



The role of measles vaccine (MV) in reaching MDG4: Removing out-of-sequence vaccination and increasing coverage: Evidence from Navrongo and GAVI multi-country study

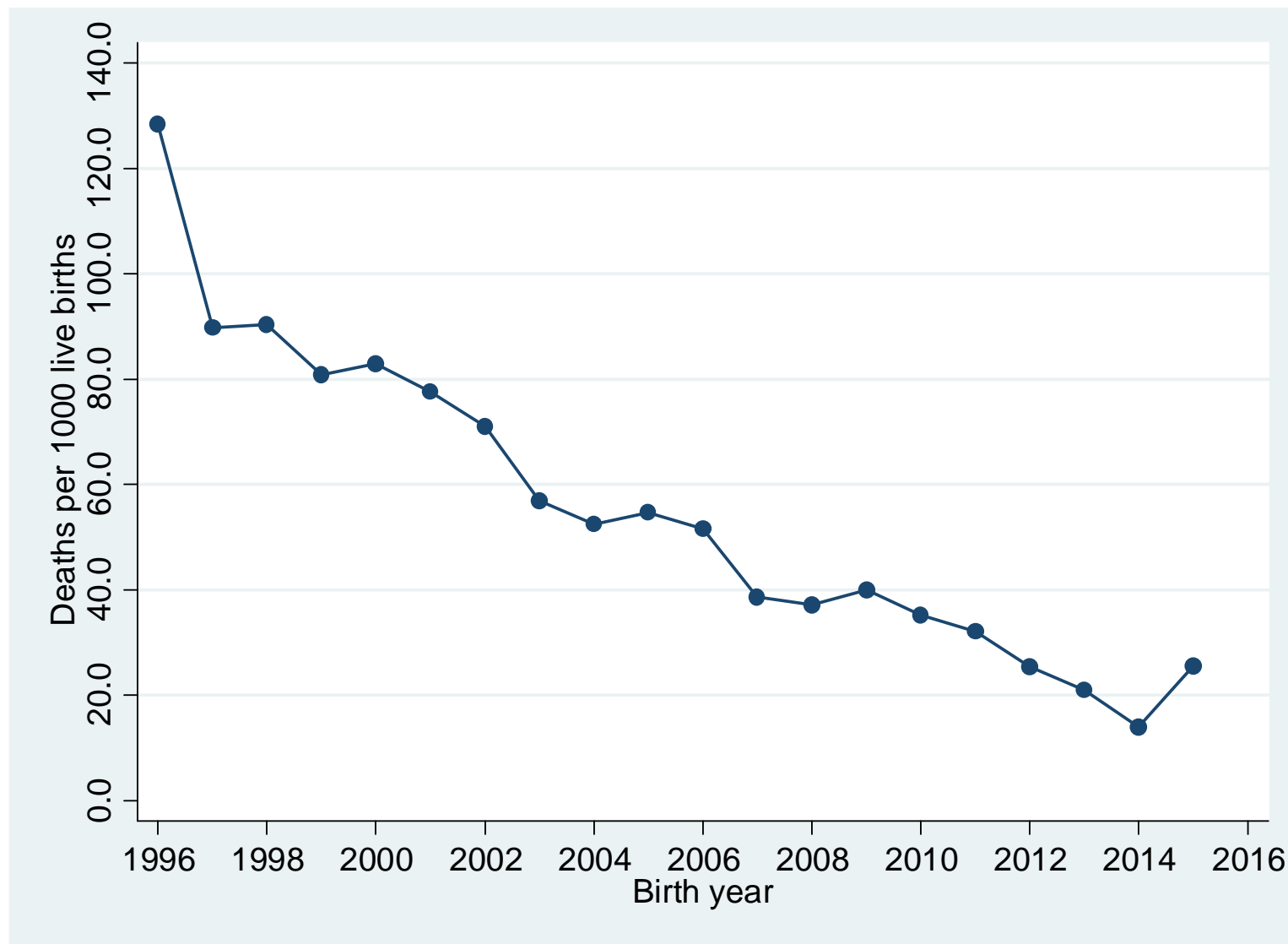


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Mortality after 9 months to 5-years in Navrongo HDSS: 1996-2015



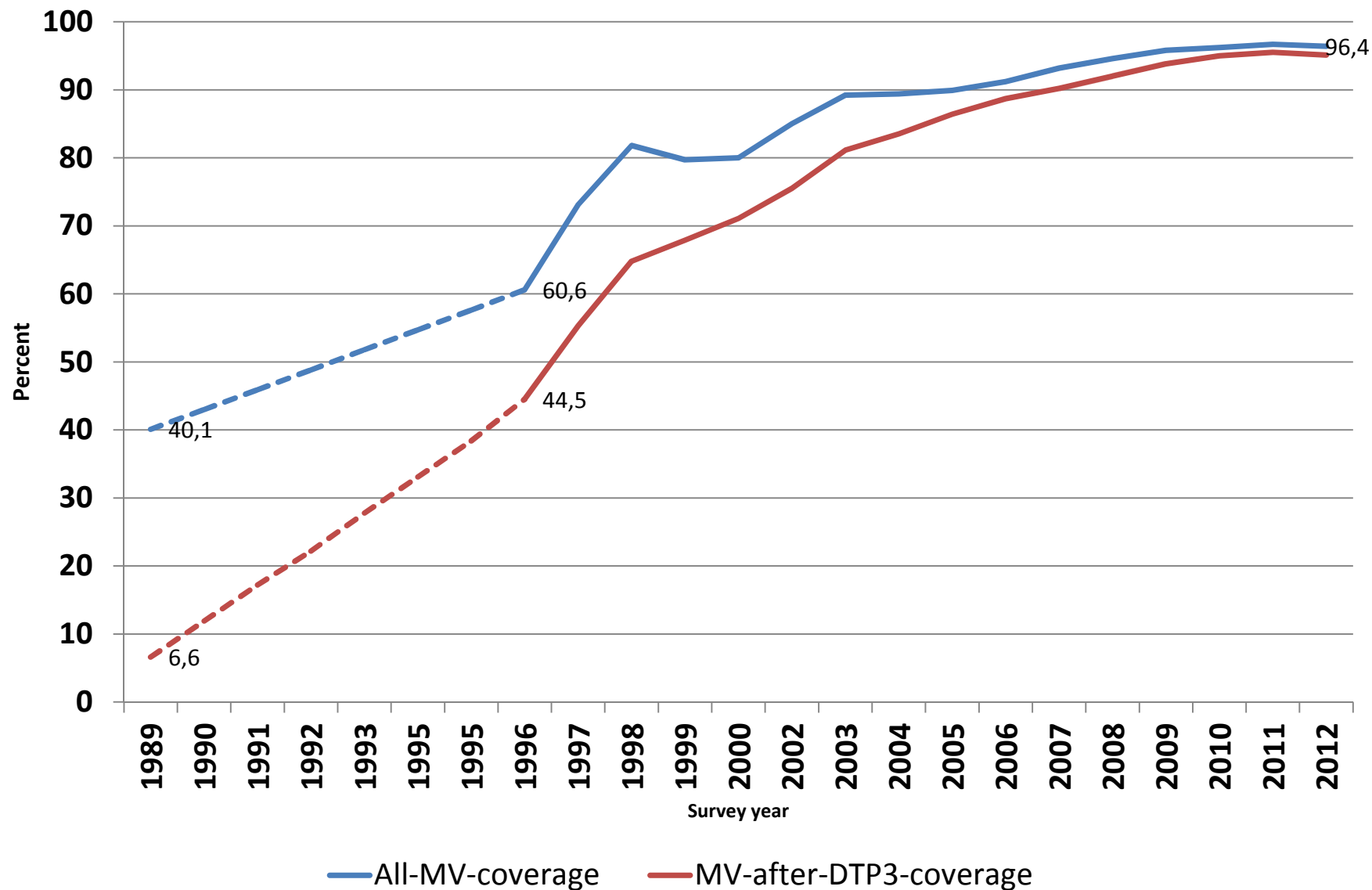
Mortality decline: 128/1000 in 1996 to 25.5/1000 in 2015

Importance of measles vaccination

Mortality for Measles unvaccinated versus measles vaccinated children

Measles vaccination status	One year follow-up		Up to five years of age	
	Adjusted relative mortality	Relative mortality excluding measles deaths	Adjusted relative mortality	Relative mortality excluding measles deaths
Measles vaccinated	ref	ref	ref	ref
No measles vaccine	1.38 (1.15-1.66)	1.36 (1.13-1.64)	1.22 (1.05-1.41)	1.20 (1.04-1.39)

Coverage for measles vaccine (MV) and MV after DTP3 Children aged 12-23m in Navrongo 1989-2012

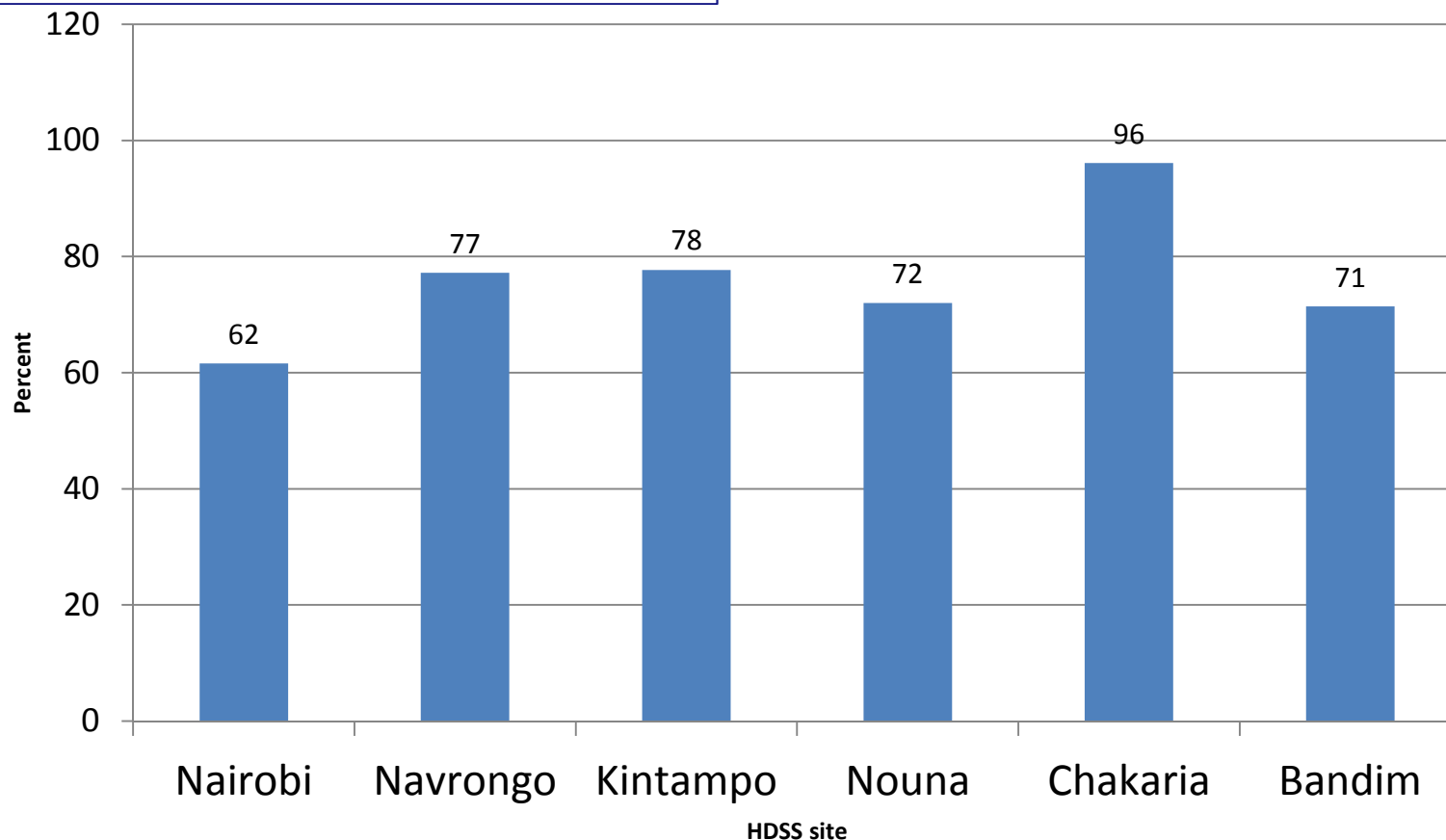


Decline in mortality as a result of increased measles vaccination coverage

- Assuming not receiving measles vaccination is associated with 38% higher mortality in one year, increase in MV coverage from 44% to 96% **between 1996 and 2012** would amount to a **14%** reduction in childhood mortality among children aged 9 months to 3 years.
- **Tracing back to 1989-1991** when 10% had received MV-after-DTP3 to 93% in 2012 would amount to a **24%** reduction in childhood mortality rate

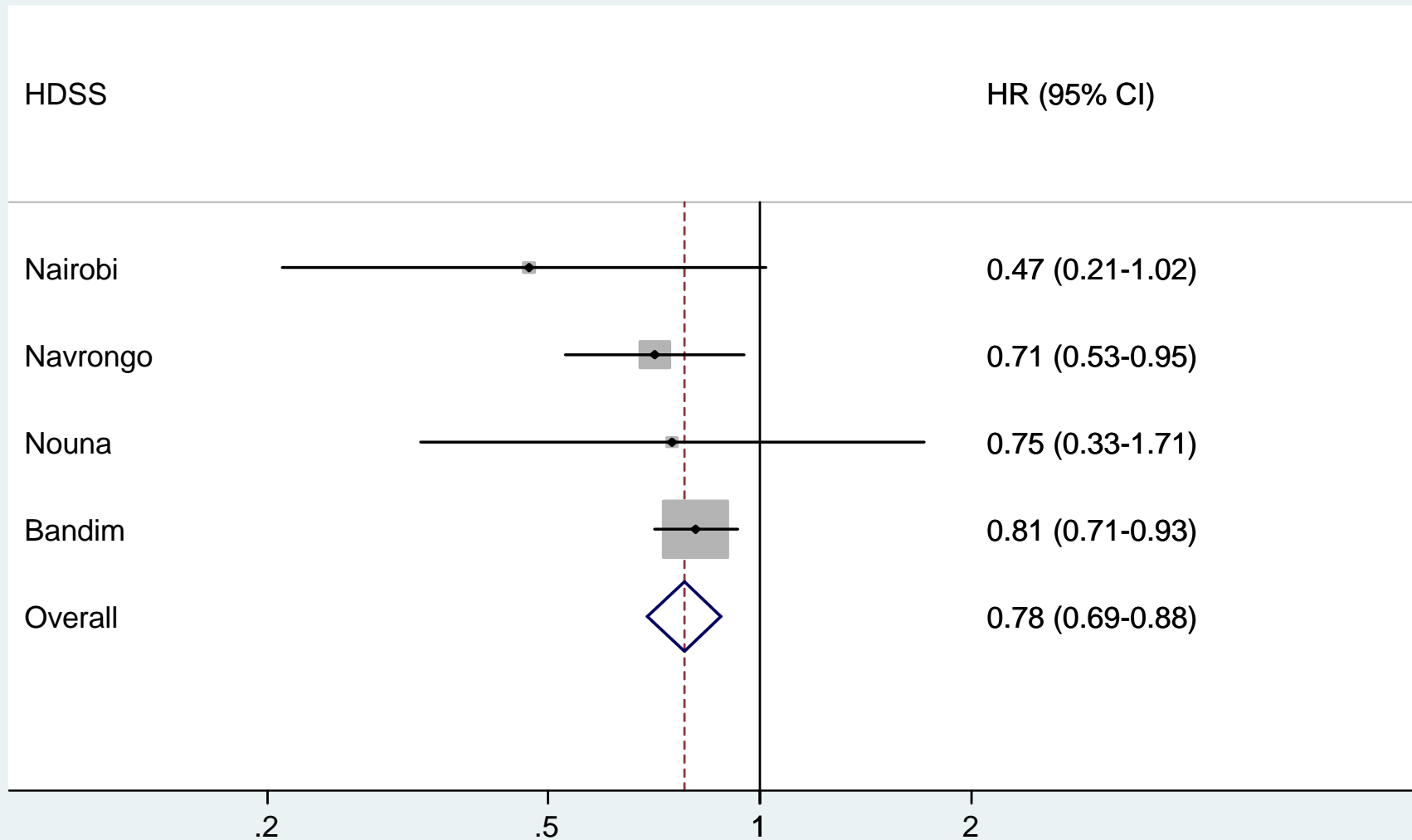
OPTIMUNISE conducted a study in collaboration with GAVI of the determinants of being a fully immunized child (FIC)

Proportion missing measles vaccine among not fully immunized children



Lacking measles vaccination was the main reason for not being fully immunized at all 6 sites

Mortality for Fully immunized children versus not fully immunized children



Being fully immunized associated with 22% (12-31%) lower mortality

Importance of out-of-sequence
vaccination with measles vaccine and
DTP-containing vaccines

Testing out-of-sequence vaccinations

Vaccination status at enrolment	Mortality rate	Relative mortality (95% CI) Adjusted
DTP3-then-MV	15	ref
DTP=MV	25	1.30 (0.91-1.87)
DTP>MV	32	1.68 (1.14-2.49)
Out-of-sequence		
DTP>=MV	28	1.42 (1.06-1.90)

Welaga et al, submitted

Mortality within 12 months of follow-up for children aged 12-23 months by vaccination status during the DTP and Penta periods *in Navrongo*

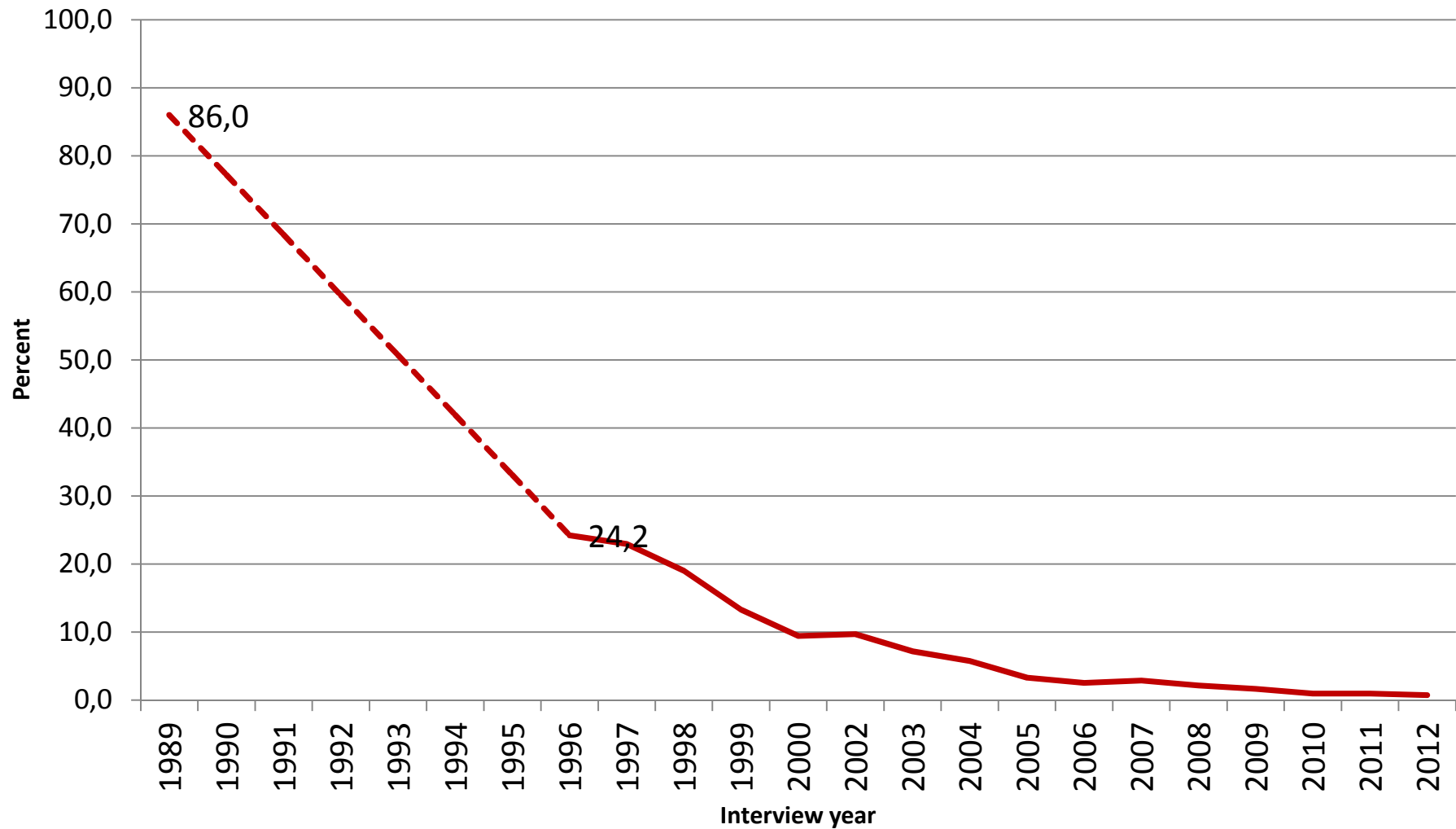
Vaccination status at enrolment	DTP Period (1996-2001)		Penta period (2002-2012)	
	Mortality rate	Adjusted relative mortality	Mortality rate	Adjusted relative mortality
DTP3-then-MV	20	Ref	12	ref
DTP>=MV	30	1.42 (1.03-1.96)	22	1.55 (0.88-2.73)

Adjusted for age, socioeconomic status, sex, mother's education and interview year

Mortality risk before and after an OPV or measles campaign

Vaccination status at enrolment	Mortality before OPV or MV campaign		Mortality after OPV or MV campaign	
	Mortality rate	Adjusted Relative mortality	Mortality rate	Adjusted Relative mortality
MV-after-DTP3	27	ref	14	ref
DTP>=MV	86	2.58 (1.14-5.84)	25	1.37 (1.02-1.85)

Trends in out-of-sequence DTP/Penta and Measles vaccinations in Navrongo: 1989-2012



Contribution of changes in out-of-sequence vaccinations to mortality decline towards MDG4

- Assuming out-of-sequence vaccinations to be associated with 42% higher mortality in one year, 24% to 0.7% decrease in OOS **between 1996 and 2012** would amount to a **9%** reduction in childhood mortality among children who had received both MV and DTP
- **Tracing back to 1989-1991** when 86% had received DTP and MV out-of-sequence to 0.7% in 2012 would amount to a **26%** reduction in the childhood mortality rate
- The reduction in mortality would be **57%** if we assume out-of-sequence vaccinations were associated with 158% higher mortality in the period before the national OPV and MV campaigns were introduced

Conclusion

- New monitoring targets are needed to put a stronger emphasis on measles vaccination to all children
- EPI/SAGE should encourage policies that would ensure that DTP and MV vaccinations are not administered out-of-sequence
- We should continue to vaccinate with MV even if measles is completely eliminated because of its beneficial effect on overall child survival
- Continue to monitor the effects on mortality of vaccines and their timing in the context of the changing immunization landscape

Thank you for your attention