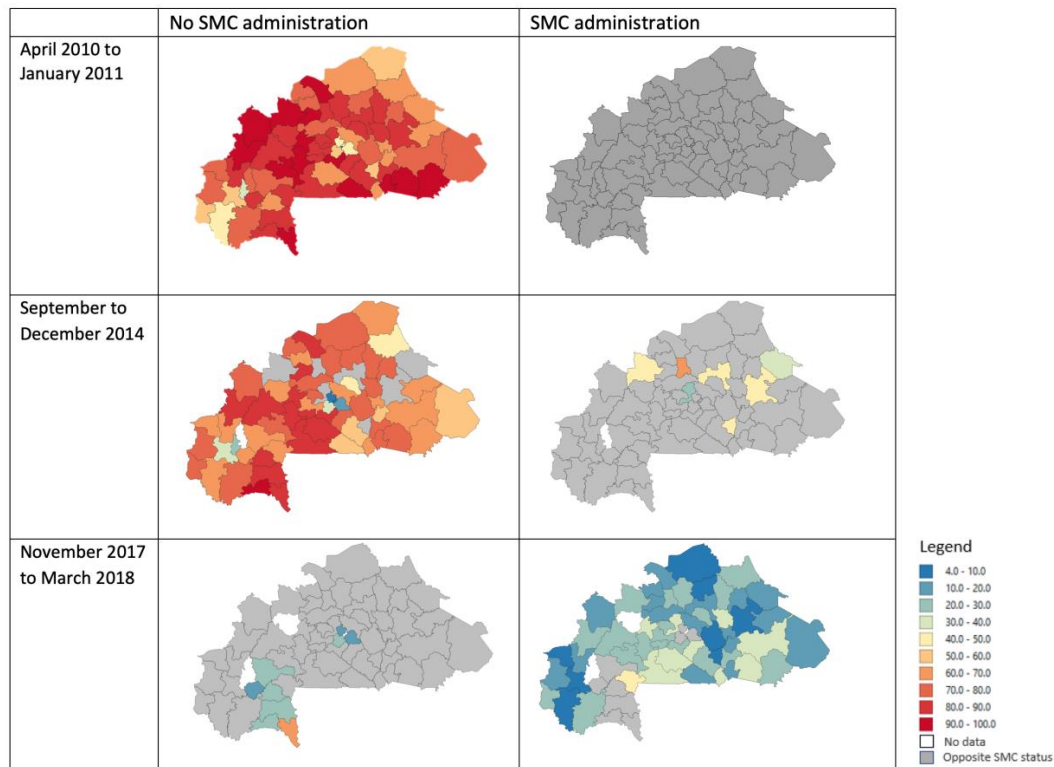


SUPPLEMENTAL MATERIAL



Supplement 1. Prevalence of RDT-confirmed malaria by district and SMC administration status over 2010–2018, Burkina Faso. Data shown are for prevalence of RDT-confirmed malaria infection by health district and SMC administration across the three DHS/MIS surveys in Burkina Faso. Districts in white did not have a cluster located in that district during data collection for that year. Districts in grey are of the opposite SMC administration status that year. Districts with no SMC administration surveyed April 2010 to January 2011 (A),

Supplement 2. Survey respondent characteristics, Burkina Faso

	2010 (N=6377)	2014 (N=6081)	2017 (N=5558)	Total (N=18016)
Malaria by RDT				
No	1481 (23.2%)	2150 (35.4%)	4417 (79.5%)	8048 (44.7%)
Yes	4562 (71.5%)	3914 (64.4%)	1139 (20.5%)	9615 (53.4%)
Missing	334 (5.2%)	17 (0.3%)	2 (0.0%)	353 (2.0%)
Malaria by microscopy				
No	2120 (33.2%)	3170 (52.1%)	4584 (82.5%)	9874 (54.8%)
Yes	3901 (61.2%)	2870 (47.2%)	965 (17.4%)	7736 (42.9%)
Missing	356 (5.6%)	41 (0.7%)	9 (0.2%)	406 (2.3%)
SMC				
No SMC	6377 (100%)	5411 (89.0%)	663 (11.9%)	12451 (69.1%)
During SMC	0 (0%)	610 (10.0%)	0 (0%)	610 (3.4%)
1 month post-SMC	0 (0%)	0 (0%)	50 (0.9%)	50 (0.3%)

2 months post-SMC	0 (0%)	0 (0%)	246 (4.4%)	246 (1.4%)
3 month post-SMC	0 (0%)	0 (0%)	742 (13.4%)	742 (4.1%)
4 months post-SMC	0 (0%)	0 (0%)	3457 (62.2%)	3457 (19.2%)
5 months post-SMC	0 (0%)	0 (0%)	351 (6.3%)	351 (1.9%)
Missing	0 (0%)	60 (1.0%)	49 (0.9%)	109 (0.6%)
Child's age (months)				
6-11	731 (11.5%)	657 (10.8%)	608 (10.9%)	1996 (11.1%)
12-23	1416 (22.2%)	1292 (21.2%)	1155 (20.8%)	3863 (21.4%)
24-35	1415 (22.2%)	1388 (22.8%)	1207 (21.7%)	4010 (22.3%)
36-47	1439 (22.6%)	1404 (23.1%)	1329 (23.9%)	4172 (23.2%)
48-59	1376 (21.6%)	1340 (22.0%)	1259 (22.7%)	3975 (22.1%)
Sex				
Female	3103 (48.7%)	2994 (49.2%)	2751 (49.5%)	8848 (49.1%)
Male	3274 (51.3%)	3087 (50.8%)	2807 (50.5%)	9168 (50.9%)
Net use				
None	3213 (50.4%)	1479 (24.3%)	2574 (46.3%)	7266 (40.3%)
Net use	3164 (49.6%)	4602 (75.7%)	2984 (53.7%)	10750 (59.7%)
Wealth quintile				
Poorest	1292 (20.3%)	1339 (22.0%)	1131 (20.3%)	3762 (20.9%)
Poor	1288 (20.2%)	1375 (22.6%)	1208 (21.7%)	3871 (21.5%)
Middle	1365 (21.4%)	1404 (23.1%)	1181 (21.2%)	3950 (21.9%)
Richer	1363 (21.4%)	1342 (22.1%)	1136 (20.4%)	3841 (21.3%)
Richest	1069 (16.8%)	621 (10.2%)	902 (16.2%)	2592 (14.4%)
Urbanisation				
Urban	1426 (22.4%)	921 (15.1%)	857 (15.4%)	3204 (17.8%)
Rural	4951 (77.6%)	5160 (84.9%)	4701 (84.6%)	14812 (82.2%)
Treatment seeking				
None	4592 (72.0%)	3096 (50.9%)	4537 (81.6%)	12225 (67.9%)
Treatment seeking	531 (8.3%)	1226 (20.2%)	604 (10.9%)	2361 (13.1%)
Missing	1254 (19.7%)	1759 (28.9%)	417 (7.5%)	3430 (19.0%)
Month				
Mean (SD)	9.45 (1.74)	10.4 (0.544)	2.91 (2.97)	7.76 (3.81)
Median [Min, Max]	10.0 [1.00, 12.0]	10.0 [9.00, 12.0]	2.00 [1.00, 12.0]	10.0 [1.00, 12.0]
Rainfall (m)				
Mean (SD)	0.415 (0.186)	0.492 (0.109)	0.0267 (0.0631)	0.327 (0.238)
Median [Min, Max]	0.413 [0.00699, 0.847]	0.512 [0.172, 0.686]	0.00461 [0.0000537, 0.384]	0.373 [0.0000537, 0.847]
Missing	399 (6.3%)	128 (2.1%)	503 (9.1%)	1030 (5.7%)

Supplement 3. Stratum specific characteristics and odds ratios of microscopy-diagnosed malaria in children, Burkina Faso

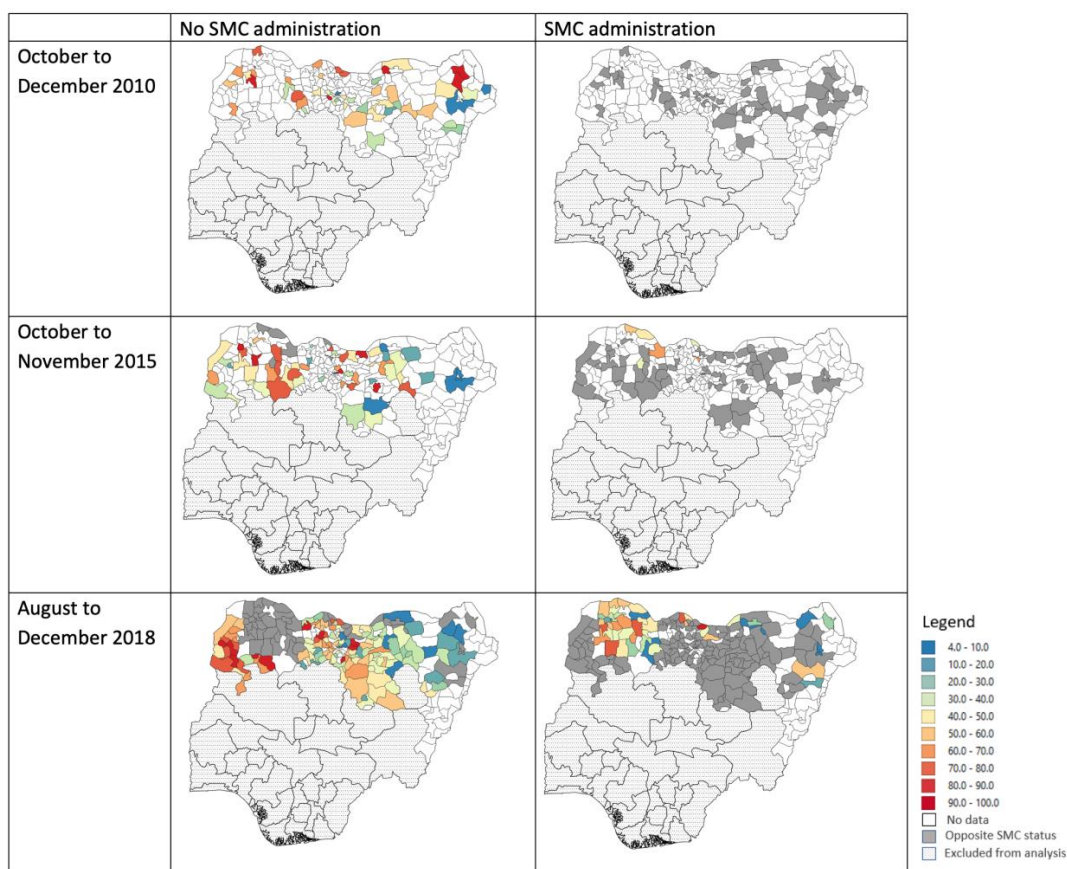
Variable	Total (N=18016)	Malaria by microscopy	Unadjusted ¹		Adjusted ²	
	N (%)	% (95% CI)	OR (95% CI)	P- Value ³	OR (95% CI)	P- Value ³
SMC						
No SMC	12451 (69.1%)	54.2 (53.2–55.2)	1.00 (Base)		1.00 (Base)	
During SMC	610 (3.4%)	26.2 (25.3–27.1)	0.26 (0.21–0.33)	<0.001	0.38 (0.29–0.52)	<0.001
1 month post-SMC	50 (0.3%)	14.0 (13.3–14.7)	0.19 (0.08–0.44)	<0.001	0.61 (0.22–1.72)	0.35
2 months post-SMC	246 (1.4%)	15.0 (14.3–15.7)	0.18 (0.12–0.27)	<0.001	0.50 (0.24–1.04)	0.07
3 months post-SMC	742 (4.1%)	21.8 (21.0–22.6)	0.18 (0.15–0.22)	<0.001	0.73 (0.50–1.06)	0.10
4 months post-SMC	3457 (19.2%)	15.6 (14.9–16.3)	0.11 (0.10–0.13)	<0.001	0.44 (0.32–0.61)	<0.001
5 months post-SMC	351 (1.9%)	12.5 (11.9–13.1)	0.11 (0.08–0.16)	<0.001	0.45 (0.27–0.73)	<0.001

Missing	109 (0.6%)					
year						
2010	6377 (35.4%)	61.2 (60.2–62.2)	1.00 (Base)		1.00 (Base)	
2014	6081 (33.8%)	47.2 (46.2–48.2)	0.46 (0.42–0.50)	<0.001	0.41 (0.36–0.46)	<0.001
2017	552 (3.1%)	11.4 (10.8–12.0)	0.16 (0.11–0.22)	<0.001	0.22 (0.12–0.40)	<0.001
2018	5006 (27.8%)	18.0 (17.2–18.8)	0.09 (0.08–0.10)	<0.001	0.14 (0.10–0.20)	<0.001
Sex						
Female	8848 (49.1%)	43.5 (42.5–44.5)	1.00 (Base)		1.00 (Base)	
Male	9168 (50.9%)	42.4 (41.4–43.4)	0.97 (0.91–1.03)	0.304	0.95 (0.87–1.03)	0.19
Child's age (months)						
6–11	1996 (11.1%)	33.6 (32.7–34.5)	1.00 (Base)		1.00 (Base)	
12–23	3863 (21.4%)	37.9 (36.9–38.9)	1.21 (1.07–1.37)	0.002	1.25 (1.08–1.46)	<0.001
24–35	4010 (22.3%)	44.2 (43.2–45.2)	1.59 (1.41–1.80)	<0.001	1.63 (1.40–1.89)	<0.001
36–47	4172 (23.2%)	47.2 (46.2–48.2)	1.73 (1.53–1.94)	<0.001	1.96 (1.69–2.27)	<0.001
48–59	3975 (22.1%)	46.8 (45.8–47.8)	1.73 (1.54–1.95)	<0.001	1.95 (1.67–2.26)	<0.001
Net use						
None	7266 (40.3%)	44.8 (43.8–45.8)	1.00 (Base)		1.00 (Base)	
Net use	10750 (59.7%)	41.7 (40.7–42.7)	0.88 (0.83–0.94)	<0.001	0.93 (0.85–1.01)	0.10
Wealth quintile						
Poorest	3762 (20.9%)	51.4 (50.4–52.4)	1.00 (Base)		1.00 (Base)	
Poor	3871 (21.5%)	48.8 (47.8–49.8)	0.91 (0.82–1.00)	0.057	0.86 (0.76–0.98)	0.02
Middle	3950 (21.9%)	47.0 (46.0–48.0)	0.88 (0.80–0.98)	0.014	0.83 (0.73–0.95)	0.01
Richer	3841 (21.3%)	41.2 (40.2–42.2)	0.71 (0.64–0.79)	<0.001	0.73 (0.64–0.83)	<0.001
Richest	2592 (14.4%)	18.2 (17.4–19.0)	0.26 (0.23–0.30)	<0.001	0.35 (0.29–0.42)	<0.001
Urbanicity						
Urban	3204 (17.8%)	22.3 (21.5–23.1)	1.00 (Base)		1.00 (Base)	
Rural	14812 (82.2%)	47.4 (46.4–48.4)	2.64 (2.38–2.93)	<0.001	2.50 (2.16–2.90)	<0.001
Treatment seeking						
None	12225 (67.9%)	41.5 (40.5–42.5)	1.00 (Base)		1.00 (Base)	
Treatment seeking	2361 (13.1%)	33.4 (32.5–34.3)	0.7 (0.63–0.77)	<0.001	0.71 (0.64–0.80)	<0.001
Missing	3430 (19.0%)					
Month			1.00 (Base)			
Mean (SD)	7.76 (3.81)	8.98 (2.88)	1.22 (1.21–1.23)	<0.001		
Median [Min, Max]	10.0 [1.00, 12.0]	10.0 [1.00, 12.0]				
Rainfall (m)						
Mean (SD)	0.327 (0.238)	0.400 (0.200)	19.91 (17.02–23.29)	<0.001	0.88 (0.57–1.37)	0.57
Median [Min, Max]	0.373 [0.000537, 0.847]	0.430 [0.0000537, 0.847]				
Missing	1030 (5.7%)	404 (5.2%)				

¹Odds ratios calculated using multilevel generalized linear model for binary outcomes with random intercepts for health district

² Odds ratios calculated using multilevel generalized additive model for binary outcomes with random intercepts for health district adjusted for SMC, year, age, sex, use of a net the night before data collection, wealth quintile, urbanicity, rainfall, and treatment seeking behaviour (edf 0.605, p=0.139)

³Wald-p value



Supplement 4. Prevalence of RDT-confirmed malaria by district and SMC administration status over 2010–2018, Nigeria. Data shown are for prevalence of RDT-confirmed malaria infection by LGA and SMC administration across the three DHS/MIS surveys in Nigeria. LGAs in white did not have a cluster located in that district during data collection for that year. LGAs in grey are of the opposite SMC administration status that year. LGAs in dots were not originally eligible for SMC and therefore excluded from this analysis.

Supplement 5. Survey respondent characteristics, Nigeria

	2010 (N=1551)	2015 (N=1812)	2018 (N=3298)	Total (N=6661)
Malaria by RDT				
No	655 (42.2%)	889 (49.1%)	1729 (52.4%)	3273 (49.1%)
Yes	894 (57.6%)	921 (50.8%)	1559 (47.3%)	3374 (50.7%)
Missing	2 (0.1%)	2 (0.1%)	10 (0.3%)	14 (0.2%)
Malaria by microscopy				
No	850 (54.8%)	1142 (63.0%)	1625 (49.3%)	3617 (54.3%)
Yes	697 (44.9%)	585 (32.3%)	701 (21.3%)	1983 (29.8%)
Missing	4 (0.3%)	85 (4.7%)	972 (29.5%)	1061 (15.9%)
SMC				
No SMC	1551 (100%)	1601 (88.4%)	2360 (71.6%)	5512 (82.8%)
During SMC	0 (0%)	211 (11.6%)	827 (25.1%)	1038 (15.6%)

1 month post-SMC	0 (0%)	0 (0%)	111 (3.4%)	111 (1.7%)
Child's age (months)				
6-11	158 (10.2%)	128 (7.1%)	372 (11.3%)	658 (9.9%)
12-23	301 (19.4%)	391 (21.6%)	746 (22.6%)	1438 (21.6%)
24-35	327 (21.1%)	396 (21.9%)	676 (20.5%)	1399 (21.0%)
36-47	341 (22.0%)	452 (24.9%)	762 (23.1%)	1555 (23.3%)
48-59	424 (27.3%)	445 (24.6%)	742 (22.5%)	1611 (24.2%)
Sex				
Female	780 (50.3%)	891 (49.2%)	1619 (49.1%)	3290 (49.4%)
Male	771 (49.7%)	921 (50.8%)	1679 (50.9%)	3371 (50.6%)
Net use				
None	891 (57.4%)	688 (38.0%)	1033 (31.3%)	2612 (39.2%)
Net use	660 (42.6%)	1124 (62.0%)	2265 (68.7%)	4049 (60.8%)
Wealth quintile				
Poorest	559 (36.0%)	809 (44.6%)	1387 (42.1%)	2755 (41.4%)
Poor	384 (24.8%)	431 (23.8%)	866 (26.3%)	1681 (25.2%)
Middle	375 (24.2%)	272 (15.0%)	563 (17.1%)	1210 (18.2%)
Richer	149 (9.6%)	195 (10.8%)	321 (9.7%)	665 (10.0%)
Richest	84 (5.4%)	105 (5.8%)	161 (4.9%)	350 (5.3%)
Urbanisation				
Urban	289 (18.6%)	456 (25.2%)	738 (22.4%)	1483 (22.3%)
Rural	1262 (81.4%)	1356 (74.8%)	2560 (77.6%)	5178 (77.7%)
Month				
Aug	0 (0%)	0 (0%)	275 (8.3%)	275 (4.1%)
Sep	0 (0%)	0 (0%)	888 (26.9%)	888 (13.3%)
Oct	950 (61.3%)	1230 (67.9%)	820 (24.9%)	3000 (45.0%)
Nov	536 (34.6%)	582 (32.1%)	655 (19.9%)	1773 (26.6%)
Dec	65 (4.2%)	0 (0%)	660 (20.0%)	725 (10.9%)
Treatment seeking				
None	971 (62.6%)	1265 (69.8%)	1973 (59.8%)	4209 (63.2%)
Treatment seeking	360 (23.2%)	361 (19.9%)	431 (13.1%)	1152 (17.3%)
Missing	220 (14.2%)	186 (10.3%)	894 (27.1%)	1300 (19.5%)
Rainfall (m)				
Mean (SD)	0.534 (0.155)	0.539 (0.145)	0.454 (0.170)	0.496 (0.166)
Median [Min, Max]	0.546 [0.126, 0.768]	0.535 [0.303, 0.1030]	0.480 [0.103, 0.827]	0.512 [0.103, 0.1030]

Supplement 6. Stratum specific characteristics and odds ratios of microscopy-diagnosed malaria in children, Nigeria

Variable	Total (N=18016)	Malaria by microscopy	Unadjusted ¹		Adjusted ²	
	N (%)	% (95% CI)	OR (95% CI)	P-Value ³	OR (95% CI)	P-Value ³
SMC						
No SMC	5512 (82.8)	31.3 (30.4–32.2)	1.00 (Base)		1.00 (Base)	
During SMC	1038 (15.6)	23.8 (23.0–24.6)	0.59 (0.45–0.77)	<0.001	0.53 (0.38–0.76)	<0.001
1 month post-SMC	111 (1.7)	7.2 (6.7–7.7)	0.33 (0.14–0.78)	0.012	0.58 (0.23–1.52)	0.27
year						
2010	1551 (23.3)	44.9 (43.9–45.9)	1.00 (Base)		1.00 (Base)	
2015	1812 (27.2)	32.3 (31.4–33.2)	0.55 (0.43–0.69)	<0.001	0.68 (0.52–0.89)	0.01
2018	3298 (49.5)	21.3 (20.5–22.1)	0.45 (0.37–0.55)	<0.001	0.55 (0.40–0.74)	<0.001
Sex						
Female	3290 (49.4)	29.4 (28.5–30.3)	1.00 (Base)		1.00 (Base)	
Male	3371 (50.6)	30.1 (29.2–31.0)	1.04 (0.92–1.17)	0.58	1.08 (0.93–1.24)	0.35
Child's age (months)						

6–11	658 (9.9)	21.4 (20.6–22.2)	1.00 (Base)		1.00 (Base)	
12–23	1438 (21.6)	25.2 (24.3–26.1)	1.18 (0.92–1.51)	0.206	1.13 (0.85–1.49)	0.42
24–35	1399 (21.0)	28.4 (27.5–29.3)	1.5 (1.17–1.93)	<0.001	1.48 (1.12–1.97)	0.01
36–47	1555 (23.3)	30.9 (30.0–31.8)	1.78 (1.39–2.27)	<0.001	1.75 (1.33–2.31)	<0.001
48–59	1611 (24.2)	37.2 (36.3–38.1)	2.46 (1.93–3.13)	<0.001	2.29 (1.74–3.02)	<0.001
Net use						
None	2612 (39.2)	33.2 (32.3–34.1)	1.00 (Base)		1.00 (Base)	
Net use	4049 (60.8)	27.5 (26.6–28.4)	0.79 (0.69–0.90)	<0.001	0.84 (0.72–0.98)	0.03
Month						
Aug	275 (4.1)	11.6 (11.0–12.2)	1.00 (Base)		1.00 (Base)	
Sep	888 (13.3)	25.8 (24.9–26.7)	2.34 (1.38–3.96)	0.002	1.00 (0.50–2.00)	0.99
Oct	3000 (45.0)	33.8 (32.9–34.7)	3.29 (2.01–5.37)	<0.001	1.44 (0.76–2.75)	0.28
Nov	1773 (26.6)	32.7 (31.8–33.6)	3.35 (2.04–5.51)	<0.001	2.69 (1.26–5.73)	0.02
Dec	725 (10.9)	17.7 (17.0–18.4)	1.84 (1.05–3.21)	0.032	2.07 (0.92–4.70)	0.09
Wealth quintile						
Poorest	2755 (41.4)	36.2 (35.3–37.1)	1.00 (Base)		1.00 (Base)	
Poor	1681 (25.2)	32.9 (32.0–33.8)	0.85 (0.72–0.99)	0.042	0.81 (0.67–0.97)	0.02
Middle	1210 (18.2)	25.4 (24.5–26.3)	0.49 (0.40–0.59)	<0.001	0.55 (0.43–0.69)	<0.001
Richer	665 (10.0)	14.7 (14.0–15.4)	0.31 (0.23–0.41)	<0.001	0.43 (0.31–0.60)	<0.001
Richest	350 (5.3)	8.3 (7.8–8.8)	0.17 (0.11–0.27)	<0.001	0.24 (0.14–0.40)	<0.001
Urbanicity						
Urban	1483 (22.3)	13.1 (12.4–13.8)	1.00 (Base)		1.00 (Base)	
Rural	5178 (77.7)	34.6 (33.7–35.5)	4.55 (3.59–5.78)	<0.001	3.14 (2.34–4.22)	<0.001
Treatment seeking						
None	4209 (63.2)	28.8 (27.9–29.7)	1.00 (Base)		1.00 (Base)	
Treatment seeking	1152 (17.3)	33.9 (33.0–34.8)	1.16 (0.98–1.38)	0.078	1.18 (0.99–1.40)	0.08
Missing	1300 (19.5)					
Rainfall (m)					1.00 (Base)	
Mean (SD)	0.496 (0.166)	0.531 (0.154)	2.93 (1.68–5.09)	<0.001	2.48 (0.77–7.98)	0.129
Median [Min, Max]	0.512 [0.103, 0.1030]	0.546 [0.107, 0.827]				

¹Odds ratios calculated using multilevel generalized linear model for binary outcomes with random intercepts for LGA

² Odds ratios calculated using multilevel generalized linear model for binary outcomes with random intercepts for district adjusted for SMC, year, age, sex, use of a net the night before data collection, wealth quintile, urbanicity, rainfall, month, and treatment seeking behaviour

³Wald-p value