Vaccination as an essential element of reducing inequities

Ulla Kou Griffiths

Annecy, France
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Outline

Four ways immunization is reducing inequities

1	The poor have higher case fatality and sequelae rates	Promoting disease equity
2	The poor have less ability to pay for treatment costs	Promoting economic equity
3	Vaccination is an entry point to the health system for the poor	Promoting social equity
4	Some vaccines are against diseases of poverty	Vertical equity intervention

1. Promoting disease equity

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Malnutrition an underlying mortality cause for vaccine preventable diseases

Gambia 1998

Weight for age *Z*-score	Diahoea case fatality ratio	Acute respiratory infection case fatality ratio
> -2	5.6%	4.4%
< -2 to > -3	11.4%	6.9%
< -3 to > -4	16.5%	15.2%
< -4	30.5%	15.5%

Man WD *et al*. Nutritional status of children admitted to hospital with different diseases and its relationship to outcome in The Gambia, West Africa, Trop Med Int Health 1998, 3: 678–686

Link between limited treatment access and measles case fatality rates

2003-2005 measles epidemics in Niger, Nigeria and Chad

	Moursal, Chad	Boukoki, Niger	Dong, Nigeria
Case fatality in children < 5 years	6.1%	5.3%	12.9%
Proportion taken for treatment within 30 days after rash onset	73.5%	85.7%	52.8%
Proportion of those seeking care paying for services	85.2%	95.0%	95.2%
Proportion dying at home	57.1%	63.3%	87.5%
Proportion of parents whose children died at home reporting lack of money as reason for not seeking care	11%	62%	16%

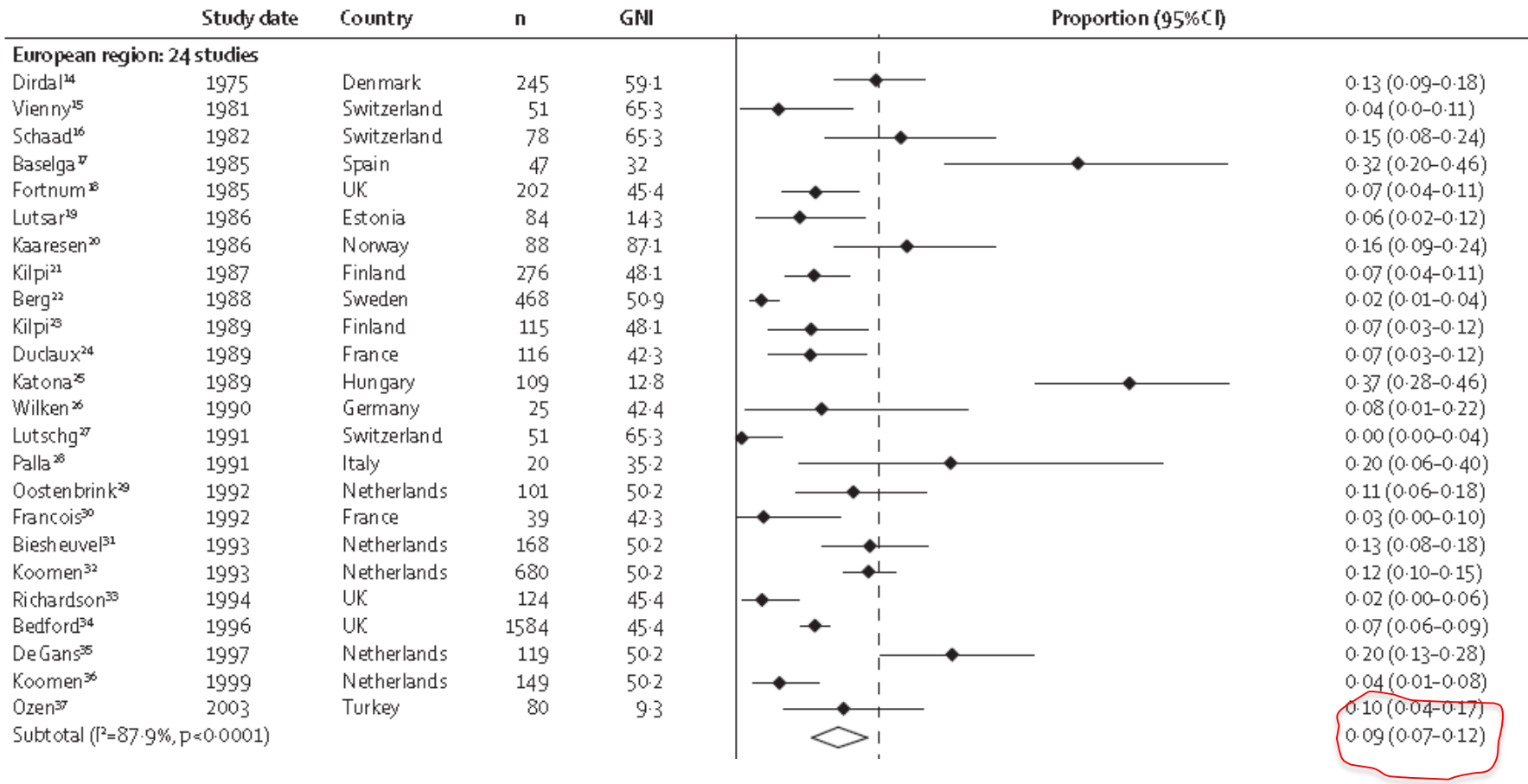
Grais *et al*, Unacceptable high mortality related to measles epidemics in Niger, Nigeria and Chad, PlosMed, 4 (1), 2007

Measles case fatality in children 1-4 yrs

CFR (%)	EURO	WPRO	SEARO	EMRO	AFRO
0.05	Developed economies	NZ, Australia, Japan			
0.1 - 0.5	Transition economies	Malaysia, Singapore	Thailand, Maldives		Mauritius, Swaziland
0.5 – 1		Philippines, Mongolia	Bhutan, Sri Lanka	Jordan, Egypt, Irak	
1 – 2			India, Bangladesh	Pakistan	
2 – 3		Cambodia, Vietnam	Nepal, Indonesia	Djibouti, Yemen	Algeria, South Africa
3 – 4		Laos, PNG	Myanmar	Sudan	Angola, Ethiopia, Uganda
4 – 5				Afghanistan, Somalia	Chad, Congo, Nigeria
5 - 4					Guinea, Liberia, Togo

Wolfson et al, Estimates of measles CFRs: A comprehensive review of community based studies, Int Jour Epi, 2009, 38, 192-205

Meningitis sequelae rates in Europe

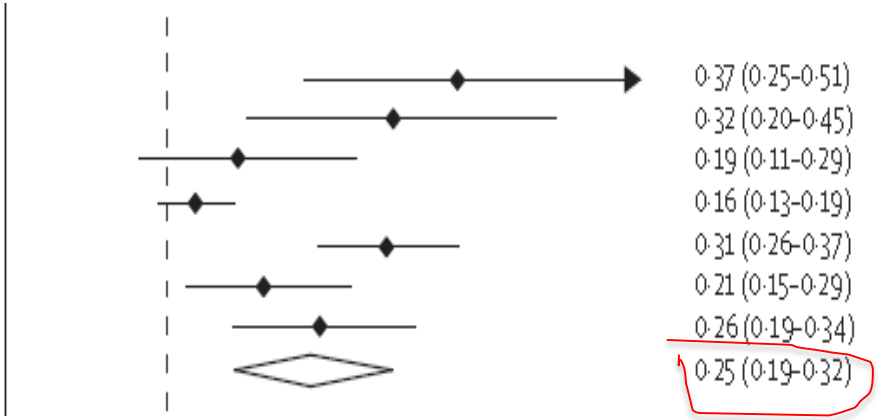


	Study date	Country	n	GNI	Proportion (95%CI)
European region: 24 studies					
Dirdal[14]	1975	Denmark	245	59·1	0·13 (0·09–0·18)
Vienny[15]	1981	Switzerland	51	65·3	0·04 (0·0–0·11)
Schaad[16]	1982	Switzerland	78	65·3	0·15 (0·08–0·24)
Baselga[17]	1985	Spain	47	32	0·32 (0·20–0·46)
Fortnum[18]	1985	UK	202	45·4	0·07 (0·04–0·11)
Lutsar[19]	1986	Estonia	84	14·3	0·06 (0·02–0·12)
Kaaresen[20]	1986	Norway	88	87·1	0·16 (0·09–0·24)
Kilpi[21]	1987	Finland	276	48·1	0·07 (0·04–0·11)
Berg[22]	1988	Sweden	468	50·9	0·02 (0·01–0·04)
Kilpi[23]	1989	Finland	115	48·1	0·07 (0·03–0·12)
Duclaux[24]	1989	France	116	42·3	0·07 (0·03–0·12)
Katona[25]	1989	Hungary	109	12·8	0·37 (0·28–0·46)
Wilken[26]	1990	Germany	25	42·4	0·08 (0·01–0·22)
Lutschg[27]	1991	Switzerland	51	65·3	0·00 (0·00–0·04)
Palla[28]	1991	Italy	20	35·2	0·20 (0·06–0·40)
Oostenbrink[29]	1992	Netherlands	101	50·2	0·11 (0·06–0·18)
Francois[30]	1992	France	39	42·3	0·03 (0·00–0·10)
Biesheuvel[31]	1993	Netherlands	168	50·2	0·13 (0·08–0·18)
Koomen[32]	1993	Netherlands	680	50·2	0·12 (0·10–0·15)
Richardson[33]	1994	UK	124	45·4	0·02 (0·00–0·06)
Bedford[34]	1996	UK	1584	45·4	0·07 (0·06–0·09)
De Gans[35]	1997	Netherlands	119	50·2	0·20 (0·13–0·28)
Koomen[36]	1999	Netherlands	149	50·2	0·04 (0·01–0·08)
Ozen[37]	2003	Turkey	80	9·3	0·10 (0·04–0·17)
Subtotal (I^2=87·9%, p<0·0001)					0·09 (0·07–0·12)

Edmond *et al* , Global and regional risk of disabling sequelae from bacterial meningitis: a systematic review and meta-analysis, Lancet Infec Dis, 2010

Meningitis sequelae rates in Africa

African region: 7 studies				
Ford[65]	1991	Swaziland	51	2·5
Akpede[66]	1992	Nigeria	50	1·2
Goetghebuer[67]	1993	Gambia	73	0·4
Hodgson[68]	1998	Ghana	505	0·7
Molyneux[69]	1999	Malawi	248	0·3
Melaku[70]	2000	Ethiopia	136	0·3
Pitkaranta[71]	2005	Angola	131	3·5
Subtotal (I^2=82·7%, p<0·0001)				



Edmond *et al* , Global and regional risk of disabling sequelae from bacterial meningitis: a systematic review and meta-analysis, Lancet Infec Dis, 2010

2. Promoting economic equity

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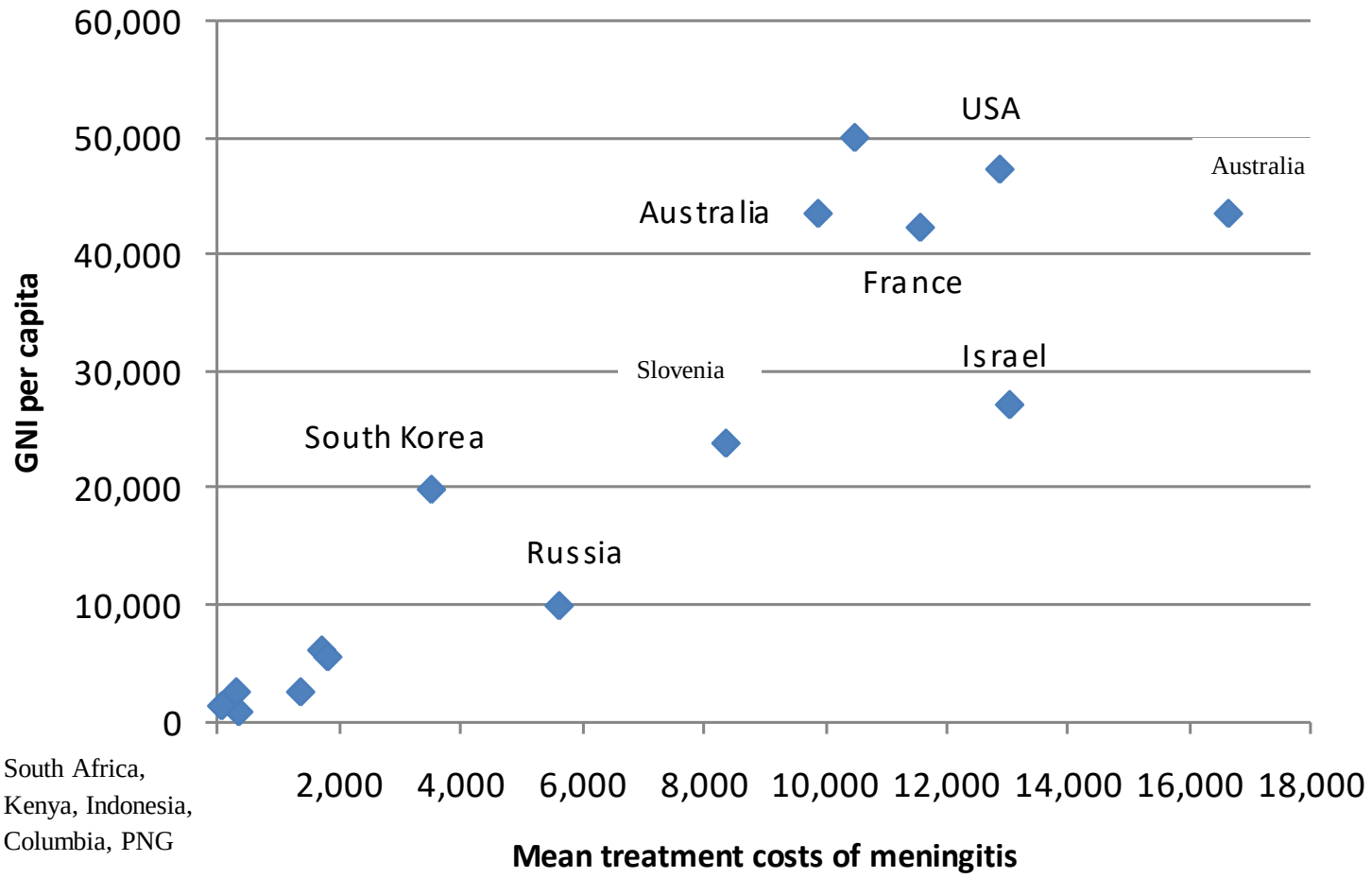
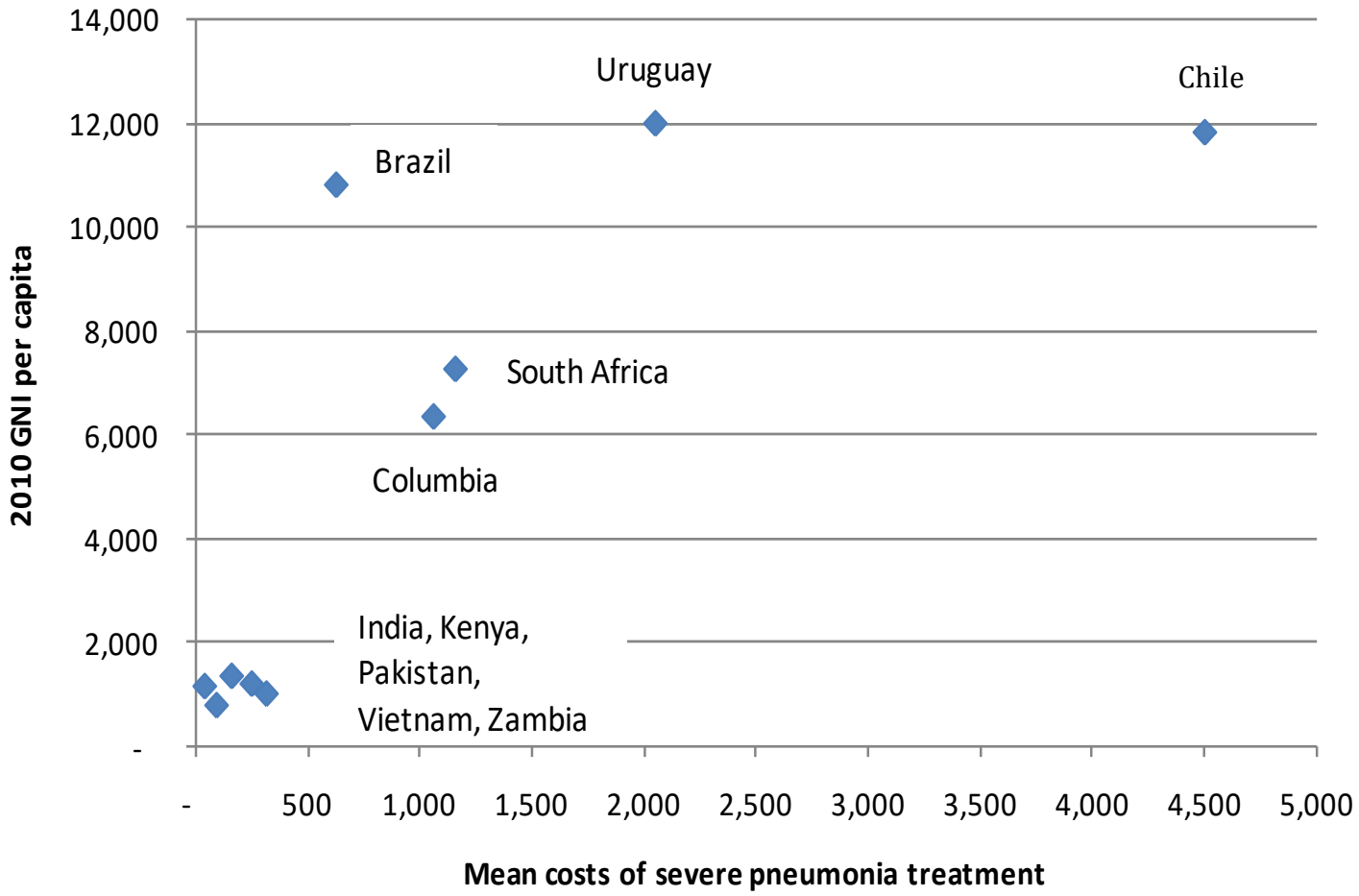
Meningitis treatment costs



South Africa, Kenya, Indonesia, Columbia, PNG

Severe pneumonia treatment costs



Kenya: User fees as a proportion of provider costs for pneumonia, malaria and meningitis treatment

Sample of 572 patients:

- Mission hospitals
  - 44% to 100%
- Government tertiary referral facility
  - 40% (average US$ 65 in user fees per child admitted)
- Public district hospitals
  - 15% (US$ 6-20 in user fees per child admitted)

Ayieko *et al*. The economic burden of inpatient paediatric care in Kenya: household and provider costs for treatment of pneumonia, malaria and meningitis. Cost Eff Resour Alloc. 2009 Jan 22;7:3

Were these user fees “catastrophic” in Kenya?

- Tertiary hospital: 25% of study children still in the ward waiting for relatives to be able to pay user fee bills on average 4 days after being medically discharged
  - Daily cost of US$17.46 to the provider
  - Charge of US$ 5.32 to the household per each extra day spent in hospital
  - Longest stay by a patient awaiting administrative discharge was 22 days
- District hospitals: 10% of admissions remained in the wards 2 to 3 days
- Mission hospitals: Offering credit to households with difficulties in raising funds

Costs of Meningitis Sequelae in Children in Dakar, Senegal

Ulla K. Griffiths, PhD, Yakou Dieye, MD,† Jessica Fleming, PhD,‡ Rana Hajjeh, MD,§ and Karen Edmond, MB BS, PhD¶*

Background: Survivors of bacterial meningitis risk lifelong sequelae. In economic evaluations of vaccines protecting against meningitis, treatment and productivity costs due to meningitis sequelae are rarely included in studies from low-income countries, mainly due to lack of data. The aim of this study was to estimate the costs of meningitis sequelae in children in Senegal from the perspective of households.

Methods: Children who had suffered from bacterial meningitis were identi-

bacterial meningitis is immediate, high-dose intravenous antibiotics. The risk of sequelae increases with delay in treatment as untreated patients are likely to experience coma, seizures and prolonged fever.[3]

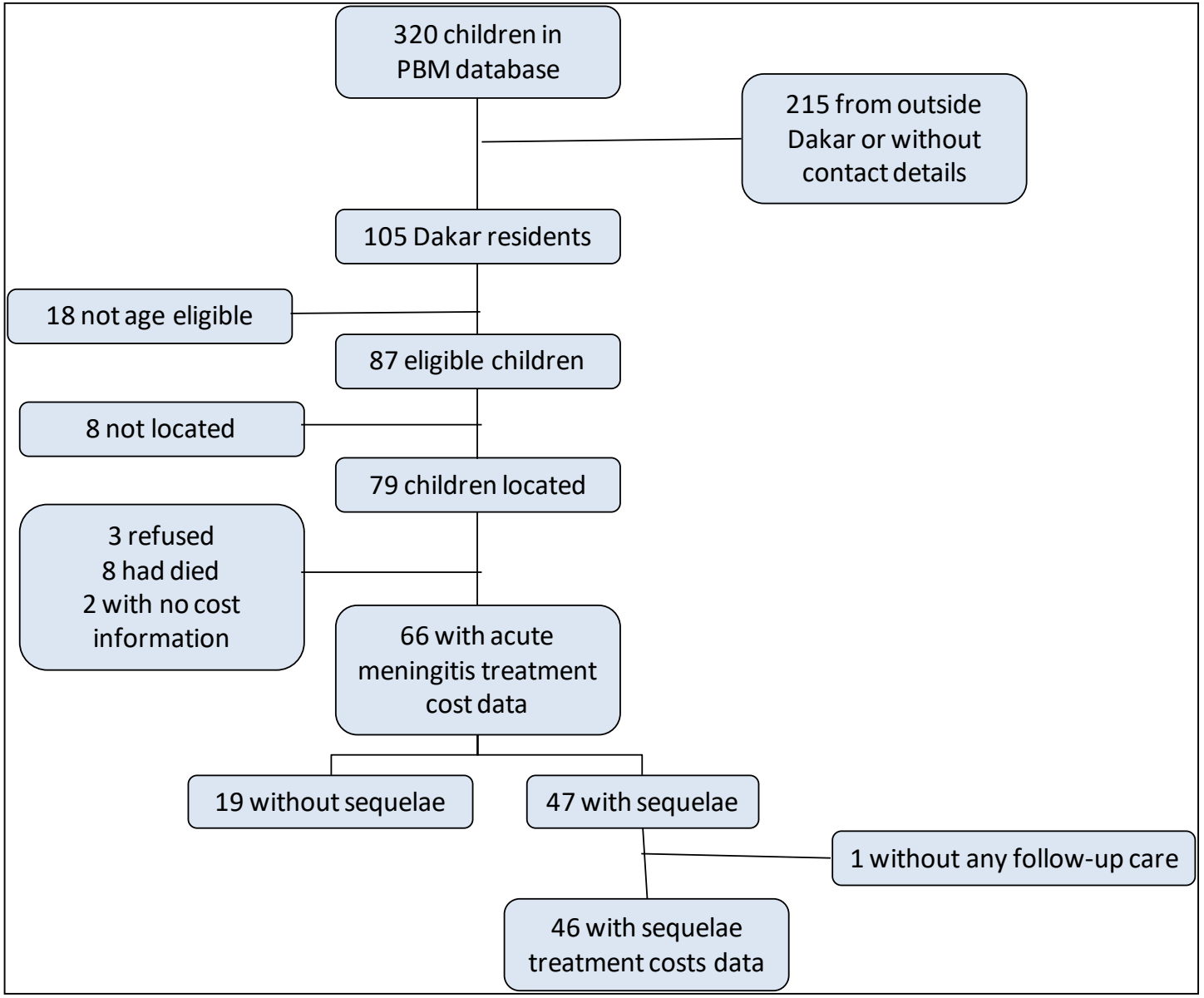
Vaccines against Hib, *S. pneumonia* and *N. meningitidis* infections are currently being introduced into many low-income countries with support from the GAVI Alliance. All the 36 GAVI-eligible countries in Sub-Saharan Africa except South Sudan have

Pediatric Infectious Disease Journal 31 (11) Nov. 2012

Objectives of Senegal meningitis cost study

1. Estimate household treatment costs of the acute bacterial meningitis episode
2. Investigate healthcare-seeking behaviors of caregivers of children suffering from meningitis sequelae
3. Estimate household treatment costs of meningitis sequelae
4. Estimate costs of paid child care
5. Estimate productivity costs of caregivers of children with meningitis sequelae

Senegal study flow chart



Several different types of disabilities in the children

	Number	Percent
No sequelae	19	29%
One type of sequelae	12	18%
Two types of sequelae	7	11%
Three types of sequelae	9	14%
Four types of sequelae	2	3%
Five types of sequelae	12	18%
Six types of sequelae	4	6%
Seven types of sequelae	1	2%
	66	**100%**

Acute meningitis episode

- 70% of children taken to at least one other health care provider before being admitted to Albert Royer Hospital
- Mean length of hospital stay: 22 days
  - One stayed 88 days and one 120 days
- Mean patient costs per episode: US$ 1,289
  - Range US$ 207 – US$ 7,076

Quote on financial burden of acute episode

“During hospitalization we spent much money because the prescriptions were expensive. The injection was very expensive with the cost of one vial 8000 CFA (US$ 16). I was obliged to take the heritage of my deceased father, but this was not enough. God assisted us. I borrowed some money from my friend, but I only managed this situation with difficulties because I was unemployed. The hospitalization was a heavy financial charge and now we haven’t got the household expenses. I used my only money for the child’s treatment”.

Another quote – acute episode

“We first thought it was a malaria attack that caused the fever. We used butter shea in vain during three days for massage. We then brought him to hospital. He spent one month at hospital under drip. He was always sleeping. We bought many medicaments and the prescriptions were very expensive. My parents assisted me to buy the prescriptions and I sold all my possessions”.

Lifetime sequelae costs (2010 US$)

None of the children were taken for regular rehabilitation when they were followed up

N=47 patients

	Mean	Min	Max
Re-hospitalization	275	0	2,572
Lifetime outpatient visits	185	0	753
Lifetime childcare	3,158	0	29,012
Lifetime productivity costs	31,276	0	111,380
TOTAL	**34,895**	**0**	**99,528**

Acute meningitis episode: Catastrophic?

- Mean costs exceeded *annual income* of an informal sector worker by 41%
- Mean costs of one outpatient consultation equivalent to 36% of the *monthly salary* in the informal sector

Quotes on financial burden of sequelae costs

- “If I did not look after the child, I would sell at the market”.
- “If the child had not had meningitis, she could go to school like her brothers”.
- “The child does not speak, does not walk, he cannot even sit down. At the age of eight years he cannot do anything, but is totally dependent. Since the attack of meningitis he is no longer at school”.
- “If the child was not disabled we would not have to pay someone to look after him and we would save money”.

3. Promoting social equity

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Vaccination the first entry-point to the health system or the poor

- In some settings, vaccination is one of the few health interventions for which no user fees are charged
- In some settings, the home based vaccination record is the only official document of a child's existence
  - Home based record the method for birth registration in Burundi

Effect of possessing a home based record in Kenya

	Have a HBR	Do not have a HBR	Treatment effect
Higher health knowledge	1331	650	0.059**
Proper health seeking behavior for child's fever	1012	476	0.094***
Proper health seeking behavior for child's diarrhea	566	266	0.126***
Full vaccination	1319	586	0.032

Kawakatsu *et al*, Effectiveness of and factors related to possession of a mother and child health handbook: an analysis using propensity score matching, Health Edu Res, 2015

4. Vertical equity

Maternal and neonatal tetanus elimination

Defined as:

Less than one Neonatal Tetanus (NT) case per 1000 live births in a year in every district of a country.

If NT is eliminated,

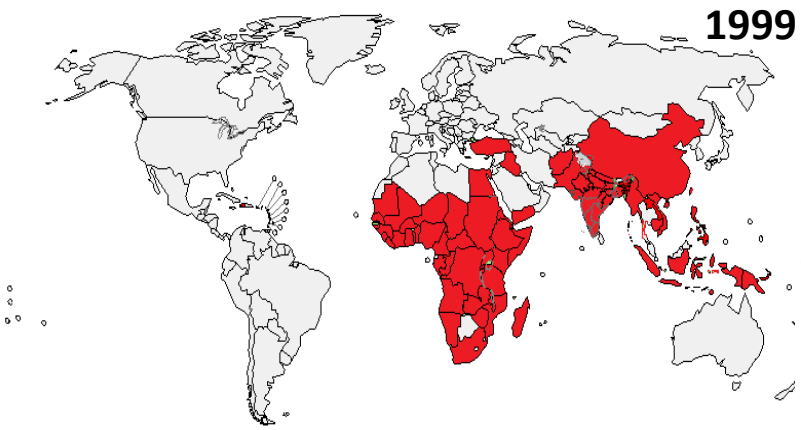
maternal tetanus (MT) is also considered eliminated

Strategies for achieving MNT elimination

1) Strengthening routine immunization of pregnant women with tetanus toxoid vaccine (TT)
2) TT Supplementary Immunization Activities in selected high risk areas, targeting women of child bearing age with 3 properly-spaced doses of tetanus toxoid
3) Promotion of clean deliveries
4) Reliable neo-natal tetanus surveillance

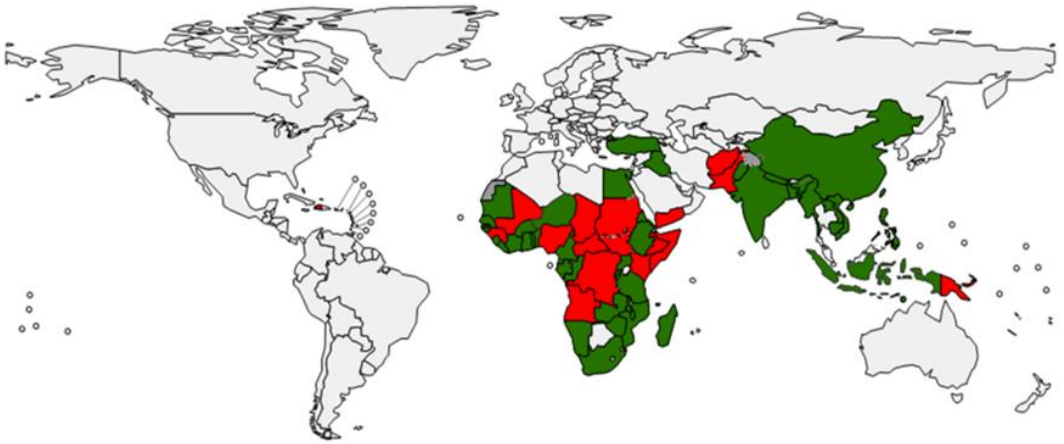
41 Countries eliminated MNT between 2000 & Sept 2016

*(Plus Ethiopia except Somali region, and 16 out of 17 regions in Philippines and Punjab province of Pakistan)



18 countries yet to eliminate MNT

*(Plus Ethiopia except Somali region and 16 regions out of 17 in Philippines and Punjab in Pakistan) leaving 18 countries yet to eliminate MNT



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Source: WHO/UNICEF Database
Date of slide : 08June 2016
Map production: Immunization Vaccines and Biologicals, (IVB), World Health Organization

Measurement challenges

Measurement challenges

	Equity area	Challenges
1	Promoting disease equity	CFR and morbidity in settings with limited access to care hard to measure
2	Promoting economic equity	No costs to measure when patients don't access care
3	Promoting social equity	Largely intangible
4	Vertical equity intervention	Similar measurement challenges as 1-3

Thank You

For more information, please contact

Ulla Kou Griffiths
Senior Advisor Health, Immunization Financing and Systems Strengthening
ugriffiths@unicef.org
+1 347 345 5095

United Nations Children's Fund
3 United Nations Plaza
New York, NY 10017, USA
Tel: 212-326-7000
www.unicef.org

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