SUPPLEMENTARY MATERIAL

Prevalence of human metapneumovirus infection among children suffering from acute respiratory illness in India: a systematic review and meta-analysis

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Key words: human metapneumovirus, acute respiratory infections, severe acute respiratory illness, acute lower respiratory tract infection, prevalence.

Author (Year of Publication)	Number of patients suffering from hMPV	Total patients	Proportion with 95% CI	Weig
2007-2019	3	,		
Banerjee et al. (2007)	12	97	0.12 [0.06, 0.19] 2.0
Bharaj et al. (2009)	11	301 -	0.04 [0.02, 0.06	_
Agrawal et al. (2011)	107	1,863	0.06 [0.05, 0.07	_
Banerjee et al. (2011)	21	662	0.03 [0.02, 0.05	-
Mukherjee et al. (2013)	78	1,741	0.04 [0.04, 0.05	-
Narayanan et al. (2013)	38	300	0.13 [0.09, 0.16	-
Mazumdar et al. (2013)	8	880	0.01 [0.00, 0.02	-
Biswas et al. (2014)	20	276	0.07 [0.04, 0.10	
Broor et al. (2014)	3	245	0.01 [0.00, 0.03	-
Singh et al. (2014)	2	188	0.01 [0.00, 0.03	-
Panda et al. (2016)	7	332	0.02 [0.01, 0.04	
Nandhini et al. (2016)	8	209	0.04 [0.01, 0.06	
Sarkar et al. (2016)	14	142	0.10 [0.05, 0.15	_
Malhotra et al. (2016)	35	155	0.23 [0.16, 0.29	-
Jambagi et al. (2018)	1	407	0.00 [0.00, 0.01	-
Biswal et al. (2018)	30	1,063	0.03 [0.02, 0.04	_
Swamy et al. (2018)	44	997	0.04 [0.03, 0.06	-
Sonawane et al. (2019)	7	100	0.07 [0.02, 0.12	-
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 9$		100	0.05 [0.03, 0.07	-
Fest of $\theta_i = \theta_i$: Q(17) = 265.12,			0.03 [0.03, 0.07	1
Fest of $\theta = 0$: $z = 4.77$, $p = 0.0$	•			
2020-2024			_	
Anand et al. (2020)	3	50	0.06 [0.00, 0.13	-
Palani et al. (2020)	8	292 -	0.03 [0.01, 0.05	-
Kumar et al. (2021)	7	94	0.07 [0.02, 0.13	-
Viswanathan et al. (2022)	6	45	0.13 [0.03, 0.23	-
Muruganandam et al. (2022)	11	105	0.10 [0.05, 0.16	3] 2.2
Hindupur et al. (2022)	14	350	0.04 [0.02, 0.06	3.7
Sarkar et al. (2022)	23	349	0.07 [0.04, 0.09	
Chandy et al. (2022)	13	256	0.05 [0.02, 0.08	3.5
Koul et al. (2022)	9	412	0.02 [0.01, 0.04	-
Agarwal et al. (2023)	5	180	0.03 [0.00, 0.05	_
Kang et al. (2023)	11	355	0.03 [0.01, 0.05	3.8
Taduri et al. (2023)	2	88 -	0.02 [0.00, 0.05	3.3
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 4$	9.84%, H ² = 1.99		0.04 [0.03, 0.05	i]
Test of $\theta_i = \theta_j$: Q(11) = 23.96, p				
Test of $\theta = 0$: $z = 7.03$, $p = 0.0$	0			
Overall	F 000/ 112 - 22 - 23		0.05 [0.04, 0.06	6]
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 9$				
Test of $\theta_i = \theta_j$: Q(29) = 302.95,	•			
Test of $\theta = 0$: $z = 7.17$, $p = 0.0$	0			
Test of group differences: Q _b (1) = 0.95, p = 0.33	0	.1 .2 .3	
		_		

Supplementary Figure 1. Forest plot of pooled prevalence of human metapneumovirus among children with acute respiratory infections, stratified by study publication year (2007–2019 vs. 2020–2024).

Author (Year of Publication)	Number of patients suffering from hMPV	Total patients	s	Proportion with 95% CI	Weight (%)
East			_		
Agrawal et al. (2011)	107	1,863	_	0.06 [0.05, 0.07]	3.99
Mukherjee et al. (2013)	78	1,741	_	0.04 [0.04, 0.05]	4.01
Mazumdar et al. (2013)	8	880	_	0.01 [0.00, 0.02]	4.06
Panda et al. (2016)	7	332	•	0.02 [0.01, 0.04]	3.88
Biswal et al. (2018)	30	1,063		0.03 [0.02, 0.04]	4.01
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$			•	0.03 [0.02, 0.05]	
Test of $\theta_i = \theta_j$: Q(4) = 76.72, p Test of θ = 0: z = 3.68, p = 0.0					
North					
Banerjee et al. (2007)	12	97		0.12 [0.06, 0.19]	2.05
Bharaj et al. (2009)	11	301	-	0.04 [0.02, 0.06]	3.71
Banerjee et al. (2011)	21	662		0.03 [0.02, 0.05]	3.93
Broor et al. (2014)	3	245		0.01 [0.00, 0.03]	3.92
Singh et al. (2014)	2	188		0.01 [0.00, 0.03]	3.90
Sarkar et al. (2016)	14	142		0.10 [0.05, 0.15]	2.63
Malhotra et al. (2016)	35	155		0.23 [0.16, 0.29]	2.04
Kumar et al. (2021)	7	94	_	0.07 [0.02, 0.13]	2.47
Sarkar et al. (2022)	23	349	-	0.07 [0.04, 0.09]	3.54
Koul et al. (2022)	9	412		0.02 [0.01, 0.04]	3.92
Agarwal et al. (2023)	5	180	-	0.03 [0.00, 0.05]	3.61
Kang et al. (2023)	11	355	-	0.03 [0.01, 0.05]	3.81
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$	95.83%, H ² = 23.99		•	0.06 [0.03, 0.09]	
Test of $\theta_i = \theta_i$: Q(11) = 74.04,	p = 0.00		•		
Test of $\theta = 0$: $z = 3.69$, $p = 0.0$	00				
North-East					
Biswas et al. (2014)	20	276	_	0.07 [0.04, 0.10]	3.36
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$.%, H ² = .			0.07 [0.04, 0.10]	
Test of $\theta_i = \theta_j$: Q(0) = 0.00, p =	=.				
Test of $\theta = 0$: $z = 4.64$, $p = 0.0$	00				
South					
Narayanan et al. (2013)	38	300	_	0.13 [0.09, 0.16]	3.08
Nandhini et al. (2016)	8	209	-	0.04 [0.01, 0.06]	3.54
Jambagi et al. (2018)	1	407		0.00 [0.00, 0.01]	4.08
Anand et al. (2020)	3	50		0.06 [0.00, 0.13]	2.04
Palani et al. (2020)	8	292	-	0.03 [0.01, 0.05]	3.79
Muruganandam et al. (2022)	11	105		0.10 [0.05, 0.16]	2.28
Hindupur et al. (2022)	14	350	-	0.04 [0.02, 0.06]	3.73
Chandy et al. (2022)	13	256	-	0.05 [0.02, 0.08]	3.51
Taduri et al. (2023)	2	88	-	0.02 [0.00, 0.05]	3.34
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$	91.35%, H ² = 11.56		•	0.05 [0.02, 0.07]	
Test of $\theta_i = \theta_i$: Q(8) = 84.11, p	= 0.00		•		
Test of $\theta = 0$: $z = 3.73$, $p = 0.0$	00				
West			_		977.1
Swamy et al. (2018)	44	997		0.04 [0.03, 0.06]	3.95
Sonawane et al. (2019)	7	100		0.07 [0.02, 0.12]	2.59
Viswanathan et al. (2022)	6	45		0.13 [0.03, 0.23]	1.24
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$				0.06 [0.03, 0.10]	
Test of $\theta_i = \theta_j$: Q(2) = 3.91, p =					
Test of $\theta = 0$: $z = 3.42$, $p = 0.0$	00				
Overall			•	0.05 [0.04, 0.06]	
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 0.00$	95.09%, H ² = 20.36		*		
Test of $\theta_i = \theta_i$: Q(29) = 302.95					
Test of $\theta = 0$: $z = 7.17$, $p = 0.0$					
Test of group differences: Q _b (
			0 .1 .2	.3	
Random-effects REML model	F. 0				

Supplementary Figure 2. Forest plot of pooled prevalence of human metapneumovirus among children with acute respiratory infections, stratified by geographic region in India.



Author (Year of Publication)	Number of patients suffering from hMPV	Total patients	Proportion with 95% CI	Weight (%)
Acute Lower Respiratory tract infection	sullering from flivir v	iolai palierils	WILL 95% CI	(70)
Bharaj et al. (2009)	11	301	0.04 [0.02, 0.06	3.71
Singh et al. (2004)	2	188	0.04 [0.02, 0.06	-
	14			-
Sarkar et al. (2016)	14 7	142	0.10 [0.05, 0.1	-
Sonawane et al. (2019)	-	100	0.07 [0.02, 0.12	-
Sarkar et al. (2022)	23	349	0.07 [0.04, 0.09	-
Kang et al. (2023)	11	355	0.03 [0.01, 0.09	
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 82.21\%$, $H^2 = 5.62$			0.05 [0.02, 0.0	7]
Test of $\theta_i = \theta_j$: Q(5) = 24.16, p = 0.00				
Test of $\theta = 0$: $z = 3.80$, $p = 0.00$				
Influenza like lillness				
Biswas et al. (2014)	20	276	0.07 [0.04, 0.10	3.36
Palani et al. (2020)	8	292	0.03 [0.01, 0.09	5] 3.79
Agarwal et al. (2023)	5	180	0.03 [0.00, 0.09	5] 3.61
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 73.92\%$, $H^2 = 3.83$			0.04 [0.01, 0.0	7]
Test of $\theta_i = \theta_i$: Q(2) = 6.72, p = 0.03				
Test of $\theta = 0$: $z = 2.92$, $p = 0.00$				
Influenza like lillness or Severe acute respiratory illness				
Mukherjee et al. (2013)	78	1,741	0.04 [0.04, 0.0	5] 4.01
Mazumdar et al. (2013)	8	880	0.01 [0.00, 0.0	-
Nandhini et al. (2016)	8	209	0.04 [0.01, 0.00	-
Muruganandam et al. (2022)	11	105	0.10 [0.05, 0.10	-
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 94.81\%$, $H^2 = 19.28$			0.04 [0.01, 0.0	-
Test of $\theta_i = \theta_i$: Q(3) = 46.45, p = 0.00			5.6 . [5.6 . , 5.6	,
Test of $\theta = 0$: $z = 2.61$, $p = 0.01$				
Severe acute respiratory infections				
Malhotra et al. (2016)	35	155	0.23 [0.16, 0.29	9] 2.04
Koul et al. (2022)	9	412	0.02 [0.01, 0.04	-
	9	412		-
Heterogeneity: $\tau^2 = 0.02$, $I^2 = 97.16\%$, $H^2 = 35.26$			0.12 [-0.08, 0.3	<u>-1</u>
Test of $\theta_i = \theta_j$: Q(1) = 35.26, p = 0.00				
Test of $\theta = 0$: $z = 1.19$, $p = 0.23$				
Overall			0.05 [0.03, 0.0	7]
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 95.42\%$, $H^2 = 21.85$				
Test of $\theta_i = \theta_j$: Q(14) = 120.56, p = 0.00				
Test of $\theta = 0$: $z = 4.68$, $p = 0.00$				
Test of group differences: $Q_b(3) = 0.70$, $p = 0.87$				
			0 .1 .2 .3	
andom-effects REML model				

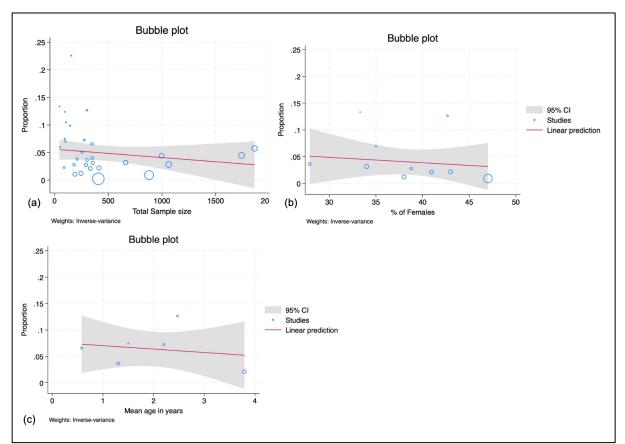
Supplementary Figure 3. Forest plot of pooled prevalence of human metapneumovirus among children with acute respiratory infections, stratified by clinical presentation.



Author (Year of Publication)	Number of patients suffering from hMPV	Total patients				Proportion with 95% CI	Weigh (%)
More than 5 years		Total palionio					(,0)
Muruganandam et al. (2022)	4	45			_	0.09 [0.01, 0.17]	2.61
Hindupur et al. (2022)	3	81	_			0.04 [0.00, 0.08]	
Nandhini et al. (2016)	3	36			_	0.08 [0.00, 0.17]	
Jain et al. (2013)	4	205	-	_		0.02 [0.00, 0.04]	
Mukherjee et al. (2013)	4	389	•			0.01 [0.00, 0.02]	
Singh et al. (2014)	0	33	-			0.01 [0.00, 0.06]	
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 1$			•			0.02 [0.01, 0.03]	
Fest of $\theta_i = \theta_i$: Q(5) = 7.40, p =			•			0.02 [0.01, 0.00]	
Test of $\theta = 0$: $z = 2.98$, $p = 0.00$							
Under 5 years							
Viswanathan et al. (2022)	6	45	_	-		0.13 [0.03, 0.23]	2.12
Muruganandam et al. (2022)	7	60	_	_		0.12 [0.04, 0.20]	2.68
Panda et al. (2016)	1	75				0.01 [0.00, 0.04]	5.14
Nandhini et al. (2016)	5	173	-			0.03 [0.00, 0.05]	5.18
Biswas et al. (2014)	20	276	-	_		0.07 [0.04, 0.10]	4.94
Jain et al. (2013)	12	235	-	_		0.05 [0.02, 0.08]	5.04
Mukherjee et al. (2013)	74	1,352				0.05 [0.04, 0.07]	5.59
Narayanan et al. (2013)	38	300		_	_	0.13 [0.09, 0.16]	4.6
Agrawal et al. (2011)	107	1,863				0.06 [0.05, 0.07]	5.62
Agarwal et al. (2023)	5	180	-			0.03 [0.00, 0.05]	5.21
Chandy et al. (2022)	13	256	-	_		0.05 [0.02, 0.08]	5.10
Broor et al. (2014)	3	245				0.01 [0.00, 0.03]	5.55
Malhotra et al. (2016)	35	155				0.23 [0.16, 0.29]	3.28
Sonawane et al. (2019)	7	100	-			0.07 [0.02, 0.12]	4.00
Singh et al. (2014)	2	155				0.01 [0.00, 0.03]	5.44
Swamy et al. (2018)	44	997				0.04 [0.03, 0.06]	5.58
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 9$	4.55%, H ² = 18.36		4			0.06 [0.04, 0.08]	
Test of $\theta_i = \theta_j$: Q(15) = 108.80,	p = 0.00					-	
Test of $\theta = 0$: $z = 5.07$, $p = 0.00$)						
Overall			•	•		0.05 [0.03, 0.07]	
Heterogeneity: $\tau^2 = 0.00$, $I^2 = 9$	3.08%, H ² = 14.44						
Test of $\theta_i = \theta_j$: Q(21) = 151.16,	p = 0.00						
Test of $\theta = 0$: $z = 5.67$, $p = 0.00$)						
Test of group differences: $Q_b(1)$) = 10.21, p = 0.00						
			0	.1	.2	.3	

Supplementary Figure 4. Forest plot of pooled prevalence of human metapneumovirus among children with acute respiratory infections, stratified by age groups (more than 5 years *vs.* under 5 years).





Supplementary Figure 5. a) Bubble plot representing the relationship between human metapneumovirus (HMPV) proportion and total sample size of studies; b) bubble plot showing the relationship between HMPV proportion and percentage of females across studies; c) bubble plot depicting the association between HMPV proportion and mean age of participants in years.



Supplementary Table 1. Inclusion and exclusion criteria.

	Inclusion criteria	Exclusion criteria
Population	 Children aged 18 years or below diagnosed with ARI, including Influenza-like illness (ILI), Severe acute respiratory infection (SARI), Acute lower respiratory tract infection (ALRTI), and Non-specific ARI cases with upper respiratory tract infection (URTI) symptom. Geographical scope restricted to studies conducted in India. 	 Adult population Studies not focused on ARI. Studies involving populations outside India.
Outcome	Studies reporting the prevalence of Human Metapneumovirus (HMPV)	Studies without outcome data on hMPV prevalence
Timeline	Initiation to January 3 rd 2025	
Language	English	Published in other languages
Type of study	Observational studies: cross-sectional, case-control, and cohort studies	Reviews, case series, case study

Supplementary Table 2. Search strategy.

Pubmed

- #1 "Metapneumovirus" [MeSH Terms] OR "Metapneumovirus" [Title/Abstract] OR "hmpv" [Title/Abstract] OR "metapneumoviru*" [Title/Abstract] OR "hmpv" [Title/Abstract] OR "Severe Acute Respiratory illness" [Title/Abstract] OR "SARI" [Title/Abstract] 4399
- #2 "Prevalence" [MeSH Terms] OR "Epidemiology" [MeSH Terms] OR "Cross-Sectional Studies" [MeSH Terms] OR "Prevalence" [Title/Abstract] OR "Epidemiology" [Title/Abstract] OR "Cross-Sectional Studies" [Title/Abstract] OR "burden" [Title/Abstract] OR "seroepidemiologic studies" [MeSH Terms] OR "seroepidemiologic studies" [MeSH Terms] OR "seroepidemiologic studies" [MeSH Terms] OR "seroprevalen*" [Title/Abstract] 1,884,401
- #3 "india"[MeSH Terms] OR "india"[All Fields] OR "india's"[All Fields] OR "indias"[All Fields] 878,603 #1 AND #2 AND #3 64

Web of Science

- #1 TS=("Metapneumovirus" OR "hmpv" OR "metapneumoviru*" OR "Severe Acute Respiratory illness" OR "SARI")-5,087
- #2 TS=("Prevalence" OR "Epidemiology" OR "Cross-Sectional Studies" OR "burden" OR "seroepidemiologic studies" OR "seroprevalen*")-1,776,905
- #3 TS=("india" OR "india s" OR "indias")-240,686
- #1 AND #2 AND #3 -49

Embase

- #1 ('metapneumovirus'/exp OR 'metapneumovirus' OR 'hmpv' OR 'metapneumoviru*')-6,118
- #2 ('prevalence'/exp OR 'epidemiology'/exp OR 'cross-sectional study'/exp OR 'prevalence' OR 'epidemiology' OR 'cross-sectional studies' OR 'burden' OR 'seroepidemiologic studies'/exp OR 'seroprevalen*')-6,748,297
- #3 ('india' OR 'india s' OR 'indias')-1,574,936
- #1 AND #2 AND #3- 133

Scopus:

- #1 (TITLE ("metapneumovirus" OR "hmpv" OR "metapneumoviru*" OR "severe acute respiratory illness" OR "SARI") OR ABS ("metapneumovirus" OR "hmpv" OR "metapneumoviru*" OR "severe acute respiratory illness" OR "SARI"))-7105
- #2 (TITLE ("prevalence" OR "epidemiology" OR "cross-sectional studies" OR "burden" OR "seroepidemiologic studies" OR "seroprevalen*") OR ABS ("prevalence" OR "epidemiology" OR "cross-sectional studies" OR "burden" OR "seroepidemiologic studies" OR "seroprevalen*"))-2,044,821
- #3 (TITLE ("india" OR "india s" OR "indias") OR ABS ("india" OR "india s" OR "indias"))- 551,277
- #1 AND #2 AND #3=45

