan
 Nigeria
 Niger
 Nicaragua
 Nepal
 Myanmar
 Mozambique
 Mauritania
 Mali
 Malawi
 Madagascar
 Liberia
 Lesotho
 Lao PDR
 Kyrgyz Republic
 DPR Korea
 Kenya
 India
 Haiti
 Guinea Bissau
 Guinea
 Ghana
 Gambia
 Ethiopia
 Eritrea
 Djibouti
 Cote d'Ivoire
 Dem Republic of Congo
 Comoros
 Chad
 Central African Republic
 Cameroon
 Cambodia
 Burundi
 Burkina Faso
 Benin
 Bangladesh
 Afghanistan

Cost routine immunisation

1. Countries with primary source data on:

- incremental economic cost per dose
- health care provider perspective

Average delivery cost per dose (2016 USD)

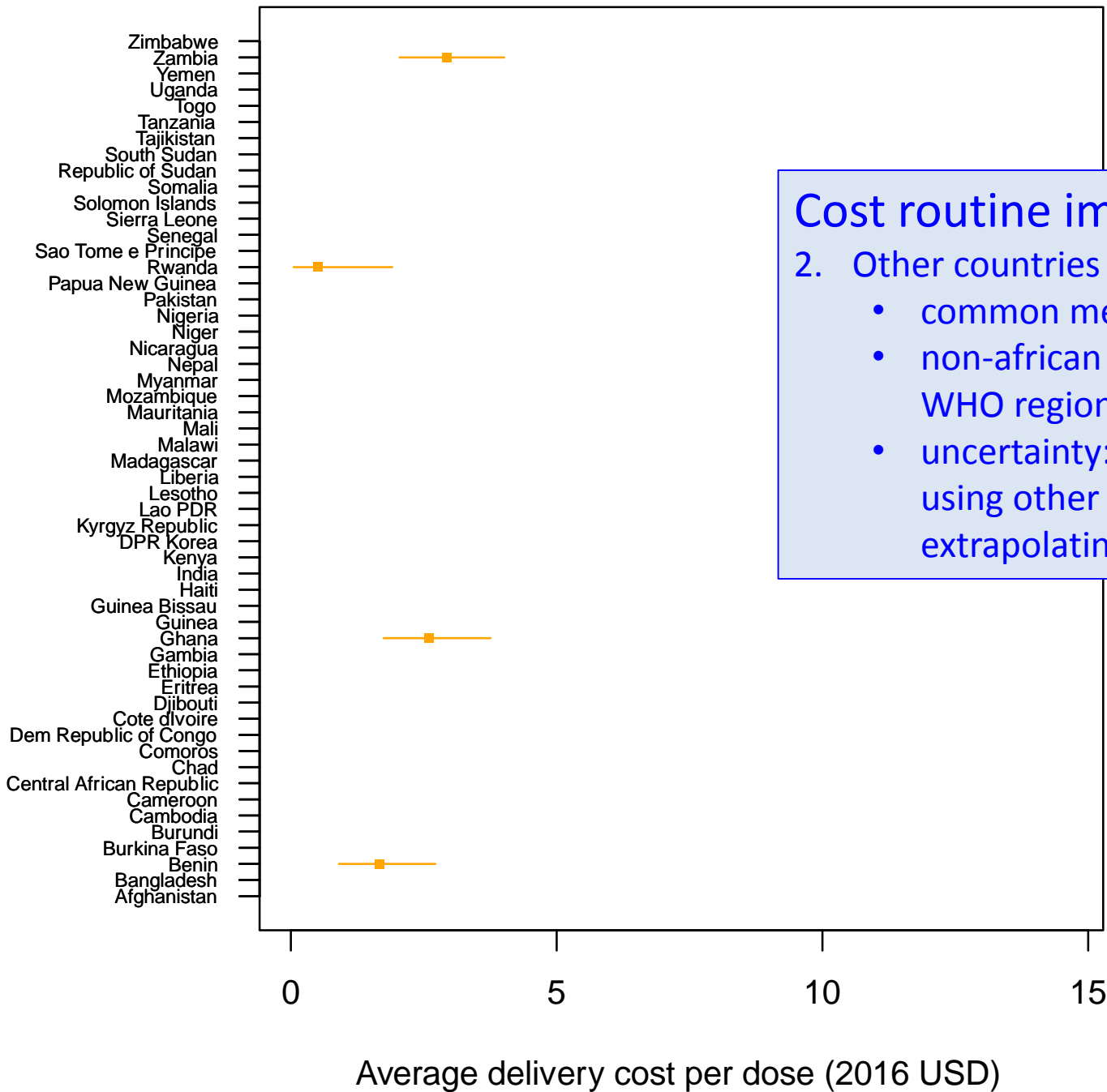


Delivery cost routine immunisation

1. Countries with primary source data:

- **Zambia:** PCV10 (EPIC)
- **Rwanda:** PCV13, RV (Ngabo et al)
- **Ghana:** PCV13+RV+measles (EPIC)
- **Benin:** PCV13 (EPIC)

Average delivery cost per dose (2016 USD)

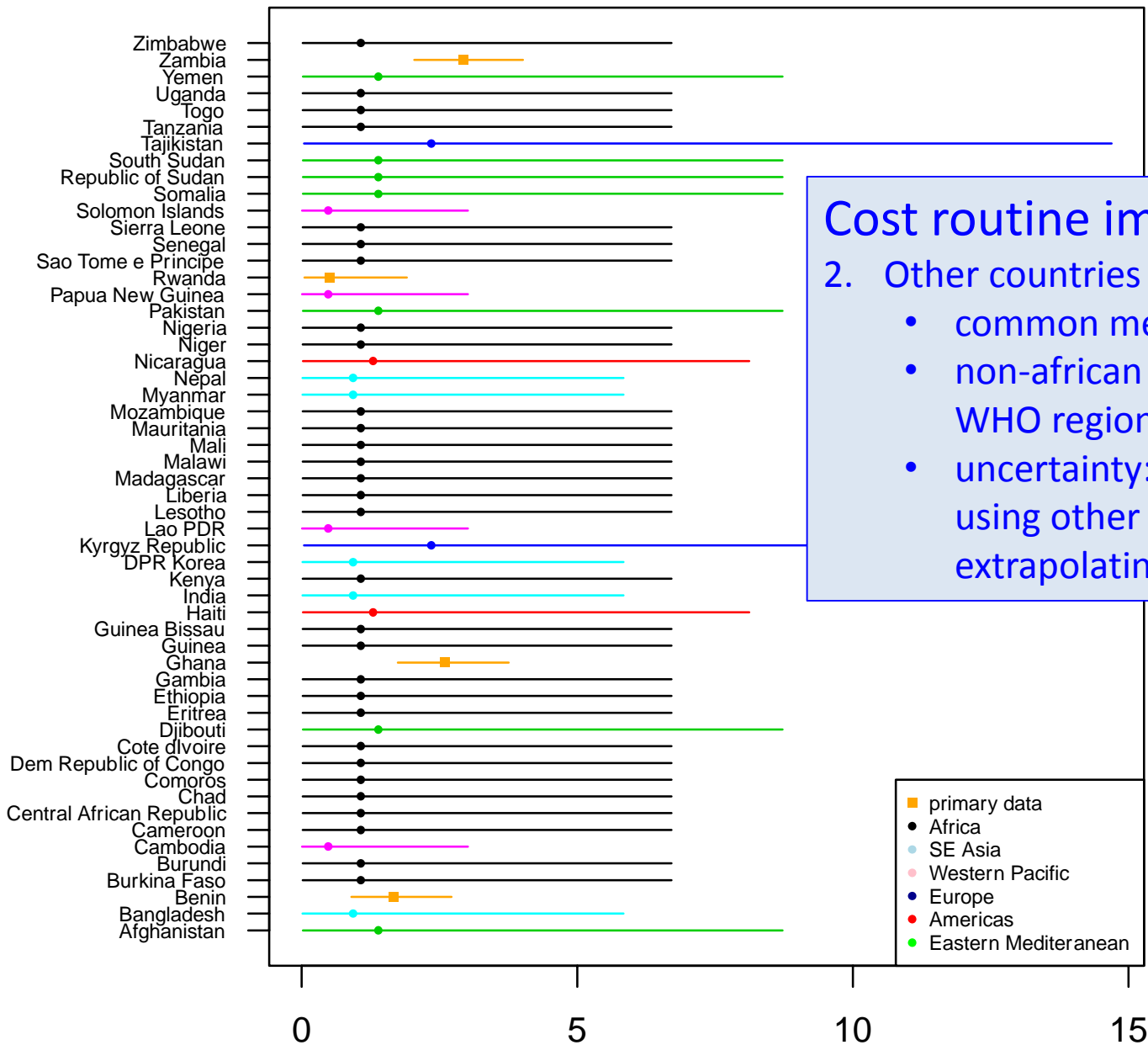


Cost routine immunisation

2. Other countries

- common mean **\$1.94 ± 0.45**
- non-african countries adjusted by WHO region (Atherly et al)
- uncertainty: SE*4 to account for using other vaccines as proxy + extrapolating from other countries

$\$1.94 \pm 0.45$



Cost routine immunisation

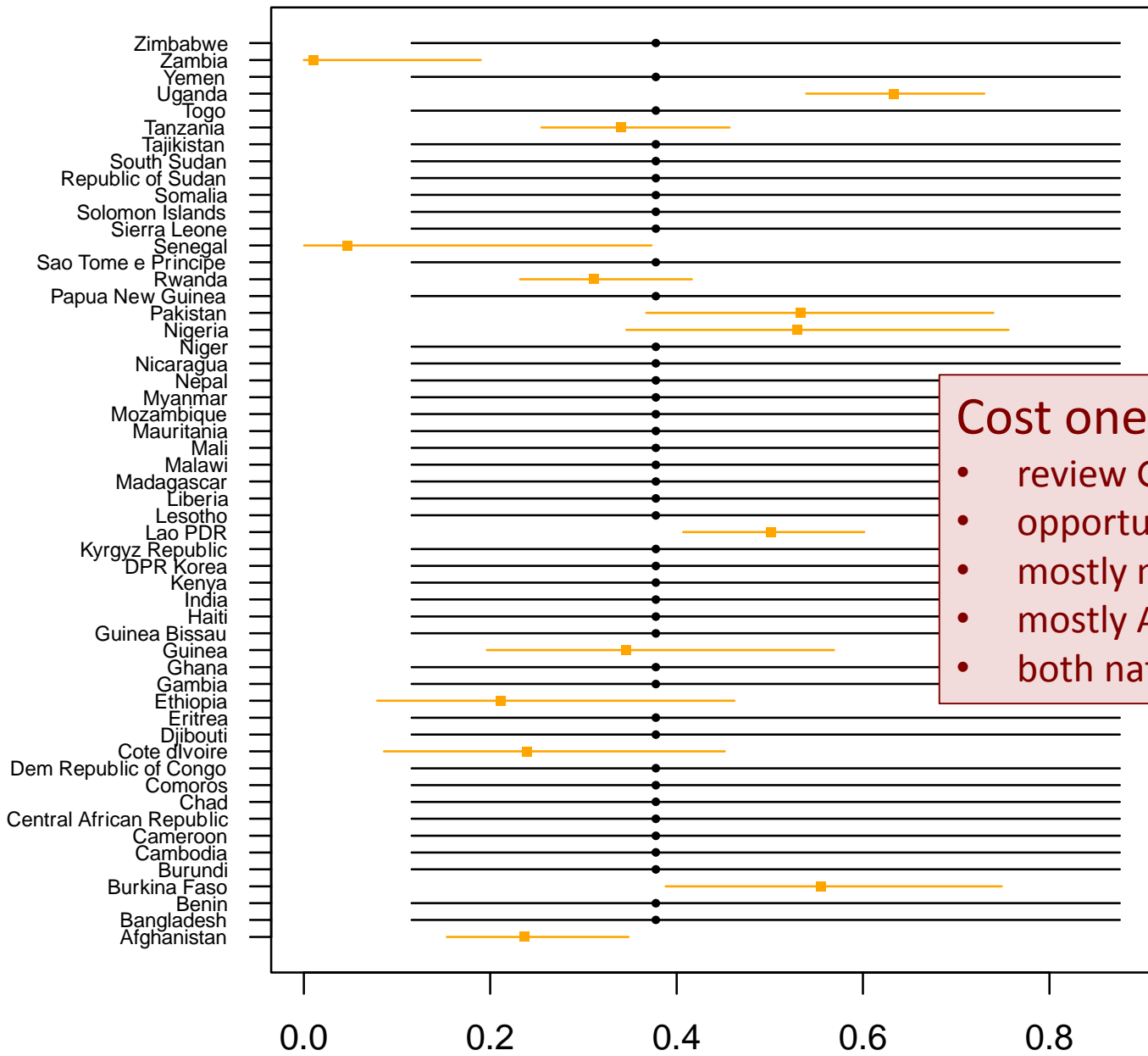
2. Other countries

- common mean $\$1.94 \pm 0.45$
- non-african countries adjusted by WHO region (Atherly et al)
- uncertainty: $SE * 4$ to account for using other vaccines as proxy + extrapolating from other countries

- primary data
- Africa
- SE Asia
- Western Pacific
- Europe
- Americas
- Eastern Mediterranean

Average delivery cost per dose (2016 USD)

\$0.41 ± 0.20



Cost one-time campaign

- review Gandhi and Lydon 2014
- opportunity costs excluded
- mostly measles
- mostly African countries
- both nationwide and regional

Average delivery cost per dose (2016 USD)

Limitations

- Few countries with primary source data
- Few data on typhoid treatment costs
- No data on typhoid vaccine delivery cost

- Relatively old data sources (WHO-CHOICE and campaign vaccine delivery)

Strengths

- Accounting for the uncertainties about how representative data are from another country/setting and from using a proxy

- Validated WHO-CHOICE with more recent data

Next steps

- Implement in cost-effectiveness model
- Use EVPPI to evaluate if and which of these costs are influential on cost-effectiveness of different strategies
- **Sensitivity analysis** on the uncertainty ranges

Thank you!

- Virginia Pitzer
- Marina Antillon
- Zoë Pieters
- David Paltiel



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GATES *foundation*