Conclusions of the SAGE Working Group on Measles and Rubella
August 25-26, Geneva

WHO Policy Recommendation on Routine Measles Second Dose (MCV2):
Considerations for Removing the Criterion for Introduction

FOR DECISION
In light of the following considerations and in the interest of advancing progress towards measles control and elimination, SAGE is requested to consider whether it is appropriate at this time to remove the introduction criterion for MCV2 published in the 2009 WHO Measles Vaccine position paper[1].

Definitions

"First dose" and "second dose" refer to the doses of measles-containing vaccine an individual receives and, thus, have implications for the likelihood that a vaccinated individual is protected against measles.

"MCV" refers to measles-containing vaccine, which can include measles, measles-rubella, measles-mumps-rubella, or measles-mumps-rubella-varicella vaccines.

"MCV1" and "MCV2" refer to "measles-containing vaccine dose 1" and "measles-containing vaccine dose 2". These are programmatically scheduled vaccinations, which can be delivered through routine services, intensification of routine services, or supplementary immunization activities (SIAs).

In this document use of the term "MCV1" implies delivery through routine services. Because MCV2 can be delivered in routine or campaign mode, the term "routine MCV2" will be used to refer to the 2nd dose of measles-containing vaccine delivered through routine services. MCV1 and MCV2 refer to any of measles-containing vaccine formulations.

Background

WHO's current policy recommendation, as provided in the 2009 Measles Vaccine Position Paper[1], is that all children should receive two doses of measles-containing vaccine:

"Reaching all children with 2 doses of measles vaccine should be the standard for all national immunization programmes."

The position paper provides the following criterion for introduction of routine MCV2:

"MCV2 may be added to the routine immunization schedule in countries that have achieved ≥80% coverage of MCV1 at the national level for 3 consecutive years as determined by the most accurate means available. In general, countries that do not meet this criterion should prioritize improving MCV1 coverage and conducting high-quality follow-up supplemental immunization activities (SIAs), rather than adding MCV2 to their routine schedule."

This policy guidance gives clear direction to countries with low coverage of MCV1 to focus their efforts on improving first dose coverage before introducing a second in the national schedule. The rationale underpinning this recommendation was the high effectiveness of one dose of MCV delivered at 9 months of age or older, and the expectation that children in countries without routine MCV2 would receive a second dose of measles-containing vaccine through supplementary immunization activities. Findings from the 3rd Meeting of the SAGE Working Group on Measles (2009) indicate that although countries with lower starting MCV1 levels were able to increase their routine MCV2 coverage during the first 5 years after introduction, their performance remained highly variable and their median routine MCV2 value never reached > 90%. Thus,

[1] WHO 2009. *Measles Vaccines: WHO Position Paper*. WER No. 35, 2009. 84. Pp. 349-360.

working group members felt that countries with weaker systems would not be able to achieve high coverage with a second measles dose delivered through routine services[2]. This policy guidance gives clear direction to countries with low coverage of MCV1 to focus their efforts on improving first dose coverage before introducing a second in the national schedule.

With respect to stopping SIAs, the WHO recommendation in the 2009 Measles Position Paper specifies:

"The cessation of SIAs should be considered only when >90-95% immunization coverage has been achieved at the national level for both MCV1 and routine MCV2 for a period of at least 3 consecutive years".

Thus, in countries not meeting the MCV2 introduction criterion, SIAs should continue to be the means of providing a second dose of MCV, while in countries with MCV2 in the routine schedule, SIAs will still be needed until national coverage levels with the two routine doses reaches levels higher than 90%.

The position paper also provides guidance regarding the optimal timing of routine delivery of MCV2:

"Countries with ongoing measles transmission and MCV1 delivered at age 9 months should administer the routine dose of MCV2 at age 15–18 months. The minimum interval between MCV1 and MCV2 is 1 month. Providing routine MCV2 to children in their second year of life reduces the rate of accumulation of susceptible children and the risk of an outbreak. In countries with low measles transmission (that is, those that are near elimination) and where MCV1 is administered at age 12 months, the optimal age for delivering routine MCV2 is based on programmatic considerations that achieve the highest coverage of MCV2 and, hence, the highest population immunity. Administration of MCV2 at age 15–18 months ensures early protection of the individual, slows accumulation of susceptible young children and may correspond with other routine immunizations (for example, a DTP booster). If MCV1 coverage is high (>90%) and school enrolment is high (>95%), administration of routine MCV2 at school entry may prove an effective strategy for achieving high coverage and preventing outbreaks in schools."

Finally, the position paper outlines a policy on catch-up vaccination at school entry:

"Irrespective of the strategy or schedule followed, both MCV1 and MCV2 should be recorded on a child's immunization card and in a clinic's vaccination register. Children should be screened for their measles vaccination history at the time of school entry, and those lacking evidence of receipt of 2 doses should be vaccinated."

The rubella position paper recommends that when rubella vaccine is introduced and combined with measles vaccine, the same formulation of combined MR or MMR vaccine should be used for both doses:

"However, when combined with measles vaccination, it may be easier to implement a second dose of rubella-containing vaccine (RCV) using the same combined MR vaccine or MMR vaccine for both doses."[3]

With the accumulation of 6 years of implementation experience, there are a number of considerations that have emerged which call into question the continued usefulness of the MCV2 introduction criterion. During its August 2016 Meeting, the SAGE Working Group on Measles and Rubella (SAGE MR WG) reviewed the evidence and experience related to the criterion for the introduction of MCV2 into routine immunization schedules.

Based on this review, the SAGE MR WG recommends that the criterion for introduction of routine MCV2 be removed. Other recommendations related to routine MCV2, such as the optimal timing, recording doses, school entry, use of rubella-containing vaccines with routine MCV2, were not reviewed and remain unchanged.

[2] WHO 2009. *Report from the 3rd Meeting of the SAGE Working Group on Measles, 2009.*
[3] WHO 2011. *Rubella Vaccines: WHO Position Paper*. WER No. 29, 2011, 86, Pp. 301–316.

Current Status of Measles Coverage Related to Routine Measles Second Dose Introduction:

Routine MCV2 introduction

As of December 2015, the vast majority of countries in the world are implementing a 2-dose routine measles vaccination schedule (160/194, or 82% of countries) and global coverage of MCV2 is estimated at 61%. Of the 33[4] countries yet to introduce MCV2 into their national immunization schedule, 10 already meet the WHO MCV2 introduction criteria (Bolivia, Comoros, Congo, Dominican Republic, Honduras, Lao People's Democratic Republic, Namibia, Nicaragua, Solomon Islands and Uganda). For the remaining 23 countries, 6 have high or improving coverage, and are close to meeting the introduction criterion; 7 have MCV1 coverage close to 70% or above; and 10 have low coverage (Table 1). Of these 23 countries, 18 are in the WHO Africa Region.

Table 1. Countries that have not introduced routine MCV2 and do not meet routine MCV2 introduction criterion, MCV1 coverage (WUENIC estimates)

Country	WHO Region	MCV1 2013	MCV1 2014	MCV1 2015
MCV1 coverage close to introduction criterion				
Guatemala	AMRO	85	67	99
Togo	AFRO	72	82	85
Cameroon	AFRO	83	80	79
Democratic Republic of the Congo	AFRO	76	77	79
Ethiopia	AFRO	62	70	78
Mali	AFRO	80	80	76
Lower MCV1 coverage				
Benin	AFRO	68	68	75
Côte d'Ivoire	AFRO	76	62	72
Mauritania	AFRO	80	84	70
Timor-Leste	SEARO	70	74	70
Gabon	AFRO	70	61	70
Guinea-Bissau	AFRO	69	69	69
Liberia	AFRO	74	58	64
Lowest MCV1 coverage				
Chad	AFRO	59	54	62
Madagascar	AFRO	63	64	58
Nigeria	AFRO	47	51	54
Haiti	AMRO	65	53	53
Vanuatu	WPRO	53	53	53
Guinea	AFRO	62	52	52
Central African Republic	AFRO	25	49	49
Somalia	EMRO	46	46	46
Equatorial Guinea	AFRO	42	44	27
South Sudan	AFRO	30	22	20

Routine MCV2 coverage after introduction of the second dose

The accumulated evidence demonstrates that both groups of countries (those meeting and those not meeting the introduction criterion) show a trend of increased routine MCV2 coverage during the first five years after introduction. Unsurprisingly, countries with stronger systems that had higher MCV1 coverage at the time of routine MCV2 introduction also achieve higher levels of routine MCV2 coverage (Figure 1). Similar trends are also observed when restricting the analysis to countries that have the routine MCV2 in the second year of life and are thus providing the second dose through routine vaccination services rather than other means which may be more likely with school entry vaccination (Figure 2).

[4] Note that Papua New Guinea introduced routine MCV2 in January 2016, and was excluded

Figure 1. MCV2 coverage during the first five years after MCV2 introduction (1999-2014), all countries (WUENIC estimates)*

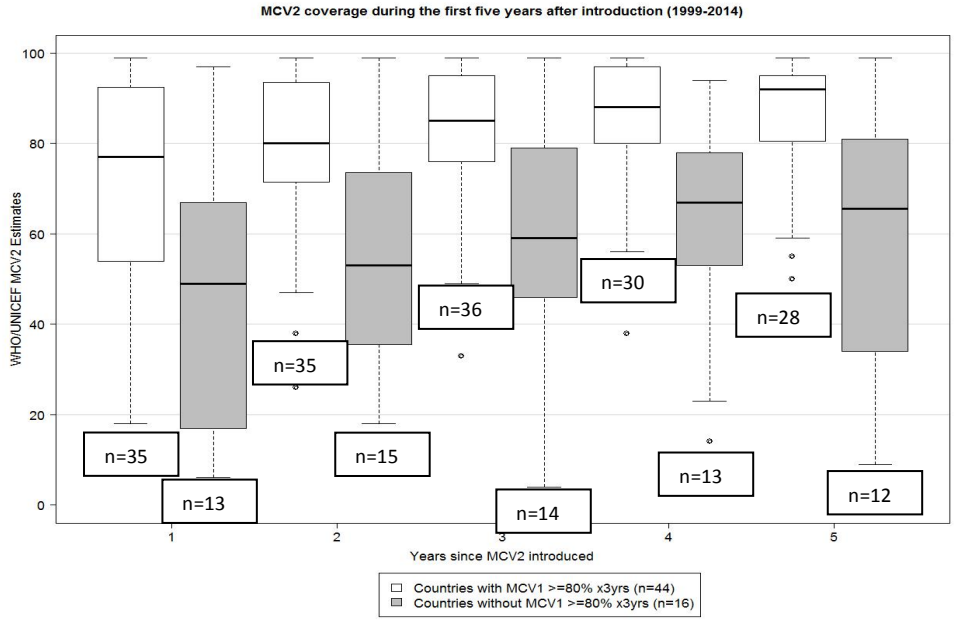
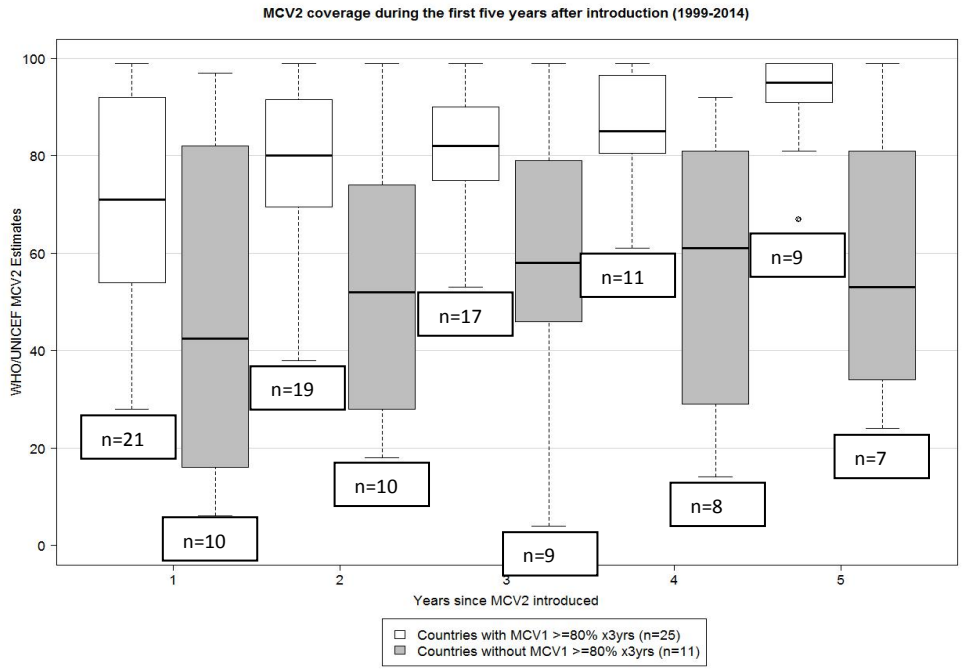


Figure 2. MCV2 coverage during the first five years after MCV2 introduction (1999-2014), countries with routine MCV2 in second year of life (WUENIC estimates)*



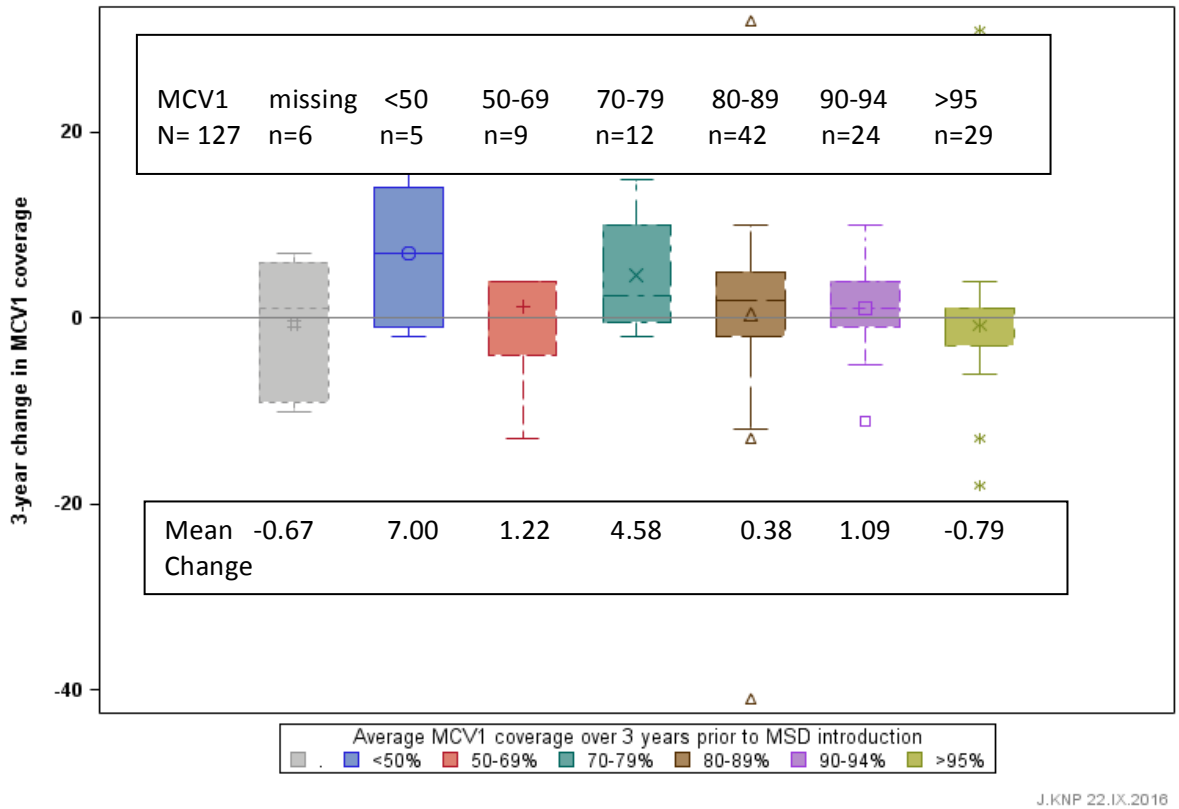
* Figures 1 and 2 display median MCV2 coverage for the 5 years after MCV2 introduction, along with 25-75% interquartile ranges. Figure 1 displays all countries and Figure 2 is restricted to those countries with MCV2 in the routine schedule between 12 and 23 months of age. The range of introduction years, 1999-2014, were selected based on the availability of WUENIC routine MCV2 estimates. If countries introduced routine MCV2 over several years, the nationwide year of introduction was considered the introduction year. Not all countries contributed 5 years of trend data. Those that introduced MCV2 after 2010 have not accumulated 5 years of MCV2 WUENIC estimates. In addition, for some countries, MCV2 estimates were not generated for the years immediately following introduction, due to the absence of reporting data. In both figures, MCV2 estimates are included for the years available; the total number of countries contributing data in each category is indicated in text boxes. The countries in both figures are separated according to whether they had achieved at least 80% MCV1 coverage for three consecutive years prior to introduction (white boxes) compared with countries which did not achieve this MCV1 coverage level (gray boxes). *Acknowledgments: Sebastian Antoni, Laure Dumolard*

MCV1 coverage after routine MCV2 introduction

Despite concerns that MCV2 may divert resources from improving MCV1 coverage, pooled data provide no evidence of this. As shown in Figure 3, countries with an MCV1 level <80% at the time of MCV2 introduction show a more marked improvement in median MCV1 coverage for the three years following MCV2 introduction relative to the three years preceding, compared to countries with MCV ≥80%. While no causal relationship is implied by these data, at least there is no evidence that MCV2 introduction causes harm to MCV1 coverage.

Five countries introduced routine MCV2 with a median MCV1 coverage <50% for the three years preceding introduction. The changes in median MCV1 for these countries are as follows: Iran 1984, +17%; United Arab Emirates 1985, +14%; Mongolia 1989, -2%; Papua New Guinea 1999, -1%; and Afghanistan 2004, +7%.

Figure 3. Mean change in median MCV1 coverage, three years preceding and three years following routine MCV2 introduction, by MCV1 level at the year of introduction, through 2012 (JRF estimates)*



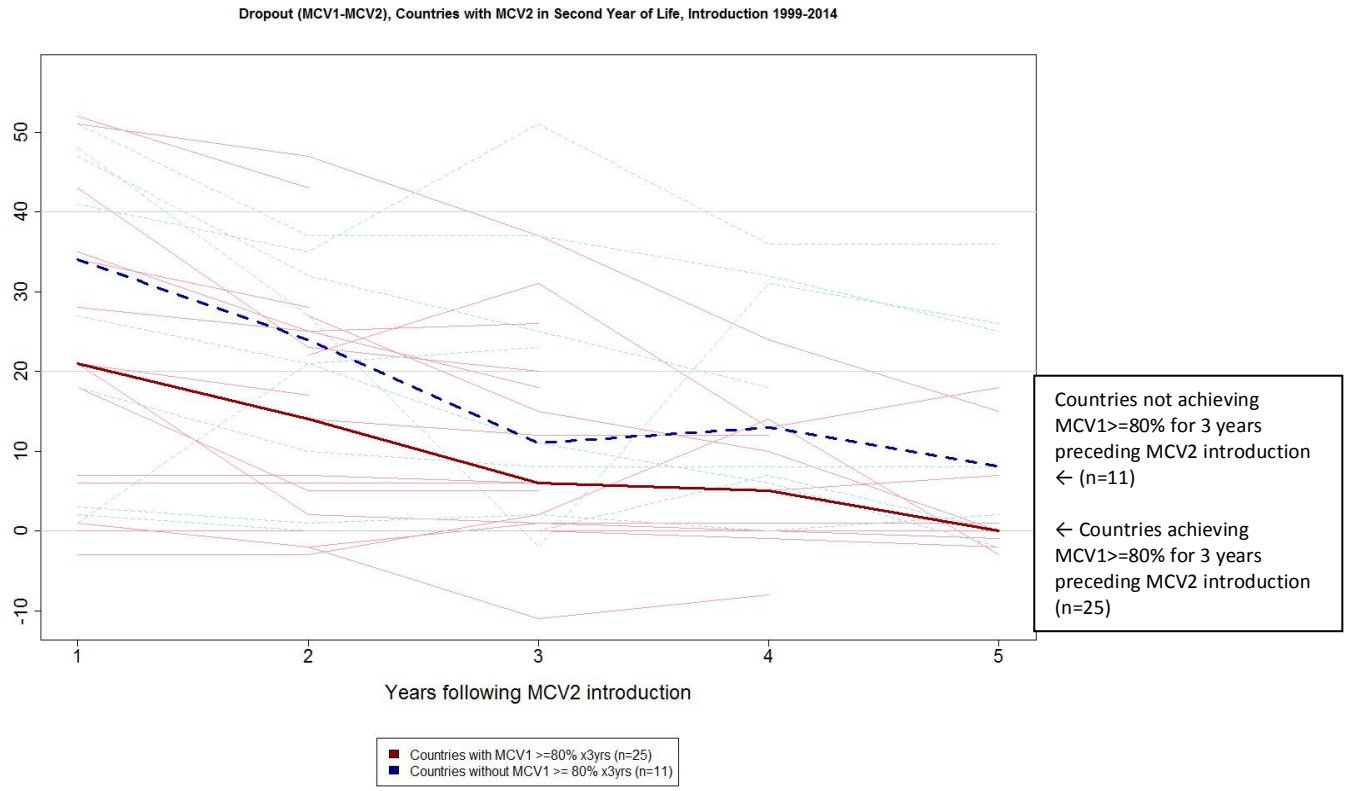
* Figure 3 displays the mean change by country groupings in the median MCV1 level for the three years preceding compared with the three years following MCV2 introduction, with 25-75% interquartile ranges. Countries are grouped by the median level of MCV1 coverage for the three years preceding routine MCV2 introduction, as reported on the Joint Reporting Form. Categories from left to right: MCV1 missing; <50; 50-69;70-79; 80-89; 90-94; >95. *Acknowledgments: Jennifer Knapp*

MCV1-MCV2 dropout after routine MCV2 introduction

The difference between MCV1 and MCV2 coverage (drop-out) at the country level in the five years after introduction is shown in Figure 4, among countries with routine MCV2 in the second year of life.

Regardless of the MCV1 coverage levels at the time of introduction, the difference between MCV1 and MCV2 declines over the five years after introduction. However, dropout is lower for countries meeting the introduction criterion, compared to countries not meeting the criterion.

Figure 4. MCV1-MCV2 dropout (difference between MCV1 and MCV2 coverage) during the 5 years following routine MCV2 introduction, 1999-2014, countries with MCV2 in the second year of life (WUENIC estimates)*



* Figure 4 displays MCV1-MCV2 dropout rates (the difference between national MCV1 and MCV2 coverage, WUENIC estimates) during the 5 years after routine MCV2 introduction, restricted to those countries with MCV2 in the routine schedule between 12 and 23 months of age. The range of introduction years, 1999-2014, were selected based on the availability of WUENIC routine MCV2 estimates. If countries introduced routine MCV2 over several years, the final year of introduction was considered the introduction year. Not all countries contributed 5 years of trend data. Those that introduced MCV2 after 2010 have not accumulated 5 years of MCV1 and MCV2 WUENIC estimates. In addition, for some countries, MCV2 estimates were not generated for the years immediately following introduction, due to the absence of reporting data. Dropout rates are included for the years available. The countries in both figures are separated according to whether they had achieved at least 80% MCV1 coverage for three consecutive years prior to introduction (solid red lines) compared with countries which did not achieve this MCV1 coverage level (dashed blue lines). Median dropout rates by category of meeting or not meeting the introduction criterion are shown in the bold lines with respective styles and colors.

Factors for Considerations:

Overall, countries with weaker immunization systems and which met the 2009 criterion for MCV2 introduction (at least 80% MCV1 coverage for 3 years preceding introduction) had poorer MCV2 performance, as measured by MCV2 coverage and MCV1-MCV2 dropout. This observation holds true for countries introducing MCV2 prior and subsequent to the publication of the 2009 recommendation.

Notwithstanding the relative overall poorer performance of countries not meeting the introduction criterion, a number of considerations compel the SAGE MR WG to recommend removing the introduction criterion, both to help increase population immunity to measles and for programmatic purposes. Below is a summary of the factors considered.

Equity in access to vaccines

In countries that do not meet the MCV2 introduction criteria, children born between campaigns do not have equitable access to two doses of measles vaccine. The current recommendation is that reaching all children with 2 doses of measles vaccine should be the standard for all national immunization programmes. However,

depending on the timing of their birth, some children have to wait up to three years for the next follow up campaign in order to receive a second dose of measles vaccine.

Particularly in settings in which measles virus continues to circulate (which describes most countries without routine MCV2), children who either do not receive a first dose or who fail to seroconvert are at risk of contracting measles. The absence of routine MCV2 likely increases the interval before they receive a dose through supplementary services and thus decreases their access to measles vaccine and increases their risk of morbidity and mortality associated with measles. Parents/guardians have the right to access a primary vaccination schedule that provides full individual protection for their children, regardless of when they are born.

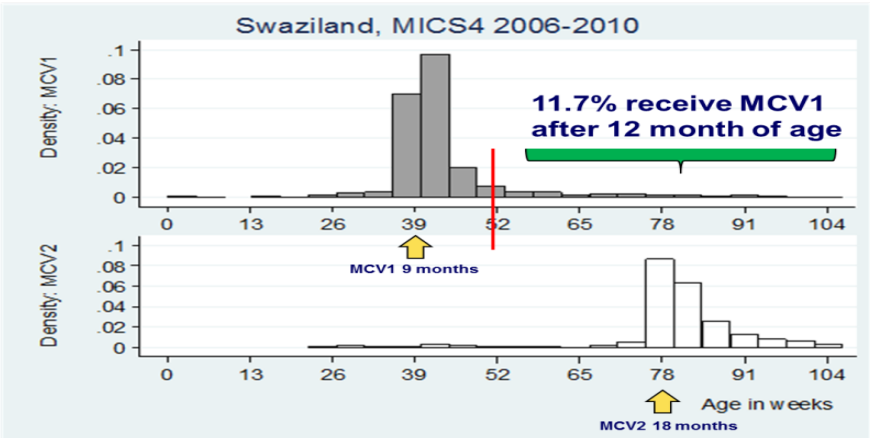
Overcoming barriers to vaccination beyond 12 months of age

Adding a routine measles dose during the second year of life may in fact increase MCV1 coverage as more children access vaccination services and barriers to administering a dose of measles vaccine after 12 months of age are overcome. Ad hoc reports indicate that many developing countries limit vaccination services to infants <12 months of age, and do not offer vaccination to children older than 12 months who come late or are missing doses. This is mainly due to fear of running out of vaccine and lack of knowledge about the need to provide measles vaccination to any non-immune person, irrespective of their age. Having routine MCV2 in the 2nd year of life signals to health workers that measles vaccination is indicated and catching up MCV1 beyond 12 months of age is in fact good practice. The data indicate that routine MCV2 likely does not adversely impact MCV1 coverage (Figure 3); routine MCV2 may in fact increase the number of children who receive MCV1.

Furthermore, when a second dose of MCV is administered to children over one year of age who failed to develop protective antibody levels (primary vaccine failure) following the first dose, the majority (median proportion, 97%; interquartile range, 87-100%)[5] will develop protective antibody levels.
For those who missed receiving their MCV1 dose entirely, a 2-dose schedule allows for them to be caught-up at the 2nd contact and because they will be > 12 months a higher proportion (90-95%) will develop protective antibodies compared to those receiving their first dose at 9 months (85%).[6]

Unfortunately, data on MCV1 doses administered late are not routinely collected through the JRF system, and only recently are being assessed by more systematic surveys such as MICS or DHS. An analysis of MICS data for Swaziland on the timeliness of vaccination for their 2-dose MCV schedule shows that more than 10% of children receive their first dose of MCV1 when they are older than 12 months (Figure 5).

Figure 5. Age of receipt of MCV1 and MCV2, Swaziland, MICS4 2006-2010



[5] WHO 2009. *Measles Vaccines: WHO Position Paper*. WER No. 35, 84. Pp. 349-360.
[6] WHO 2009. The immunological basis for immunization series - Module 7: Measles - Update 2009. http://apps.who.int/iris/bitstream/10665/44038/1/9789241597555_eng.pdf

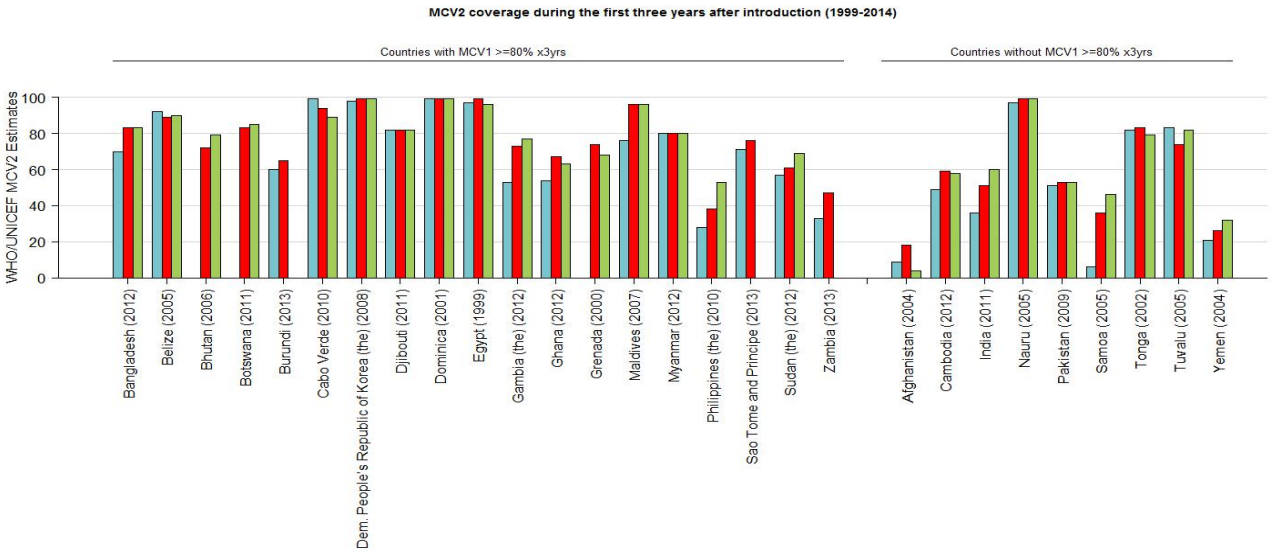
Building a 2nd year of life platform

An MCV2 contact at 15 – 18 months can help build a 2nd year of life platform, which can be used for delivering other vaccines (e.g. Men A; PCV if using a 2+1 alternative schedule, DTP4 booster doses). An MCV2 contact can also be used for catching up any missed vaccination doses and therefore help towards improving completion of the immunization schedule and fully immunized child (FIC) coverage.

Country experiences show time is needed to ramp up MCV2 coverage

Country experiences indicate for many countries, it takes a number of years to ramp up coverage levels for routine MCV2. Generally, routine MCV2 coverage increases gradually over 3-5 years as the programmatic and operational aspects are worked out. Delaying the "learning by doing" and systems strengthening needed to deliver routine MCV2 further extends the length of time that a routine 2 dose schedule is unavailable.

Figure 6. MCV2 coverage for 3 years following MCV2 introduction, 1999-2014, countries with MCV1>=80% for 3 consecutive years prior to MCV2 introduction and countries not achieving MCV1>=80% for 3 consecutive years prior to MCV2 introduction (WUENIC estimates)



Creating consistency in primary vaccination schedule recommendations

Although the WHO Position Paper clearly states that two doses of MCV are required, the restrictive MCV2 introduction criterion does not enunciate a clear recommendation with regards to the measles routine schedule, and may imply that a second dose is not truly required. All other WHO vaccination recommendations clearly specify the number of doses required for the primary series (e.g. 3 doses of DTP) irrespective of the delivery strategy. WHO's measles vaccination policy recommendation does not have this precision, which may result in the misunderstanding that the 2nd dose is a booster dose rather than a primary schedule. Many countries are not yet implementing booster doses for any vaccines.

In addition, the provision of delivery strategy options (routine or SIA) in the recommendation sends a mixed message about the 2-dose schedule. By definition, all nonselective SIAs provide "supplemental doses" which are not counted towards the completion of a child's immunization schedule. Despite guidance on recording SIA doses, in reality this is rarely done in many regions. As such, the SIA delivery strategy option is equivalent to a "second opportunity" rather than a "second dose" for all children.

Reducing MCV wastage

Removing impediments to MCV2 introduction may reduce wastage. Most developing countries are using 10-dose vials of measles vaccine. Because of the need to follow the multi-dose vial policy[7], vaccine wastage rates for developing countries with 1-dose MCV schedule are high, ranging between 45-65%.
It is estimated that the introduction of MCV2 (switching from a 1-dose to a 2-dose schedule) may reduce current measles vaccine wastage rates by almost 40% (to 25-35%) (Figure 7). This reduction in vaccine wastage rates has been confirmed by a detailed analysis of country data from Niger and Senegal. Both countries use yellow fever vaccine (1 dose schedule at 9 months; 10 dose vial) and MCV (2-dose schedule 9 and 18 months; 10 dose vial). Comparing vaccine wastage rates where coverage for MCV1 and YF are equivalent, and where reliable wastage data are available, MCV wastage rate was 40% less in Niger (national) and 62% less in Senegal (2 regions) compared to wastage rates for yellow fever (Annex 1). The reduction in MCV wastage rates for a 2-dose schedule was consistent even when MCV2 coverage was quite low.

For those countries that are still following a 1-dose MCV schedule, unused measles doses could be used to provide a 2nd dose to older children. The resulting reduction in MCV wastage rates may help to overcome the hesitation or fear that some health workers have to open vials for a few children.

Figure 7: Estimated wastage rates for 1 and 2-dose measles schedules, by vial size[8]

	For 1 dose schedule		For 2 dose schedule	
Vial size	Estimated wastage rate	Estimated wastage factor	Estimated wastage rate	Estimated wastage factor
Single dose	<5%	1.05	<5%	1.05
5 doses/vial	30–40%	1.43–1.67	15–25%	1.18–1.33
10 doses/vial	45–60%	1.82–2.50	25–35%	1.33–1.54

Improve recording of doses

Finally, routine MCV2 may improve dose recording. WHO recommends that recording and monitoring the administration of all MCV doses is required, including those delivered through mass campaigns. However, only in the Region of the Americas and Europe are campaign doses of measles vaccine regularly recorded. Non-recording of SIA doses in many measles endemic countries means that there is an incomplete record of the number of doses children have received. For improved measles control and ultimate elimination, it is important to accurately know number of doses received for case investigation and generation of population immunity profiles. Recommending a two-dose routine schedule for all countries (without any introduction criteria) would globally standardize the recording of at least two doses.

Draft Recommendations

The following recommendations are proposed by the SAGE WG on Measles and Rubella for considerations by the SAGE based on the evidence and programmatic factors described above.

- All countries should include two doses of MCV in the routine schedule; MCV2 should be added to the routine immunization schedule in all countries regardless of MCV1 coverage. The optimal timing for the age of administration for routine MCV2 remains unchanged from current recommendations. Routine MCV2 can serve to establish a well-child visit in the second year of life and provide a timely opportunity to catch-up children who missed MCV1.

[7] Multi-dose vial policy: Once measles vaccine has been reconstituted, the vial must be discarded at the end of each immunization session or at the end of six hours, whichever comes first.

[8] Detailed guidance for MCV2 introduction is available in "A Guide to Introducing a Second Dose of Measles Vaccine into Routine Immunization Schedules" World Health Organization, 2013. Available at www.who.int/vaccines-documents/

- Before introduction of routine MCV2, countries should determine a suitable age for administration of this dose and establish a system for recording doses both for the individual (e.g., an immunization card) and for the health system (e.g., a vaccination register). Training of health staff should be conducted to ensure timely scheduling of doses and tracking defaulters. Both MCV1 and MCV2 should be recorded on a child's immunization card and in a clinic's vaccination register, and both should include documentation of the age of MCV1 and MCV2 receipt. The first dose of MCV received should be recorded as MCV1, regardless of the child's age at the time of receipt. Any MCV dose administered as supplemental rather than routine should be recorded as a supplemental dose. Children should be screened for their measles vaccination history at the time of school entry, and those lacking evidence of receipt of 2 doses should be vaccinated.

- Because addition of routine MCV2 only covers a single birth cohort and will take time to achieve high coverage, countries should not stop regular follow-up SIAs of measles-containing vaccines. Accumulation of susceptible persons should continue to be monitored subsequent to routine MCV2 introduction and a follow-up SIA conducted whenever the number of susceptible pre-school age children approaches the size of a birth cohort. Furthermore, subnational coverage data should be monitored for the unequal accumulation of susceptible children, indicating equity gaps. Routine MCV2 will slow the accumulation of susceptible children and thereby lengthen the inter-SIA interval, decrease reliance on SIAs and eventually stop SIAs once high coverage (>95%) can be maintained with a routine two dose schedule.

Annex 1: Comparison of yellow fever vaccine (1 dose) and MCV (2 dose) wastage rates

NIGER (summary data for all regions)

Régions	Districts	Monthly Surviving Infants	# Health Posts	Cumulative coverage, as May 2016			Wastage rates (May-16)		Difference in wastage YF (1dose) compared to MCV (2dose)
				MCV1	MCV2	YF	MCV	YF	
AGADEZ	4 Districts	1,976	65	83%	24%	82%	8.4%	13.4%	37%
DIFFA	3 Districts	3,277	50	92%	25%	92%	9.0%	12.3%	27%
DOSSO	5 Districts	9,791	124	89%	35%	90%	7.2%	32.7%	78%
MARADI	7 Districts	17,498	145	91%	46%	89%	9.3%	18.1%	49%
TAHOUA	8 Districts	14,315	151	95%	34%	95%	10.2%	13.9%	27%
TILLABERI	6 Districts	12,764	184	91%	25%	90%	11.5%	13.8%	17%
ZINDER	6 Districts	20,454	136	89%	33%	87%	8.0%	8.2%	3%
NIAMEY	5 Districts	4,373	44	79%	9%	81%	6.6%	8.3%	20%
National Weighted Average				**90%**	**33%**	**89%**	**9.0%**	**15.2%**	**40%**

SENEGAL (data for two regions)

Régions	Districts	Monthly Surviving Infants	# Health Posts	Cumulative coverage, as March 2016			Wastage rates (March-16)		Difference in wastage YF (1dose) compared to MCV (2dose)
				MCV1	MCV2	YF	MCV	YF	
Kedougou	Kedougou	252	11	28%	25%	28%	12%	27%	54%
Kedougou	Salemata	71	7	5%	3%	5%	22%	27%	18%
Kedougou	Saraya	163	11	15%	10%	14%	17%	37%	54%
Kolda	Kolda	784	25	67%	59%	68%	16%	36%	55%
Kolda	Medina Yoro Foulah	396	13	49%	49%	49%	4%	25%	85%
Kolda	Velingara	887	20	84%	71%	84%	5%	18%	74%
Regional Weighted Average				**61%**	**54%**	**61%**	**10.2%**	**27.1%**	**62%**