

**Appendix Table 1. Additional study sample characteristics, children aged 12-23 months in rural areas, Malawi DHS 2015-16.**

	Unweighted N	Weighted %
<i>Total</i>	2740	100.0%
<b>Individual child indicators</b>		
Sex of child		
Male	1362	49.1%
Female	1378	50.9%
Birth order		
1 <sup>st</sup>	673	25.3%
2 <sup>nd</sup>	522	18.9%
3 <sup>rd</sup>	453	16.1%
4 <sup>th</sup>	375	13.2%
5 <sup>th</sup> or more	717	26.5%
<b>Maternal/household indicators</b>		
<i>Mother's age (Weighted Mean / SD)</i>	27.2	6.6
Mother's education		
None	331	13.2%
Primary	1963	71.7%
Secondary or higher	446	15.2%
Household wealth index quintile*		
Poorest	769	29.9%
Poorer	678	24.8%
Middle	601	22.3%
Richer	464	16.1%
Richest	228	7.0%
Region of Malawi		
Northern	508	12.0%
Central	959	42.0%
Southern	1273	46.0%

**Appendix Table 2. Unadjusted and adjusted comparisons of immunization rates among children in rural areas aged 12-23 months by presence of vaccine-providing facility in 8km radius, Malawi 2013-14.**

	Unadjusted rates			Unadjusted logistic regression		Adjusted logistic regression	
	No vaccine-providing facility proximal	Vaccine-providing facility proximal	p-value	OR <sup>1</sup>	95% CI	AOR <sup>1,2</sup>	95% CI
<i>Specific immunization dose coverage</i>							
BCG	96.4%	97.8%	0.22	1.59	[0.71,3.58]	1.54	[0.70,3.39]
Rotavirus 2 doses	87.0%	91.9%	0.02	1.66*	[1.03,2.65]	1.53	[0.95,2.45]
OPV 3 doses	80.4%	81.3%	0.75	1.14	[0.78,1.67]	1.14	[0.80,1.63]
Pentavalent 3 doses	90.7%	93.3%	0.25	1.55	[0.95,2.83]	1.44	[0.81,2.56]
Pneumococcal 3 doses	87.2%	89.4%	0.54	1.33	[0.67,2.64]	1.20	[0.64,2.26]
Measles 1+ dose	86.0%	92.0%	0.03	2.04*	[1.16,3.60]	1.88*	[1.06,3.33]
<i>Coverage of group of immunizations</i>							
All basic vaccines <sup>3</sup>	69.1%	76.6%	0.08	1.57*	[1.02,2.43]	1.54*	[1.02,2.32]
All recommended vaccines <sup>4</sup>	36.7%	53.2%	<0.001	1.89**	[1.28,2.81]	1.97***	[1.35,2.89]
<i>Negative immunization outcomes</i>							
Pentavalent zero dose	5.4%	2.3%	0.03	0.37*	[0.16,0.88]	0.38*	[0.18,0.82]
Pentavalent dropout <sup>5</sup>	4.1%	4.6%	0.75	1.02	[0.51,2.01]	1.10	[0.54,2.24]

<sup>1</sup>Reference is children not proximal to a vaccine-providing facility<sup>2</sup>Models also control for household wealth, mother's education, mother's age, child sex, child birth order, region of country<sup>3</sup>Defined as BCG 1 dose, OPV 3 doses, DTP/HBV/Hib (pentavalent) 3 doses, measles 1 dose<sup>4</sup>Basic + OPV birth dose + rotavirus 2 doses + PCV13 3 doses<sup>5</sup>Dropout denominator is children with at least 1 dose of pentavalent

\* p&lt;0.05, \*\* p&lt;0.01, \*\*\* p&lt;0.001

**Appendix Table 3a. Logistic regression models of individual-level vaccination among children 12-23 months living in rural areas who are within 5km of a facility providing vaccination. Only facility-characteristic coefficients reported.<sup>1</sup>**

	<i>Specific immunization dose coverage</i>											
	BCG		Rotavirus 2 dose		Polio 3 dose		Pentavalent 3 dose		Pneumococcal 3 dose		Measles 1+ dose	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
<i>Facility type offering vaccination [highest available if &gt;1]</i>												
Hospital	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Health centre	0.92	[0.34,2.49]	1.03	[0.54,1.95]	1.07	[0.72,1.58]	0.89	[0.48,1.64]	0.69	[0.40,1.20]	1.17	[0.51,2.64]
Health post/clinic/dispensary	1.88	[0.42,8.48]	0.93	[0.38,2.28]	1.94	[0.97,3.86]	0.84	[0.33,2.16]	0.87	[0.34,2.24]	0.79	[0.27,2.34]
<i>Managing authority of facility/ies offering vaccination</i>												
Government												
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	2.06	[0.51,8.36]	1.65	[0.89,3.07]	2.32**	[1.37,3.93]	1.76	[0.91,3.42]	1.18	[0.64,2.15]	1.34	[0.70,2.55]
CHAM												
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	1.71	[0.44,6.67]	1.54	[0.80,2.97]	2.47***	[1.46,4.18]	2.04*	[1.06,3.93]	1.05	[0.60,1.86]	1.39	[0.63,3.07]
Private for-profit												
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	2.85	[0.31,26.02]	9.83*	[1.20,80.47]	0.82	[0.38,1.79]	5.36	[0.95,30.14]	1.96	[0.33,11.49]	1.57	[0.32,7.73]
NGO												
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	0.53	[0.13,2.18]	1.42	[0.42,4.81]	0.57	[0.26,1.28]	2.14	[0.54,8.44]	0.76	[0.27,2.14]	1.59	[0.46,5.48]

<sup>1</sup>Models also control for household wealth, education, mother's age, child sex, child birth order, region of country

\* p&lt;0.05, \*\* p&lt;0.01, \*\*\* p&lt;0.001

**Appendix Table 3b. Logistic regression models of individual-level vaccination among children 12-23 months living in rural areas who are within 5km of a facility providing vaccination. Only facility-characteristic coefficients reported.<sup>1</sup>**

	<i>Coverage of group of immunizations</i>				<i>Negative immunization outcomes</i>			
	<b>All basic vaccines<sup>2</sup></b>		<b>All recommended vaccines<sup>3</sup></b>		<b>Pentavalent 0 dose</b>		<b>Pentavalent dropout</b>	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
<i>Facility type offering vaccination [highest available if &gt;1]</i>								
Hospital	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Health centre	1.11	[0.75,1.66]	0.79	[0.55,1.14]	1.46	[0.42,5.12]	0.95	[0.49,1.86]
Health post/clinic/dispensary	1.45	[0.75,2.81]	0.93	[0.56,1.54]	0.20	[0.03,1.28]	1.53	[0.57,4.09]
<i>Managing authority of facility/ies offering vaccination</i>								
Government								
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	1.82*	[1.15,2.88]	1.94**	[1.24,3.03]	0.08***	[0.02,0.33]	0.97	[0.44,2.11]
CHAM								
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Yes	2.29***	[1.44,3.63]	1.33	[0.86,2.07]	0.11**	[0.02,0.50]	0.64	[0.31,1.32]
Private for-profit								
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	--	--	<i>Ref</i>	<i>Ref</i>
Yes	0.84	[0.39,1.78]	1.04	[0.48,2.25]	--	--	0.26	[0.04,1.54]
NGO								
No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>	--	--	<i>Ref</i>	<i>Ref</i>
Yes	0.60	[0.28,1.28]	0.62	[0.35,1.10]	--	--	0.60	[0.15,2.32]

<sup>1</sup>Models also control for household wealth, education, mother's age, child sex, child birth order, region of country<sup>2</sup>Defined as BCG 1 dose, OPV 3 dose, DTP/HBV/Hib (pentavalent) 3 dose, measles 1 dose<sup>3</sup>Basic + OPV birth dose + rotavirus 2 doses + PCV13 3 doses

\* p&lt;0.05, \*\* p&lt;0.01, \*\*\* p&lt;0.001