

SUPPLEMENTAL TABLE 1  
Prevalence and lethality of pulmonary malaria among patients with Pv malaria

First author, year (reference)	Location	Study population	Type of PM	No. of <i>P. vivax</i> patients				Frequency, <i>n</i> (%)		
				Total	Severe	PM	Deaths	PM/total	PM/severe	Death/PM
Studies with pediatric population (children under 18 years)										
Genton, 2008 <sup>1</sup>	PNG	Pv cases in health facilities	RD	978	86	52	–	0.053 (5.3)	0.604 (60.4)	–
Kochar, 2010 <sup>2</sup>	India	Children malaria hospitalizations	ARDS	103	65	1	–	0.009 (0.9)	0.015 (1.5)	–
Singh H, 2011 <sup>3</sup>	India	Malaria patient hospital presentations	ARDS	108	23	0	0	0 (0)	0 (0)	0 (0)
Manning, 2011 <sup>4</sup>	PNG	Children with severe malaria hospitalizations	RD	27	27	8	1	0.296 (29.6)	0.296 (29.6)	0.125 (12.5)
Lança, 2012 <sup>5</sup>	Brazil	Pv pediatric hospitalizations	ARDS	24	24	3	0	0.125 (12.5)	0.125 (12.5)	0(0)
Sharma, 2012 <sup>6</sup>	India	Patients admitted to hospital	ARDS	105	46	9	7	0.085 (8.5)	0.195 (19.5)	0.778 (77.8)
Yadav, 2012 <sup>7</sup>	India	Severe vivax malaria	ARDS	131	131	3	2	0.022 (2.2)	0.022 (2.2)	0.667 (66.7)
Ketema, 2013 <sup>8</sup>	Ethiopia	Children admissions to hospital	RD	156	139	3	–	0.019 (1.9)	0.021 (2.1)	0 (0)
Gehlawat, 2013 <sup>9</sup>	India	Severe vivax in children	ARDS	18	18	1	1	0.055 (5.5)	0.055 (5.5)	1 (100)
Bhattacharjee P, 2013 <sup>10</sup>	India	Pv pediatric hospitalizations	ARDS	168	168	2	0	0.011 (1.1)	0.011 (1.1)	0 (0)
Singh, 2013 <sup>11</sup>	India	Patients admitted to hospital	ARDS	61	38	5	3	0.082 (8.2)	0.131 (13.1)	0.6 (60)
Sharma, 2013 <sup>12</sup>	India	Pv pediatric hospitalizations	ARDS	261	54	3	–	0.011 (1.1)	0.055 (5.5)	0 (0)
Goyal, 2014 <sup>13</sup>	India	Pv hospital admissions	ARDS	47	–	2	1	0.042 (4.2)	–	0.5 (50)
Kumari, 2014 <sup>14</sup>	India	Pv pediatric hospitalizations	ARDS/ PO	50	13	2	2	0.04 (4)	0.153 (15.3)	1 (100)
Total (pediatric population)				2237	832	94	17	0.042 (4.2)	0.113 (11.3)	0.181 (18.1)
Studies with adult population										
Habib, 2004 <sup>15</sup>	Singapore	Patients with imported malaria	RD	29	–	1	0	0.034 (3.4)	–	0 (0)
Kotwal, 2005 <sup>16</sup>	Afghanistan	American soldiers returning from Afghanistan	ARDS	38	1	1	0	0.026 (2.6)	1 (100)	0 (0)
Kochar, 2005 <sup>17</sup>	India	Severe vivax malaria	ARDS and PO	11	11	4	2	0.363 (36.3)	0.363 (36.3)	0.5 (50)
Sharma, 2009 <sup>18</sup>	India	Records of malaria cases	ARDS	221	–	3	3	0.013 (1.3)	–	1 (100)
Kochar, 2009 <sup>19</sup>	India	Patients admitted to hospital	ARDS	456	40	4	2	0.008 (0.8)	1 (100)	0.5 (50)
George, 2010 <sup>20</sup>	India	Severe Pv admissions	ARDS	30	30	1	1	0.033 (3.3)	0.033 (3.3)	1 (100)
Nayak K, 2011 <sup>21</sup>	India	Severe malaria cases	ARDS	80	80	4	4	0.05 (5)	0.05 (5)	1 (100)
Srivastava, 2011 <sup>22</sup>	India	Patient hospital presentations	ARDS	50	41	3	0	0.06 (6)	0.073 (7.3)	0 (0)
Limaye, 2012 <sup>23</sup>	India	Patients admitted to hospital	ARDS	336	50	10	6	0.029 (2.9)	0.2 (20)	0.6 (60)
Mehmood A, 2012 <sup>24</sup>	Pakistan	Pv cases in Emergency Dept.	ARDS	97	–	1	0	0.01 (1)	–	0 (0)
Singh, 2013 <sup>25</sup>	India	Patients admitted to hospital	ARDS	140	63	3	2	0.021 (2.1)	0.047 (4.7)	0.667 (66.7)
Barber, 2013 <sup>26</sup>	Malaysia	Hospital admitted patients	RD	43	7	1	0	0.023 (2.3)	0.142 (14.2)	0 (0)
Rizvi, 2013 <sup>27</sup>	India	Patients admitted to hospital	ARDS	172	62	6	2	0.035 (3.5)	0.097 (9.7)	0.333 (33.3)
Quispe, 2014 <sup>28</sup>	Peru	Pv malaria cases	Lung injury	6502	81	6	1	0.001 (0.1)	0.074 (7.4)	0.166 (16.6)
Saravu, 2014 <sup>29</sup>	India	Hospitalized severe malaria cases	ARDS and PO	585	99	34	2	0.058 (5.8)	0.343 (34.3)	0.058 (5.8)
Muley, 2014 <sup>30</sup>	India	Hospital admissions	ARDS	100	–	6	1	0.06 (6)	–	0.166 (16.6)
Chung, 2014 <sup>31</sup>	Singapore	Malaria hospital admissions	PO	127	43	2	0	0.015 (1.5)	0.046 (4.6)	0 (0)
Siqueira, 2015 <sup>32</sup>	Brazil	Patients admitted to hospital	ARDS	10283	40	7	1	0.0007 (0.07)	0.175 (17.5)	0.143 (14.3)
Siqueira, 2015 <sup>32</sup>	India	Patients admitted to hospital	ARDS	843	157	5	5	0.005 (0.5)	0.031 (3.1)	1 (100)
Jain, 2016 <sup>33</sup>	India	Patients in Emergency Dept.	ARDS	48	25	2	1	0.041 (4.1)	0.08 (8)	0.5 (50)

(continued)

SUPPLEMENTAL TABLE 1  
Continued

First author, year (reference)	Location	Study population	Type of PM	No. of <i>P. vivax</i> patients				Frequency, <i>n</i> (%)		
				Total	Severe	PM	Deaths	PM/total	PM/severe	Death/PM
Total (adult population)				20193	830	104	33	0.005 (0.5)	0.125 (12.5)	0.317 (31.7)
Studies with no distinction between children and adults developing PM										
Barcus, 2007 <sup>34</sup>	Indonesia	Malaria hospital admissions	ARD	1135	36	2	1	0.001 (0.1)	0.055 (5.5)	0.5 (50)
Tjitra, 2008 <sup>35</sup>	PNG	Malaria patients presenting to hospital	RD	19050	1570	78	11	0.004 (0.4)	0.049 (4.9)	0.141 (14.1)
Nayak, 2009 <sup>36</sup>	India	pregnant and non-pregnant patients admitted to hospital	ARDS	169	–	5	0	0.029 (2.9)	–	0 (0)
Alexandre, 2010 <sup>37</sup>	Brazil	Pv hospital admissions	ARDS	358	17	2	1	0.005 (0.5)	0.117 (11.7)	0.5 (50)
Andrade, 2010 <sup>38</sup>	Brazil	all patients with malaria (active and passive case detection + hospitalizations)	RF	129	18	6	4	0.046 (4.6)	0.315 (31.5)	0.666 (66.6)
Nadkar M, 2012 <sup>39</sup>	India	Severe vivax cases	ALI/ ARDS	488	488	8	5	0.016 (1.6)	0.016 (1.6)	0.625 (62.5)
Arboleda, 2012 <sup>40</sup>	Colombia	Hospitalized vivax patients	ARDS	359	83	1	0	0.002 (0.2)	0.012 (1.2)	0 (0)
Nurleila, 2012 <sup>41</sup>	Indonesia	In and outpatients with malaria	RD	1541	199	10	–	0.006 (0.6)	0.05 (5)	–
Aatif, 2013 <sup>42</sup>	Pakistan	Patients admitted to hospital	ARDS	107	–	1	1	0.009 (0.9)	–	1 (100)
Jain V, 2013 <sup>43</sup>	India	Patients admitted to hospital	RD	198	22	7	1	0.035 (3.5)	0.318 (31.8)	0.143 (14.3)
Nayak, 2013 <sup>44</sup>	India	Consecutive patients with severe malaria	RD	459	60	13	0	0.028 (2.8)	0.217 (21.7)	0 (0)
Singh, 2013 <sup>45</sup>	India	Pv hospital admissions	ARDS	110	19	2	0	0.018 (1.8)	0.105 (10.5)	0 (0)
Mendonça V, 2014 <sup>46</sup>	Brazil	Complicated vivax cases	RF	100	31	5	–	0.05 (5)	0.163 (16.3)	–
Hwang, 2014 <sup>47</sup>	US	Malaria cases	ARDS	12152	61	35	–	0.003 (0.3)	0.573 (57.3)	–
Chaparro-Narvaez, 2016 <sup>48</sup>	Colombia	Malaria cases	RD and PO	390946	1126	78	–	0.0002 (0.02)	0.069 (6.9)	–
Demissie, 2016 <sup>49</sup>	Ethiopia	Malaria patients presenting to hospital	RD	384	55	6	0	0.015 (1.5)	0.109 (10.9)	0 (0)
Total (no distinction between children and adult population)				427685	3786	259	24	0.0006 (0.06)	0.068 (6.8)	0.092 (9.2)
Total (all studies)				450115	5448	453	74	0.001 (0.1)	0.083 (8.33)	0.163 (16.3)

ALI = acute lung injury; ARD = acute respiratory distress; ARDS = acute respiratory distress syndrome; PM = pulmonary malaria; PNG = Papua New Guinea; PO = pulmonary edema; Pv = *Plasmodium vivax*; RD = respiratory distress; US = United States. Respiratory classifications were used as in original article. PM refers to any evidence of respiratory complication detected by any clinical and/or laboratorial alteration.

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SUPPLEMENTAL TABLE 2

Frequency of pulmonary impairment in *Plasmodium vivax* malaria according to groups of localities and WHO region

WHO region (no. of studies) localities	No. of <i>P. vivax</i> patients				Prevalence, <i>n</i> (%)		
	Total	Severe	PM	Deaths	PM/total	PM/severe	Death/PM
African region (2)	540	194	9	0	0.016 (1.6)	0.046 (4.6)	0 (0)
Kersa and Halaba districts, Ethiopia							
Mendi Town, Ethiopia							
Region of the Americas (8)	420,853	1,482	143	7	0.0003 (0.03)	0.096 (9.6)	0.049 (4.9)
Manaus, Amazonas, Brazil							
Riverine communities and Buritis, Rondônia, Brazil							
Apartabó, Antioquia, Colombia							
SIVIGILA, Colombia							
Sullana, Piura, Peru							
NMSS, United States							
Eastern Mediterranean region (3)	242	1	3	1	0.012 (1.2)	–	0.333 (33.3)
Karachi, Pakistan							
Afghanistan (U.S. Army deploys)							
Southeast Asia Region (31)	27,276	3,608	238	65	0.087 (8.7)	0.066 (6.6)	0.273 (27.3)
Aligarh, Uttar Pradesh, India							
Bikaner, Rajasthan, India							
Chandigarh and Gujarat territories, India							
Dehradun, Uttarakhand, India							
Delhi, India							
Grande Noida, Uttar Pradesh, India							
Madhya Pradesh, India							
Mangalore, Karnataka State, India							
Manipal, Karnataka, India							
Mumbai, India							
New Delhi, North India							
Pipariya, Vadodara, India							
Rajkot, Gujarat, Western India							
Rohtak, Haryana, India							
Uttar Pradesh, India							
Himachal Pradesh, India							
Timika, Papua, Indonesia							
Jayapura, Papua, Indonesia							
West Sumba, Indonesia							
western pacific region (5)	1,204	163	64	1	0.053 (5.3)	0.392 (39.2)	0.015 (1.5)
Sepik Province, PNG							
Madang Province, PNG							
Singapore							
Kota Kinabalu, Sabah, Malaysia							

NMSS = U.S. National Malaria Surveillance System; PM = pulmonary malaria; PNG = Papua New Guinea; SIVIGILA = Public Health Surveillance System from Colombia; WHO = World Health Organization. No study occurred in the European WHO region. Numbers cannot be presented by specific locality in the second column because most studies present data from overlapping localities.