Too early, too late: Timeliness of child vaccination in the Philippines

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Vaccination has made the most significant contribution to the prevention of infectious diseases in the past century. Immunization prevents 3 to 5 million deaths due to vaccine-preventable diseases (VPD) every year worldwide (WHO, 2019).

Brief background: EPI in the Philippines

- One of the major public health programs of DOH (established in 1976).
- The EPI is mandated by law through Republic Act no. 10152 of 2011 to provide free routine vaccination for 11 diseases.

Brief background: EPI in the Philippines

- Implementation: highly devolved setting.
  - DOH: serves as regulatory and advisory body; technical support and capacity building to LGUs; centrally procures all the vaccine.
  - LGU: cover operational expenses to deliver immunization services free-of-charge at public health facilities.

Brief background: EPI in the Philippines

- Milestones:
  - The Philippines eliminated polio in 2000 and maternal and neonatal tetanus in 2017.
  - Massive infusion of funds that has only grown steadily: from PHP 2 billion in 2013 to PHP 7 billion in 2018, approximately a 200% increase in budget over the 5 years (but…..)

Issues

- The government has struggled to maintain vaccination coverage levels and to reach its medium-term national target of fully immunizing of 95% of all children.

- The country experienced large declines in vaccination coverage in recent years.

Some concepts

- Coverage and timeliness are two separate issues.
- Immunization coverage measures completion of the immunization schedule, but it only translates to optimal protection against disease if effective vaccines are delivered in a timely manner within the recommended ages.
  - Delayed: at risk of VPDs
  - Too early: weak or sub-optimal immune response

Vaccination schedule

Vaccine / Antigen	Disease	Doses	Schedule
BCG (Bacillus Calmette–Guerin)	Tuberculosis	1	Birth (within 24 hours)
HepB	Hepatitis B	1	Birth (within 24 hours)
Pentavalent vaccine (DPT-HepB -HiB)	Diphtheria, tetanus and pertussis Hepatitis B Hemophilus influenzae type B Meningitis	3	6 weeks, 10 weeks, 14 weeks
OPV (Oral polio vaccine)	Poliomyelitis	3	6 weeks, 10 weeks, 14 weeks
IPV (Inactivated polio vaccine)		1	14 weeks
PCV (Pneumococcal conjugate vaccine)	Pneumococcal infections (e.g. meningitis)	3	6 weeks, 10 weeks, 14 weeks
MCV (Measles containing vaccine) and MMR (Measles, mumps, rubella)	Measles, mumps, rubella	2	9 months, 1 year

Objectives

- To examine immunization coverage and the extent of timely vaccination among Filipino children aged 12 to 24 months in the last 25 years (1993-2017) for the following vaccines considered to be a part of routine basic vaccination for children (BCG, OPV, DPT, measles).

Definition of terms

- Coverage: proportion of children aged 12 to 24 months who were immunized with each vaccine as recorded in vaccination cards or as reported by mother's recall regardless of the timing of immunization.

- Basic vaccination coverage: proportion of children aged 12 to 24 months who were recorded or reported by mother's to have received all 8 doses.

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Definition of terms

- Timeliness: immunization was considered timely if a child received the vaccine according to the national immunization schedule's recommended age range for the vaccine and dose.

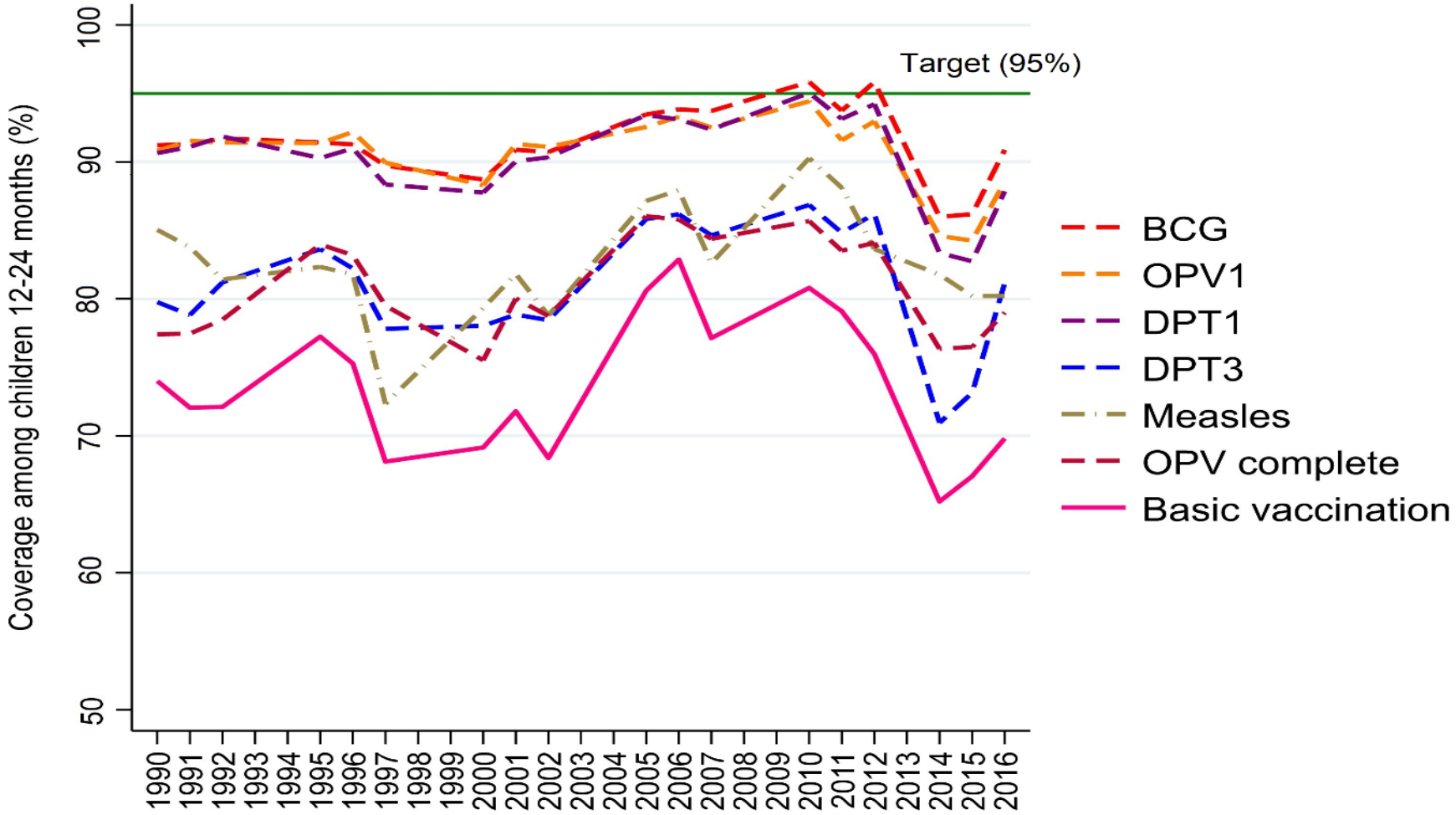
Vaccine / Antigen	Recommended age range
BCG	Birth - 2 weeks
OPV 1, DPT 1	6 weeks - 8 weeks
OPV 2, DPT 2	10 weeks - 16 weeks
OPV 3, DPT 3	14 weeks - 24 weeks
MCV or MMR 1	9 months - 12 months

Methodology

- Data: National Demographic and Health Survey (1993 to 2017)
- Kaplan Meier (KM) method

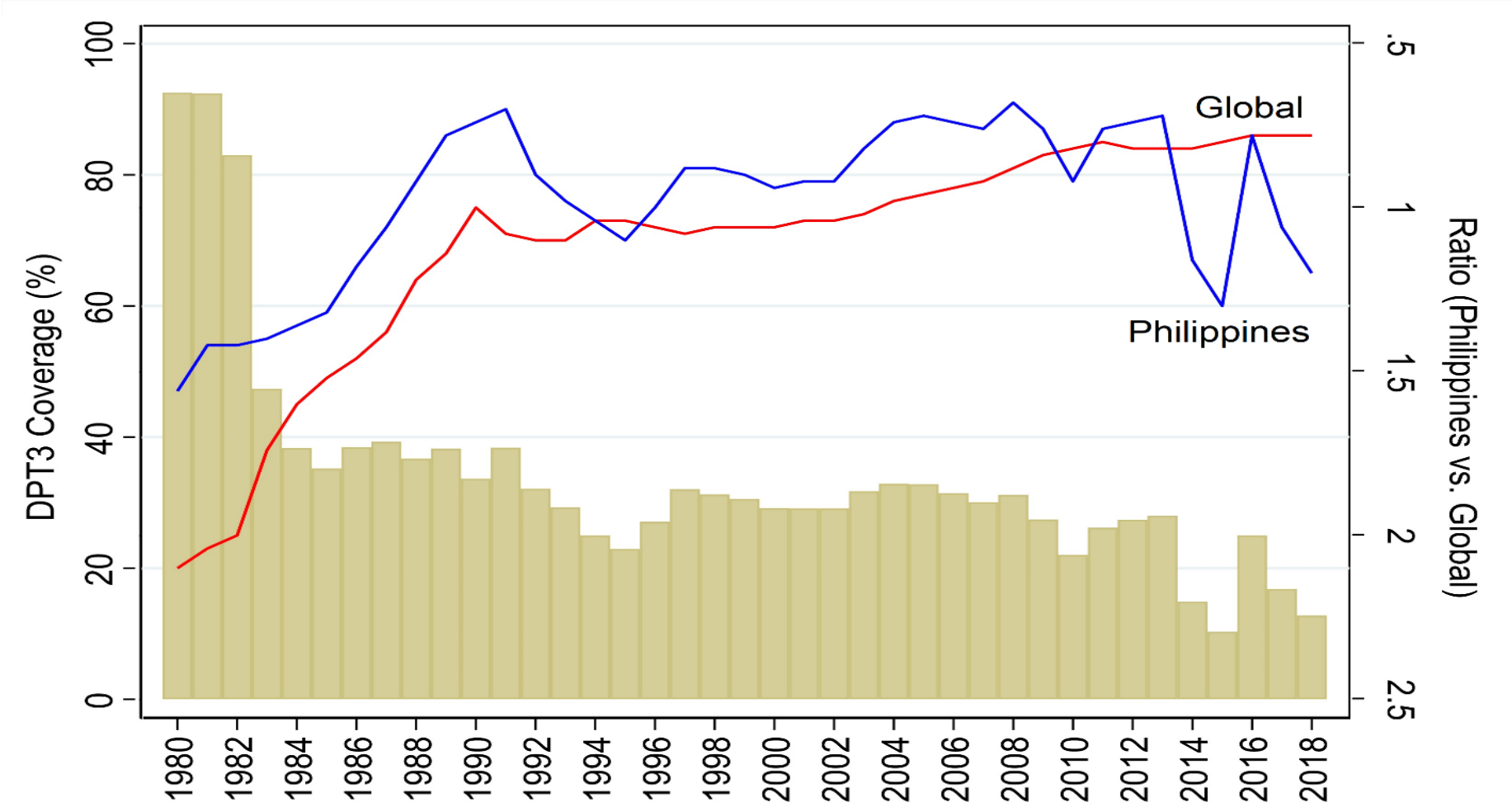
Results

Vaccine by birth cohort in the Philippines, 1990-2016

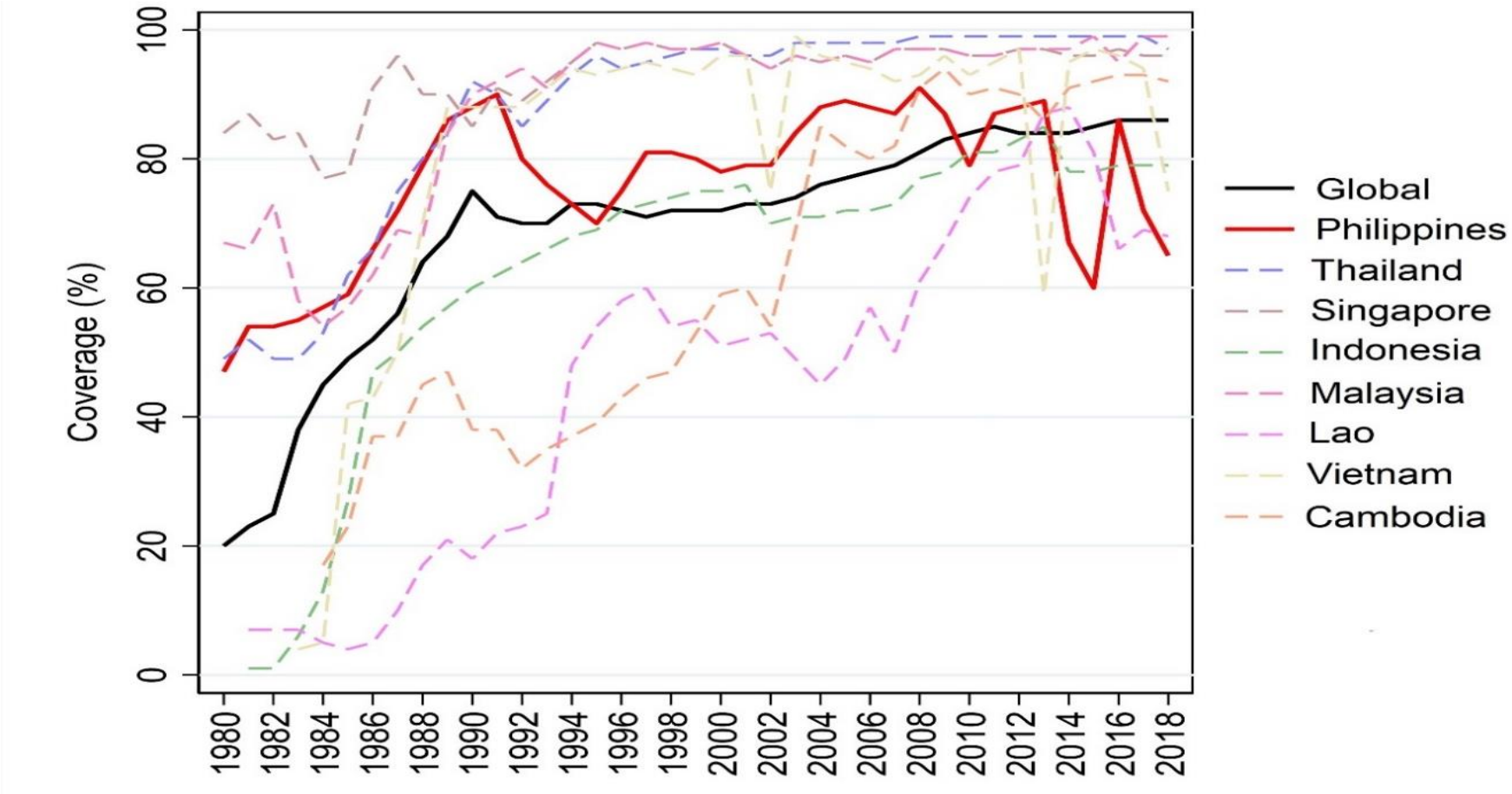


Vaccine coverage by region

DPT3 Coverage in the Philippines and Globally, 1980-2018



DPT3 Coverage in the Philippines and other ASEAN Countries, 1980-2018



BCG

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
BCG	1993	91.3	12.9	-	-	87.1	51
(birth	1998	90.8	16.5	-	-	83.5	39
dose)	2003	90.7	18.7	-	-	81.3	39
	2008	93.9	24.5	-	-	75.5	25
	2013	95.3	42.1	-	-	57.9	22
	2017	89.4	64.6	-	-	35.4	25

OPV1

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
OPV 1	1993	91.2	16.8	8.8	7	74.3	27
	1998	91.7	21.3	10.4	8	68.3	19
	2003	91.2	21.2	10.8	7	68.0	23
	2008	92.8	27.2	9.9	6	62.9	16
	2013	93.1	27.6	9.3	7	63.1	13
	2017	87.3	39.5	5.2	7	55.3	19

OPV2

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
OPV 2	1993	86.1	43.6	4.9	6	51.4	39
	1998	88.1	51.0	6.3	8	42.7	28
	2003	87.4	49.5	5.5	7	45.0	39
	2008	90.2	58.3	5.1	6	36.6	25
	2013	89.1	60.6	6.0	7	33.4	24
	2017	85.8	61.1	2.8	7	36.1	37

OPV3

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
OPV 3	1993	77.9	55.9	2.7	7	41.4	61
	1998	81.7	64.0	4.5	7	31.5	43
	2003	79.9	60.4	3.0	5	36.6	54
	2008	84.9	69.4	3.9	7	26.7	40
	2013	83.9	70.3	3.9	6	25.8	43
	2017	78.4	66.8	1.6	5	31.6	50

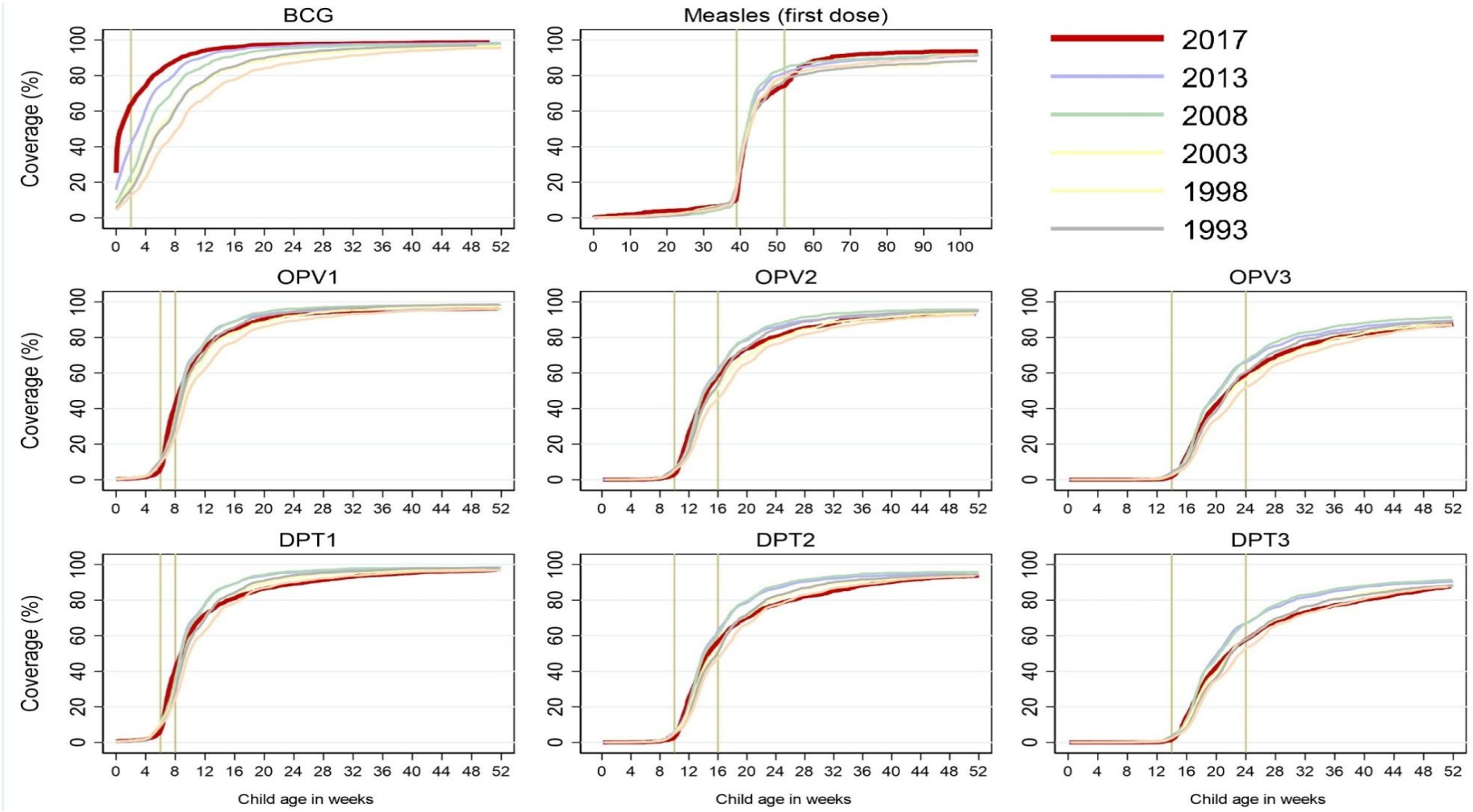
DPT1

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
DPT 1	1993	91.2	16.4	8.8	7	74.8	27
	1998	90.3	20.6	9.0	7	70.4	21
	2003	90.1	21.6	10.3	7	68.1	22
	2008	92.7	27.4	9.9	6	62.7	17
	2013	94.1	27.7	9.0	7	63.3	13
	2017	86.0	37.5	5.7	8	56.8	23

DPT3

Vaccine and Dose	NDHS Round	Coverage among 12-24 months (%)	Timely (%)	Early		Late	
				%	Median (days)	%	Median (days)
DPT 3	1993	79.5	56.5	2.6	7	40.9	55
	1998	80.5	62.1	3.5	6	34.4	48
	2003	78.6	61.8	2.9	4	35.3	49
	2008	85.1	69.5	3.8	6	26.7	40
	2013	85.5	70.7	3.4	6	25.9	43
	2017	78.8	64.5	1.3	7	34.2	62

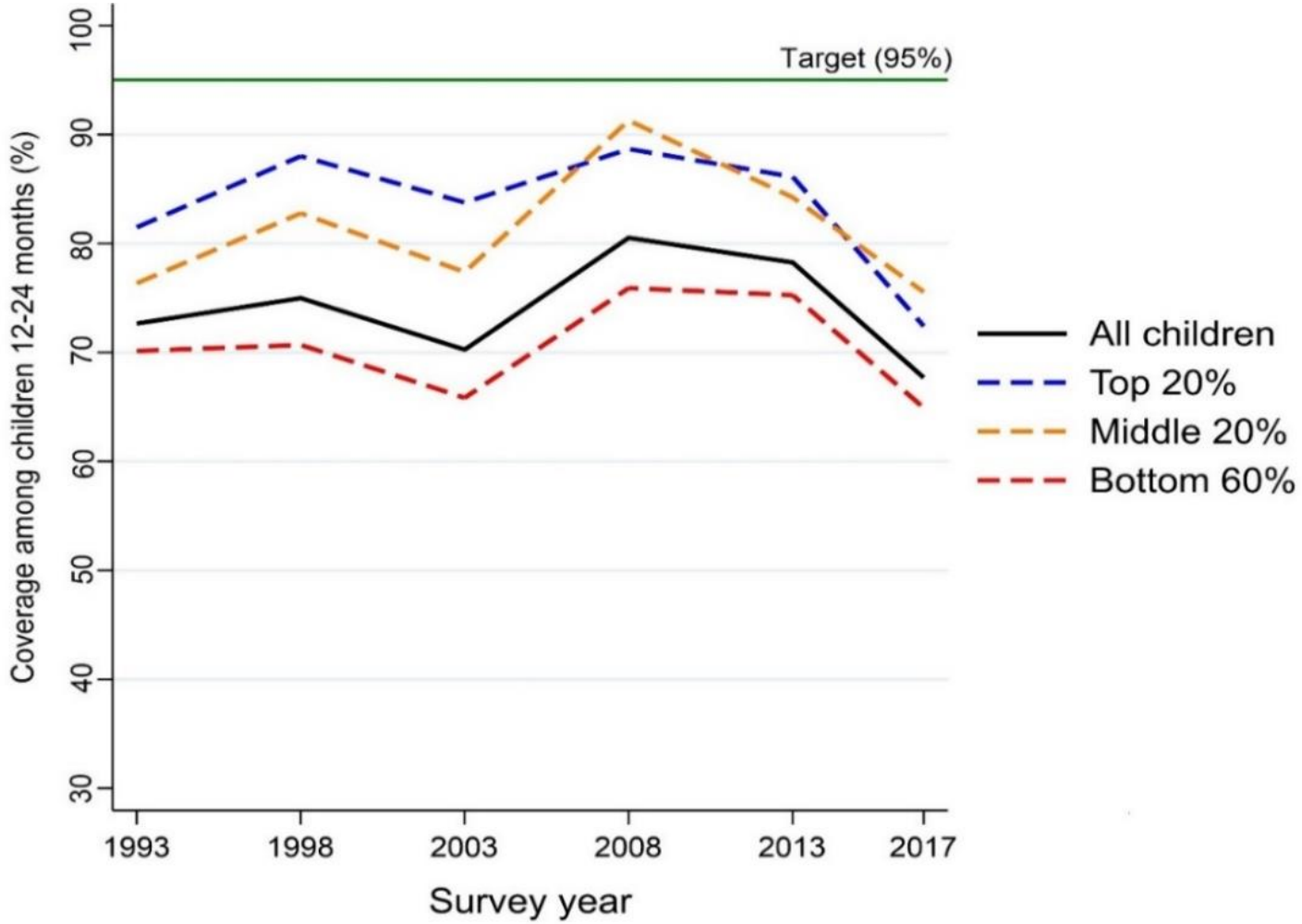
Cumulative coverages, by survey round (1993-2017)



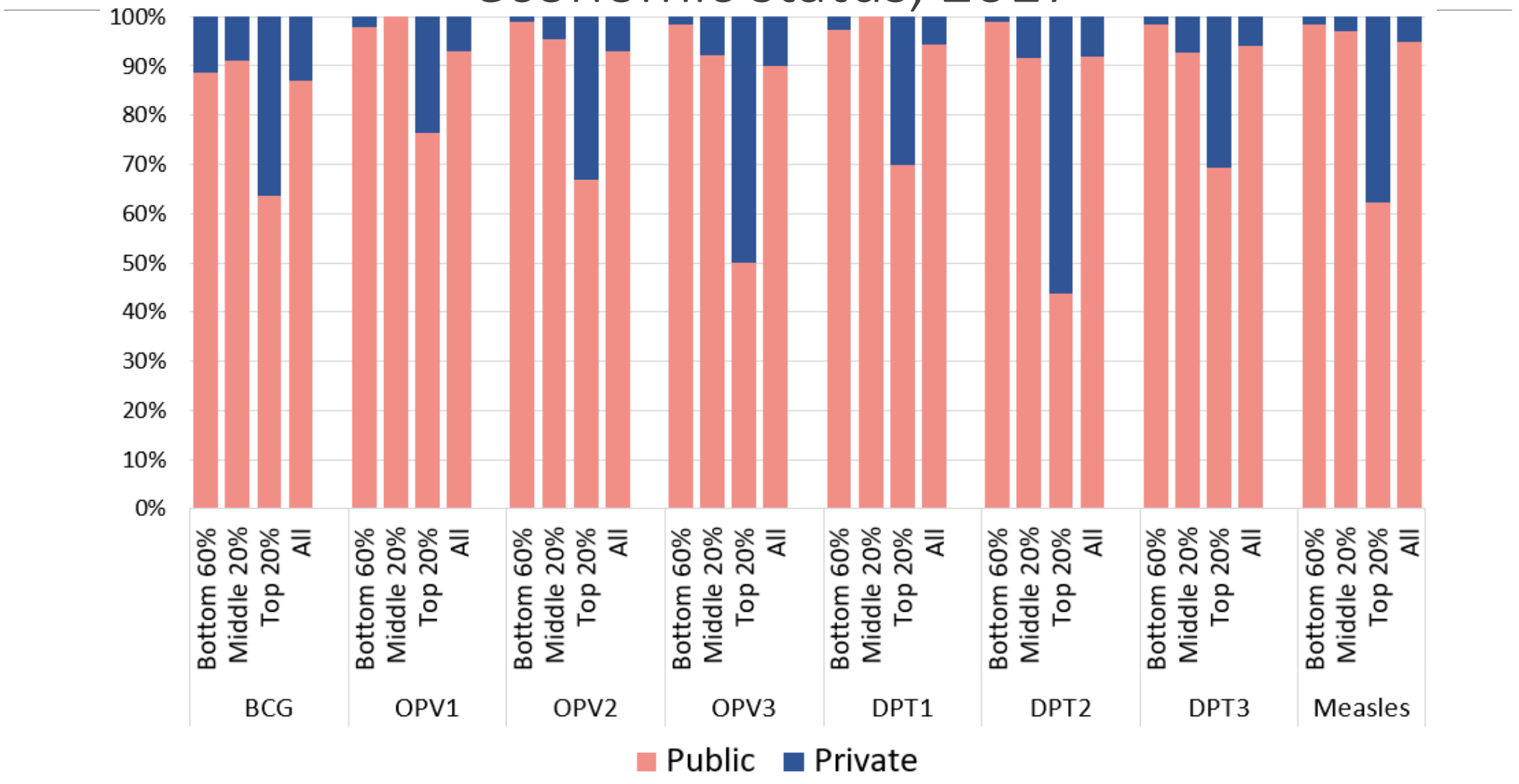
Basic vaccination coverage and timeliness, 1993-2017, Philippines

NDHS Round	Coverage among 12-24 months (%)	All vaccines Timely (%)
1993	71.9	2.1
1998	72.6	2.1
2003	69.8	2.6
2008	79.3	5.3
2013	77.2	9.3
2017	69.4	10.6

Vaccination coverages, by socio-economic status by survey year



Facility of last immunization by vaccine/dose and socio-economic status, 2017



Main Results

- Basic vaccination coverage has never reached 95%.
  - Highest peak for basic vaccination: 2006; lowest peak: 2014 (lowest in 25 years)

- Immunization coverage in past two decades was characterized by large fluctuations.
  - Immunization coverage for specific vaccines and basic vaccination has been remarkably unstable over time.

Main Results

- Depending on the vaccine, only 38% to 65% of immunized children had timely administration within the recommended age ranges of the national immunization schedule. Only 11% with basic and timely vaccination.

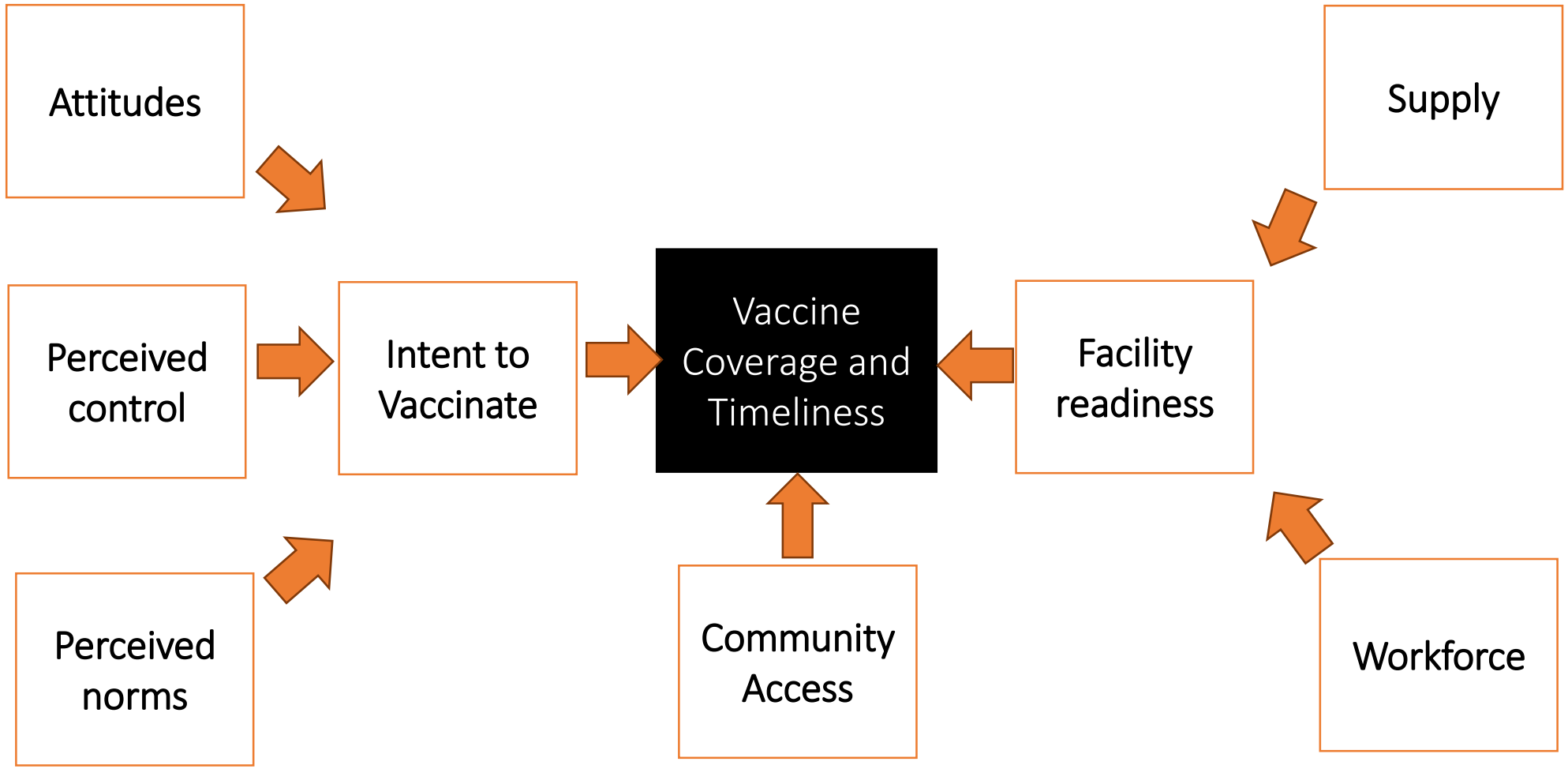
Timeliness of vaccination coverage in the Philippines compared to other countries

Vaccine / Antigen	Philippines (2017)	Kenya (Adetifa, et al 2018)	Senegal	Malaysia	Norway
GDP per capita (2010 US$)*	3,000	1,200	1,500	12,100	92,000
BCG	65%	80%	88%	-	--
OPV 1	40%	-	74%	-	80%
OPV 2	61%	-	75%	-	74%
OPV 3	67%	50%	73%	-	60%
DPT 1	38%	-	74%	76%	80%
DPT 2	58%	-	76%	66%	74%
DPT 3	65%	82%	73%	58%	60%
Measles 1	67%	28%	-	65%	59%

Main Results

- Although differences in immunization coverage are large, there are only slight differences in the level of timeliness between the rich (top 20%) and the poor (bottom 60%).

Framework summarizing determinants of vaccine coverage and timeliness



Recommendations

- EPI should aim for both high immunization coverage levels and timely administration of vaccines – not early, not late.
- Without large investments and reforms in the current system of delivery and health promotion for immunization, universal coverage targets will remain quixotic, at best.
- The EPI should also consider the feasibility of expanding the service delivery channel to private facilities.

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