Seasonal Malaria Chemoprevention in Guinea in 2020: coverage survey results

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The survey of SMC coverage in Guinea in 2020 was conducted by the University Gamal Abdel Nasser, Conakry and the London School of Hygiene & Tropical Medicine, in collaboration with the National Malaria Control Programme and Catholic Relief Services, Guinea.

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Indicators

			2018		2019		2020	
Indicator	Definition	Population	Value (95%CI)	N	Value (95%CI)	N	Value (95%CI)	N
Average coverage per cycle	Mean of coverage in cycles 1,2,3 and 4	Children aged 3-59 months at cycle 1.	71.6% (62.3,80.9)	1771	71.5% (65.2%,77.8%)	1893	**78.2%** (73.0,83.4)	2447
Mean number of treatments per child	Mean number of SMC treatments received	Children aged 3-59 months at cycle 1.	2.87 (2.49,3.24)	1771	2.86 (2.61,3.11)	1893	**3.13** (2.92,3.33)	2447
Coverage of 4 cycles	% received 4 treatments	Children aged 3-59 months at cycle 1.	60.7% (50.3,70.3)	1771	41.4% (31.7%,51.8%)	1893	**70.8%** (65.0%,76.0%)	2447
Coverage of 4 cycles by region:								
		Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	83.3% (73.3,90.1)		11.1% (1.7%,47.5%)		**77.7%** (69.6%,84.2%)	450
		Labe, Lelouma	63.9% (49.5,76.2)		1.1% (0.1%,8.4%)		**85.3%** (75.3%,91.7%)	134
		Siguiri, Mandiana	33.0% (20.0,49.1)		41.5% (31.5%,52.4%)		**49.6%** (34.4%,65.0%)	544
		Dabola, Kankan, Kouroussa	73.6% (65.1,80.7)		70.9% (58.6%,80.8%)		**80.4%** (70.1%,87.7%)	786
		Dalaba, Pita, Mamou, Faranah	-		-		**70.4%** (61.4%,78.1%)	533
Adherence	% received 3 doses at last cycle (if treated)	Children aged 3-59 months at cycle 4	97.5% (95.6,98.6)	1448	96.1% (93.4%,97.7%)	1688	**96.8%** (95.6%,97.7%)	1935
Reach of SMC programme	% who received at least one treatment	Children aged 3-59 months at cycle 1.	79.3% (68.7,87.0)	1771	85.5% (77.2%,91.2%)	1893	**82.4%** (76.5%,87.1%)	2447
Coverage of cycle 1	% treated at cycle 1	Children aged 3-59 months at cycle 1.	73.8% (63.9,81.8)	1771	81.0% (72.8%,87.1%)	1893	**78.2%** (72.4%,83.0%)	2447
Coverage of cycle 2	% treated at cycle 2	Children aged 3-59 months at cycle 1.	73.7% (63.9,81.5)	1771	78.6% (69.8%,85.4%)	1893	**79.9%** (74.1%,84.6%)	2447
Coverage of cycle 3	% treated at cycle 3	Children aged 3-59 months at cycle 1.	71.5% (60.6,80.3)	1771	77.9% (69.6%,84.4%)	1893	**77.4%** (71.7%,82.3%)	2447

Coverage of cycle 4	% treated at cycle 4	Children aged 3-59 months at cycle 1.	67.6% (56.8,76.7)	1771	48.6% (37.9%,59.5%)	1893	**77.2%** (71.5%,82.0%)	2447
Treatment of older children	Mean number of SMC treatments received	Children aged 6-7yrs at the survey	0.63 (0.24,1.02)	327	0.33 (0.16,0.49)	244	**0.21** (0.07,0.35)	465
Awareness of SMC dates	% households heard date before last cycle	All households	92.4% (85.9,96.1)	1135	92.4% (85.9%,96.1%)	1002	**92.1%** (88.5,94.6)	1374
LLIN use in children	% slept under an LLIN last night	Children 3-59 months who slept in the household last night	30.2% (22.6,39.0)	1835	85.7% (79.2%,90.4%)	1961	**66.3%** (60.1%,72.0%)	2447
LLIN use (all ages)	% slept under an LLIN last night	All who slept in the household last night	30.1% (22.3,39.4)	5198	79.7% (71.8%,85.8%)	4906	**61.5%** (56.3%,66.4%)	7028
ACCESS (% of population)	% that could sleep under LLIN (if 2/net)	All who slept in the household last night	25.4% (18.7,33.5)	5198	68.2% (61.78%,74.0%)	4906	**52.3%** (47.9%,56.6%)	7028
% households with an LLIN	% households with an LLIN	All households	39.7% (30.3,49.8)	996	89.8% (84.7%,94.8%)	1038	**73.5%** (68.4%,78.6%)	1377
ACCESS (% households)	% household with a LLIN for every two members	All households, all who slept there last night	13.1% (8.4,19.8)	996	36.8% (30.6%,42.9%)	1038	**23.4%** (19.3%,27.5%)	1377
Caregiver knowledge about SMC	Mean score out of 10	Carers of children 3-59 months	6.90 (6.26,7.55)	1135	7.0 (6.5,7.6)	1068	**6.6** (6.3,6.9)	1521
Reported CHW adherence to guidelines	Mean score out of 8	Carers of a child who received SMC last cycle	6.07 (5.41,6.72)	1135	7.6 (7.3,7.8)	1068	**6.3** (6.0,6.6)	1127
SMC directly observed	% of first doses administered or observed by CHW	Children 3-59 months who received SMC at last cycle	99.0% (97.7,99.6)	1447	97.2% (93.0%,98.9%)	1124	**99.5%** (99.0,99.8)	1912
Interval between cycle 1 and cycle 2	Mean difference between cycle dates	Dates recorded on SMC cards	34 days	1192	34 days	1261	**33** days	2447
Interval between cycle 2 and cycle 3	Mean difference between cycle dates	Dates recorded on SMC cards	36 days	1150	32 days	1231	**32** days	2447
Interval between cycle 3 and cycle 4	Mean difference between cycle dates	Dates recorded on SMC cards	29 days	969	33 days	686	**32** days	2447
SMC card at survey	% of children with SMC card	Children eligible for SMC	60.9% (52.1,69.1)	1771	67.1% (59.0%,74.3%)	1893	**59.6%** (53.1%,65.8%)	2447

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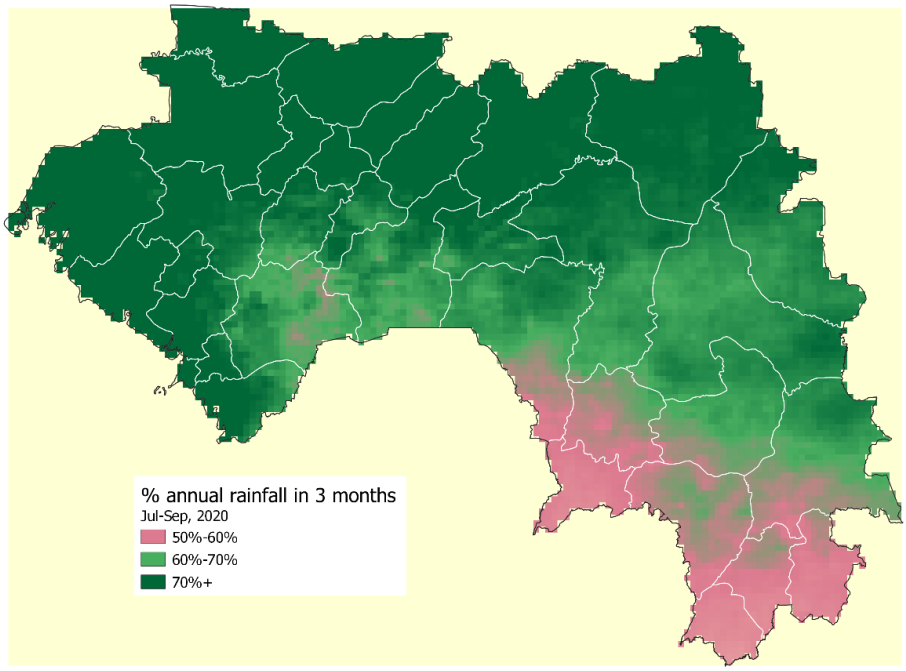


EXECUTIVE SUMMARY and RECOMMENDATIONS

Background:

In 2020, SMC distribution in Guinea was expanded to include the prefectures of Pita, Mamou, Dalaba, Faranah, SMC was therefore implemented in 17 prefectures, which include 50% of the population outside the city of Conakry and 60% of the land area of the country. In 2020 the COVID-19 pandemic, and the presidential elections in Guinea, could potentially have affected SMC campaigns. It was therefore important to evaluate coverage of SMC given these challenges and the much wider area of implementation.

Seasonal Malaria Chemoprevention (SMC) was introduced in Guinea in 2015 for children aged 3 months to 5 years, over 4 months of the year, in 6 prefectures, and was scaled-up gradually to 8 prefectures in 2016, and 10 in 2017 and 13 prefectures in 2018. SMC gives children a high level of personal protection from malaria. Evaluation of SMC programmes by the ACCESS-SMC project showed substantial reductions in malaria cases and malaria deaths in children, associated with introduction of SMC [1]. High coverage of monthly cycles is needed to maximise the impact of this intervention. In 2020, four cycles of SMC were delivered in the prefectures of Gaoual, Koundara, Mali, Lelouma, Labe, Koubia, Tougué and Dinguiraye, with support from PMI, and in Siguiri, Mandiana, Dabola, Kouroussa, Kankan, Pita, Dalaba, Mamou and Faranah prefectures, supported by the Global Fund, in July, August, September and October. This survey was conducted to assess coverage of SMC and use of long-lasting insecticide-treated bednets (LLINs) in 2020 in the 17 prefectures.

The survey took place from 3rd Dec to 22nd December 2020. All children aged 3 months to 7 years were included in order to determine coverage in the target age group (aged at least 3months at the time of treatment, and aged not more than 59 months at cycle1) and to determine the proportion of children above the recommended age limit who received treatment. Caregivers were interviewed about SMC treatments, dates of treatments were recorded from the SMC card, and SMC registers were checked to verify SMC treatments for children who did not have a card for inspection during the survey and for subset of children. In addition, all persons who slept in the household the night before the survey were listed, all bednets owned by the household were also listed and inspected, and for each person, the net they slept under, if any, was noted.

A total of 2,447 children eligible to receive 4 treatments were surveyed in 90 clusters. A total of 1374/1521 of households agreed to participate, a response rate of 90.3%. 465 children too old to be eligible for SMC, were also surveyed. Use of LLINs was assessed for a total of 7,028 household members.

Administrative data:

A total of 4.4 million treatments were administered in 2020 over four cycles to a target population of 1.1milliion children. The mean number treated per cycle was 1,088,832 (101% of target), and the number that received 4 cycles was 956,559 (89% of the target population). These administrative estimates compare with the survey estimate of the percentage of eligible children who were reached, 82.4%, and the percentage of children who received 4 cycles, 70.8% of eligible children. Administrative estimates over-estimate coverage due to

errors in the target population size, population movement, and inclusion of treatments administered to ineligible children.

In cycle 1, an average of 5.8 per 1000 infants and 3.3 per 1000 children were unwell during the SMC visit and were referred. In cycle 4, the average proportion referred was 1.3/1000 in infants and 0.5/1000 in children.

In cycle 1, the proportion of children who vomited and were given a replacement dose was 13/1000 among infants 3-11 months and 4.7/1000 among children 12-59 months. The proportion who vomited decreased in successive cycles, in cycle 4 in total 6.9/1000 infants and 1.8/1000 children vomited and were given a replacement dose.

In cycle 1, there were 3276 refusals, a rate of 3 per 1000 children seen. Most of the refusals were in Siguiri prefecture, where the rate of refusal was 15/1000 in cycle 1.

SMC coverage in 2020:

Children aged 3 to 59 months at the time of cycle 1 were eligible to receive SMC four times, and should receive all of these treatments to maximise their protection. Overall, the percentage of eligible children who received SMC was 78.2% in cycle 1, 79.9% in cycle2, 77.4% in cycle3, and 77.2% in cycle 4. Children who did not receive SMC in cycle 1 tended not to receive SMC in later cycles. A total of 17.6% of children did not receive any SMC treatment in 2020, and 70.8% of eligible children received four monthly treatments. SMC was equitable with similar coverage in boys and girls and according to caregiver wealth based on ranking according to household assets. In the four prefectures which implemented SMC for the first time in 2020 (Pita, Mamou, Dalaba and Faranah), a target population of 240,000, the average coverage per cycle was 80.4%, with 70.4% of children receiving all four cycles. The most common reasons the caregivers gave for their child not receiving SMC at cycle 4, were that the child or caregiver was away at the time of the campaign in their village.

Siguiri prefecture accounted for the largest number of treatments administered, but the lowest coverage. This suggests the target population in Siguiri may be significantly larger than has been estimated.

Timing of SMC cycles:

Cycle 1 took place in July, cycle 2 in August, cycle 3 in September and cycle 4 in October. The median interval between treatments, based on dates recorded on SMC cards, was 33 days between cycle 1 and cycle 2, and 32 days between cycle 2 and 3, and 32 days between cycles 3 and 4. These intervals should be reduced to 28 days. Cases will increase in the 5th week as protection wanes rapidly after 4 weeks.

Assessment of SMC status in the survey:

Of children eligible for four SMC treatments who were surveyed, 16.6% had not received an SMC card, 83.4% had received a card, and of those who received a card, 71.5% retained the card, so that during the survey a total of 59.6% of children had a card available for inspection. If the child did not have a card, registers were checked. SMC status could be verified using either card or register, for a total of 79% of eligible children.

For those children in the survey who had an SMC card and were found in the register, agreement between the card and register was 66%. Where there was disagreement, there tended to be more treatments in the register than on the card, suggesting that CHWs may not always record treatments on the card consistently.

Awareness of SMC campaigns:

Caregivers need to know the day when SMC will be distributed in their area in order to ensure they are available on that day. Overall, public information campaigns appeared successful, 93.6% of households were aware of SMC and 92.1% said they knew in advance the date of the last campaign.

Caregiver knowledge about SMC:

Caregivers were asked if they understood key aspects of SMC, they scored 66% overall on a 10-point questionnaire. Most caregivers (77%) knew that SMC is used to prevent malaria and most (76%) knew that there are 2 tablets to be taken on the first day and one on each of the next two days (85%). However there was a widespread view that SMC drugs could be used for treatment if there was someone unwell in the household (only 36% of caregivers gave the correct response, that SMC drugs should not be used in this way), and only 63% of caregivers appreciated the importance of completing the 3-day course of treatment

Community Health Worker (CHW) adherence to SMC guidelines as reported by caregivers:

CHW's should check the child's age, and before administering the treatment should ask about illness and refer the child if they are unwell, and should check the child has not had severe side effects to SMC before. They are also trained to explain to the caregiver how to administer the amodiaquine tablets on the next two days, and to advise caregivers about potential side effects and to bring the child to a health worker if they are become unwell after SMC. Caregivers of children who had received SMC, reported that the CHW generally followed these guidelines correctly, but were less likely to check for previous side effects to SMC or other medicines.

Administration of SMC:

In 99.5% of treated children, the first dose was directly observed, either administered by the CHW (87.4%) or by the caregiver in the presence of the CHW (12.2%). In a small number of cases, (0.5% of children) the blister pack was left with the caregiver to administer later, not observed by the CHW. Reported adherence to the unsupervised doses of amodiaquine was very high. Of eligible children treated at cycle 4, caregivers reported that 96.8% received all three daily doses.

Treatment above the age limit:

Children who are above 5 years of age at the time of the first SMC cycle, should not receive SMC. The dose has been calculated according to age and if older children are given the blister pack intended for the 12-59-month group, they may be under-dosed, this can select for resistance as parasites are exposed to sub-therapeutic doses of SMC drugs. 465 children 6years and above were surveyed. Only 6.3% were reported to have received an SMC card, and 5.2% received SMC in each cycle.

Bednet use:

In the 2018 survey, 30.2% of children slept under a LLIN the night before the survey. In the 2019 survey, following a mass distribution campaign, this increased to 86% of children. In the 2020 survey, this had fallen to 66% of children under 5 slept who under an LLIN the night before the survey. Coverage was lower in Siguiri prefecture than in other areas. LLIN use was lower than in 2019, in all age groups and in all areas, the reduction was greatest in Siguiri and Mandiana.

Children above the age of 5 were less likely to use an LLIN than children under 5. This drop in LLIN use above the age of 5 was more marked in some areas than others. The percentage of the 5-9 age group that slept under an LLIN was only 54%.

Of 1,377 households surveyed, 73.5% had at least one LLIN and 23.4% had one LLIN for every 2 persons. This compares with 89.8% had at least one LLIN and 36.8% had one LLIN for every 2 persons in the household, in 2019. Access to a LLIN, the percentage of the population who could sleep under a LLIN if there were two people per net, was 25.4% in 2018. This increased to 68.2% in 2019, and decreased 52.3% to the current survey. 61% of household members slept under an LLIN.

COVID-19:

Caregivers were asked if they had experienced three or more of the following symptoms at the same time in the past 6 months: fever, cough, sore throat, shortness of breath, fatigue, aches and pains, headaches, runny nose, and if they had any of these symptoms now. A total of 0.3% said they had 3 or more of these symptoms now and 2.9% said they had 3 or more symptoms together at some time in the previous 6 months. A total of 7 people (0.6%, 95%CI 0.2%,1.6%) said they had been tested for COVID-19. A total of 4 people (0.2%, 95%CI 0.09%,0.6%) said they thought they had been in contact with someone who had tested positive.

Recommendations:

1. SMC during 2020:

High SMC coverage has been maintained in 2020 despite the challenges of delivery during the COVID-19 pandemic, and high coverage was achieved in the four prefectures where SMC was introduced for the first time in 2020.

2. LLIN use in children who have stopped receiving SMC:

There was a marked increase in the use of LLINs following the successful distribution campaign in 2019. LLIN use has decreased from 85% of children under 5, and 80% of the population (of all ages) who slept under a LLIN the night before the survey in 2019, to 66% of children and 61% of all ages. There was a notable dip in LLIN use in children above the age of 5 yrs, with the lowest LLIN use in children aged 7yrs (45%). This is of concern, children who stop receiving SMC at age 5 need to be protected with an effective net. Specific efforts need to be made to ensure high levels of LLIN use in this age group.

3. Number of SMC cycles:

In many of the areas where SMC is currently being implemented, more than 4 cycles of SMC are needed to provide protection throughout the high-risk period. Increasing the number of cycles where appropriate is now supported by WHO. In the 2011 WHO review, areas with highly seasonal malaria transmission corresponded approximately to areas where 60% of annual rainfall fell in 3 consecutive months. By this criterion, based on 2020 rainfall patterns from CHIRPS [18], all areas of Guinea would be eligible except for the southern prefectures of Yemou, Lola, Nzerekore, Macenta, Gueckedou,and Kissidougou. Within areas with highly seasonal rainfall, malaria seasonality can vary depending on distance to water bodies and river flood plains [11]. Seasonality in malaria case reports is also influenced by diagnostic accuracy, and by seasonal population movement. In most prefectures where SMC is currently implemented, increasing the number of cycles would be expected to increase the proportion of annual burden included in the SMC period by about 10% (Annex C). Longer-term planning should also include how the malaria vaccine will be used in Guinea and combined with SMC in the most effective manner [22] if, as is anticipated, WHO recommends wider use of the vaccine.

4. Monitoring of the efficacy of SMC

Molecular monitoring of SMC efficacy through the ACCESS-SMC project in 7 countries including Guinea in 2016 and 2018 showed that key mutations were uncommon but there was evidence of selection for resistance to SP. In Guinea, the monitoring site was Siguiri prefecture, in the general population the quintuple mutation associated with resistance to SP had a prevalence of 1.6% in 2016 and 6.1% in 2018, an increase of 4.4% (95%CI 1.4%-7.5%). Molecular monitoring should be repeated in the same sample locations to assess whether there have been further increases, and monitoring should be extended to other parts of the country.

BACKGROUND AND OBJECTIVES

The Republic of Guinea is one of 17 high burden countries which, according to WHO estimates, accounted for more than 80% of deaths due to malaria worldwide in 2019 [1]. Malaria occurs year-round with a highly seasonal pattern in the north of the country. The main vectors are *Anopheles gambiae*, *An. funestus*, *An. melas* and *An. arabiensis*. WHO [1] estimated there were 3,792,217 cases of malaria and 8,180 deaths caused by malaria in Guinea in 2019 in a population of 12.8million. The estimated 2020 population is 13.1million in total including 2.1million children under 5 years of age [2]. Under-5 mortality was estimated to be 111 per 1000 live births in the 2018 DHS survey (over the 5-year period with midpoint 2016) [3], and 80.7 (for the 5-year period with midpoint 2018) in the UN projections [2].

Seasonal Malaria Chemoprevention (SMC) was introduced in Guinea in 2015. SMC involves the administration of a treatment course of sulfadoxine-pyrimethamine plus amodiaquine once a month to children aged 3–59 months during the high risk period each year to prevent malaria [4], recommended by WHO initially for up to 4 months of the year but as of 2021, for up to 5 months. Evaluation of the introduction of SMC in 7 countries, including Guinea, through the ACCESS-SMC project, showed that despite the challenges of door-to-door delivery, SMC has been highly effective in reducing malaria cases and malaria deaths in children [5,6].

In Guinea, SMC was introduced initially in 6 prefectures, scaling up to 13 prefectures by 2018 (Table 1). A survey in the 13 prefectures with SMC in 2018 showed that 79% of children received SMC at least once, and 61% received four treatments [7]. There were geographical variations, with the lowest coverage in the prefecture of Siguiri. Use of bednets (LLINs) was low, only 30% of children slept under an LLIN the night before the survey, 40% of households owned an LLIN, 13% of households had one LLIN per 2 persons, and 25% of the population had access to a LLIN. In 2019 [8], there were marked improvements in use of LLINs, 85.7% of children slept under an LLIN, 89.8% of households owned a LLIN, 36.8% of households had one LLIN per 2 persons, and 68.2% of the population had access to a LLIN. In the 5 prefectures where 4 cycles of SMC were delivered in 2019, 58% of children received four treatments, (though coverage was again lower in the prefecture of Siguiri).

In 2020 the COVID-19 pandemic threatened to disrupt malaria control activities. WHO produced guidelines for adapting malaria control measures [9] and RBM published specific operational guidance for SMC [10] including maintaining social distance during training and delivery, use of face masks and hand washing, and advice that the first dose each month should be given by the caregiver, observed by the distributor.

The present survey was conducted in 17 prefectures at the end of the 2020 transmission season to determine SMC coverage and use of LLINs. The survey aimed to determine the percentage of children who received SMC in each cycle, the percentage who received the full four treatments, the adherence to the SMC regimen, and the use of insecticide-treated bednets by all household members, and to ask caregivers of children who did not receive four treatments, the reasons their children missed SMC treatments.

Description of Seasonal Malaria Chemoprevention

SMC involves administration of a course of treatment of sulfadoxine-pyrimethemine plus amodiaquine over three days, once per month for four months of the malaria transmission season, to prevent malaria illness. Children aged at least 3 months and less than 5 years of age are eligible to receive SMC, however children who were under 5 years of age at the first month continue to receive all four monthly treatments even if they reach the age of 5 during the 4-month period of SMC distribution. Each monthly treatment consists of a dose of sulfadoxine-pyrimethamine and a dose of amodiaquine, administered on the first day, and a dose of amodiaquine on each of the next two days. The drugs are distributed by community health workers (CHWs) who visit door to door to administer the first day's doses and leave the blister pack with the caregiver with instructions to administer the remaining amodiaquine doses on each of the next two days. CHWs check the age of the child and select the appropriate blister pack (lower dose for infants, higher dose for children 12-59 month), ask about allergies to SMC drugs, check whether the child has been given sulfadoxine-pyrimethamine or amodiaquine or any sulfa-containing antibiotic in the last 4 weeks, and check if the child has a fever. Children are eligible if they do not have known allergies to the drugs, have not been given amodiaquine of sulfa-containing medication in the last 4 weeks, and are not unwell. Children who are unwell should be referred to the nearest health centre where they can be appropriately treated, including treatment with an ACT if they have malaria. If they do not have malaria, they may receive SMC at the clinic. CHWs should also remind caregivers to bring the child to the health centre if the child becomes unwell at any time after taking SMC, and that the child can still develop malaria and so the guidance to seek treatment promptly in the case of fever should continue to be followed, and all household members should sleep under a treated bednet. Each course of SMC treatment provides about 90% protection from malaria for 28 days so that four treatments one month apart can provide a high degree of personal protection for 4 months. Introduction of SMC with high coverage has been found to reduce the incidence of malaria, severe malaria, and malaria deaths, substantially. To maximise the impact of the intervention, it is important that the first SMC cycle is timed to start at the beginning of the main transmission period; cycles should take place at monthly intervals; high coverage of 4 monthly treatments should be achieved; and caregivers should ensure children adhere to the daily regimen each month. Insecticide treated bednets should continue to be used, SMC should be an additional measure not a substitute for bednets. The survey therefore assessed bednet use by children and other members of the household.

Scaling-up of SMC in Guinea

SMC was introduced in Guinea in 2015, with four monthly cycles, in 6 prefectures with a target population of 210,107 children. The area covered was increased to 8 prefectures in 2016, 10 in 2017, and 13 in 2018. The same 13 prefectures were included in 2019, (three cycles in 8 prefectures supported by PMI and four cycles in the 5 prefectures supported by the Global Fund). In 2020 the target area was expanded to 17 prefectures, for 4 cycles (Tables 1 and 2 and Figure 1), with a target population of 1,077,467 children, an increase of about 32% compared to the target number in 2019. Siguiri and Kankan are the largest prefectures together accounting for about one quarter of the target population of children in the 17 prefectures.

Table 1: Expansion of SMC in Guinea 2015-2020

Prefecture	2015	2016	2017	2018	2019	2020
Dinguiraye	X	X	X	X	X	X
Gaoual	X	X	X	X	X	X
Koubia	X	X	X	X	X	X
Koundara	X	X	X	X	X	X
Mali	X	X	X	X	X	X
Tougue	X	X	X	X	X	X
Mandiana		X	X	X	X	X
Siguiri		X	X	X	X	X
Labe			X	X	X	X
Lelouma			X	X	X	X
Dabola				X	X	X
Kankan				X	X	X
Kouroussa				X	X	X
Pita						X
Dalaba						X
Mamou						X
Faranah						X
Target population	**210,107**	**438,123**	**591,071**	**825,994**	**818,502**	**1,077,467**

The indicators related to delivery of SMC, from 2015 to 2020, are summarised in Table 2 below. The estimated percentage of children who received four SMC treatments was 57% in 2015 and 73% in 2016 and 63% in 2017 and 61% in 2018 and 41% in 2019 (lower because the fourth cycle was not implemented in PMI areas in 2019).

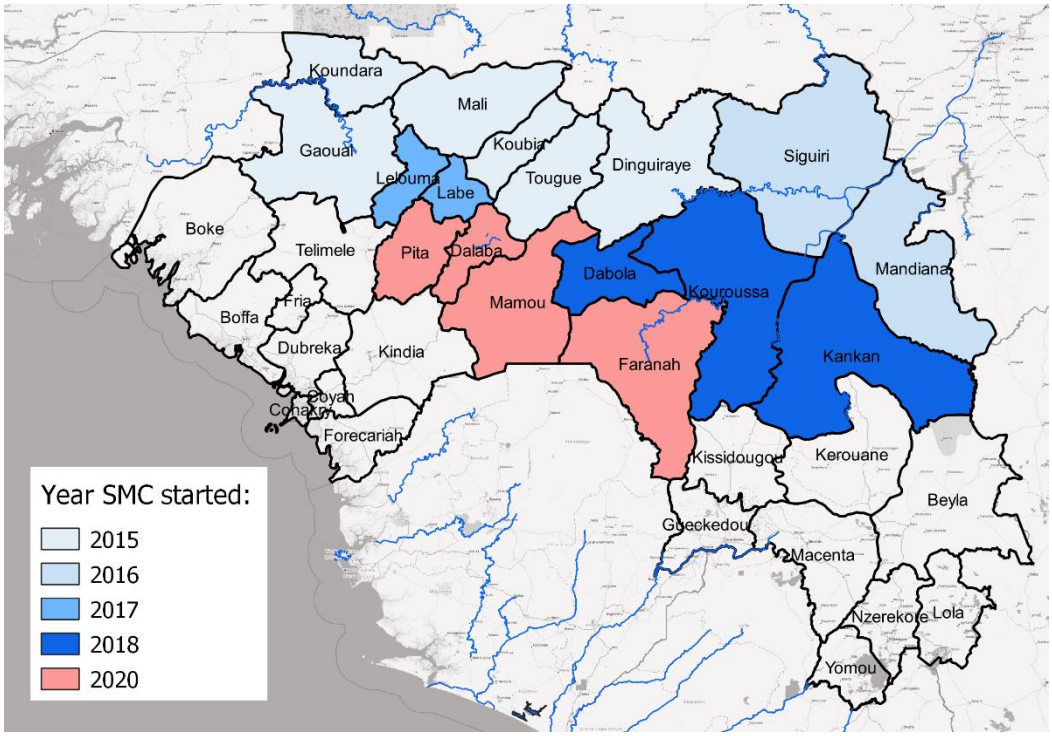
Table 2: SMC delivery in Guinea 2015-2020

Year‡	Prefectures	Target population	Doses administered	Mean coverage per cycle	% treated at least once	% treated four times	Number eligible reached*	Number received four treatments#
2015	6	210,107	805,131	80%	94%	57%	197,501	119,761
2016	8	438,123	1,750,224	88%	96%	73%	420,598	319,830
2017‡	10	591,071	2,303,709	73%	79%	63%	466,946	372,375
2018	13	825,994	3,356,780	72%	79%	61%	655,013	501,378
2019	13	818,502†	2,986,364	72%	86%	41%	699,819	338,860
2020	17	1,077,467	4,355,326	78%	82%	71%	888,355	762,743

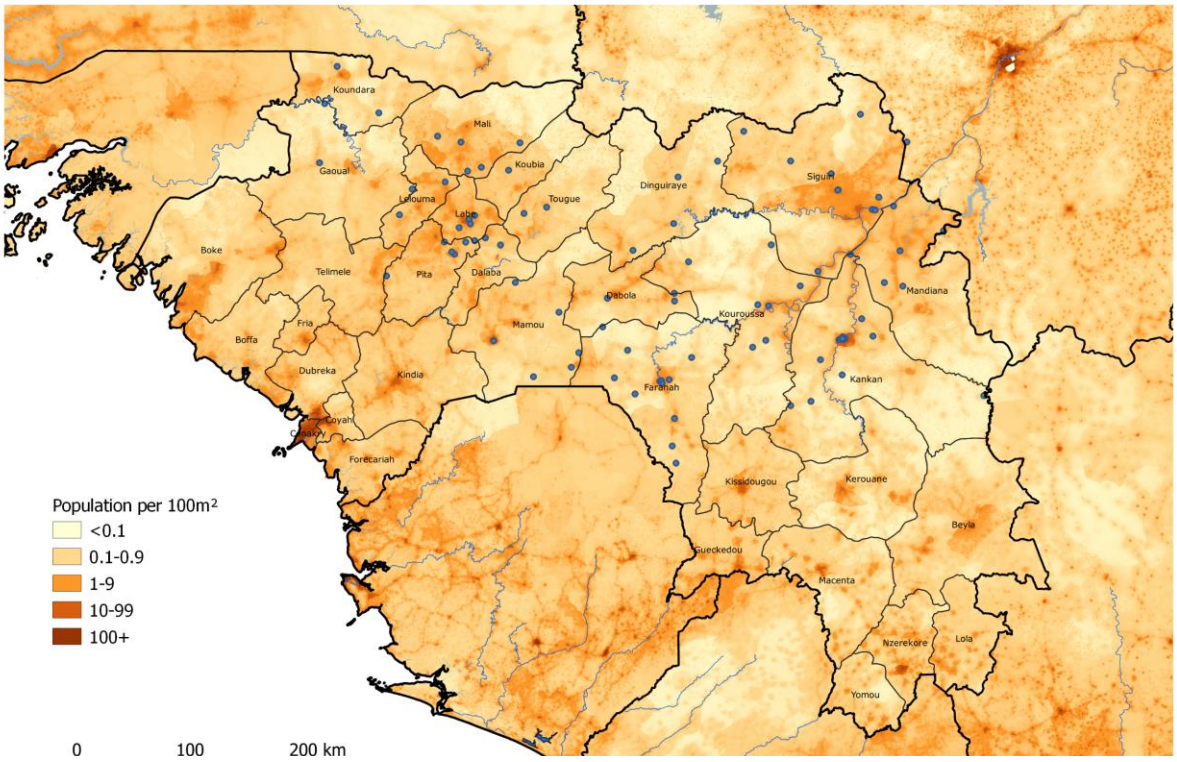
*The target population multiplied by the estimate proportion of children who received at least one SMC treatment. #The target population multiplied by the proportion of children who received four treatments. †Population updated based on bednet campaign estimates. ‡Sampling for the 2015 and 2016 surveys was based on the 1996 census, whereas for the surveys conducted since 2017, population data from the 2014 census were used. The earlier census did not reflect the increased population in mining areas. The apparent decrease in the percentage of children who received SMC in 2017 reflects a more representative sampling frame for the selection of survey villages, which included mining areas in Siguiri where SMC has been most challenging. These areas were not included in the 2016 survey.

Figure 1: A - Scale-up of SMC 2015-2018. B- Population distribution in SMC areas

A: Scaling up of SMC in Guinea



B: Survey locations and distribution of population in SMC areas
Source for spatial population data: Worldpop (2019)



SMC target population in 2020

The total estimated population of children to be treated was 1,077,465 (Table 3). The 2014 census estimates of the population were used for probability proportional to size selection of survey clusters and for calculation of survey weights.

Table 3: Target population for SMC in 2020, by prefecture

Prefecture	Target population 2020	Cumulative %	Target population 2019	Target population 2018	2014 Census population	Worldpop 2020
Siguiri	162,041	15%	157,639	179,333	708,506	963,394
Kankan	112,777	26%	109,713	105,578	963,264	578,195
Mandiana	80,344	33%	78,161	77,431	335,921	418,559
Mamou	76,244	40%			316,869	352,298
Labe	75,995	47%	76,221	73,786	318,938	349,419
Mali	73,099	54%	70,937	68,741	290,614	322,365
Faranah	66,998	60%			280,962	342,615
Pita	66,613	66%			274,468	293,646
Kouroussa	64,191	72%	62,446	64,442	545,212	327,632
Gaoual	46,996	77%	47,103	45,819	196,190	216,491
Dinguiraye	46,300	81%	46,804	45,797	199,465	222,018
Lelouma	44,907	85%	43,473	42,084	163,069	175,804
Dabola	43,319	89%	42,142	41,734	181,129	212,804
Dalaba	31,951	92%			132,677	132,431
Koundara	31,122	95%	31,184	30,335	131,388	148,324
Tougue	30,708	98%	29,468	28,484	125,405	127,467
Koubia	23,860	100%	23,212	22,430	101,293	102,469
TOTAL	1,077,465		818,503	825,994	5,265,370	5,285,930

METHODS

The survey was conducted from 3 to 22 Dec 2020. Ninety settlements were selected from 17 prefectures where SMC was implemented in 2020 (Figure 1), with probability proportional to population size based on the 2014 General Population and Housing Census (RGPH), and in each selected settlement, area sampling was used, whereby the settlement was divided into segments, one segment chosen at random, and all households in the selected segment included in the survey. In clusters which were too large to segment easily, the total area was estimated by taking GPS locations around the perimeter of the inhabited area. A single location was then chosen, by randomly generating an x and y coordinate within the settlement (this was done independently of the survey team and the location sent to them by email). Interviewers surveyed houses around this point, recording the GPS location of each dwelling, and continuing outwards, without missing any dwellings, until 20 children had been included. In the final dwelling, all children eligible for the survey were included so the final sample size for the cluster could exceed 20.

Teams were provided with face masks, aprons, sanitiser gel and soap, and were trained to maintain social distance as far as possible and to wash hands before and after each household visit.

In each household, the aims of the survey and the nature of the questions were explained and signed consent (on paper consent forms) was sought from the head of the household. Verbal consent was then sought from each caregiver and documented electronically.

Caregivers of children were asked about SMC treatments their child had received, SMC record cards were inspected and photographed, and SMC registers, borrowed from the local health centre, were checked to find the child's entry using the ID number on the SMC card or, if the card was not available, using the child's name and caregiver's name. All children aged 3 months to 7 years were included in order to determine coverage in the target age group (aged at least 3months at the time of treatment, and aged not more than 59 months at cycle1) and to determine the proportion of children just above the recommended age limit who received treatment. In addition, all persons who slept in the household the night before the survey were listed, all bednets owned by the household were also listed and inspected, and for each person, the net they slept under, if any, was noted.

Registers were available for all clusters except one (Franwalia in Siguiri, where the team were not able to access the store in the local health centre where the register was kept due to absence of the head of the centre).

When caregivers reported more SMC treatments than were recorded on the SMC card, it is plausible that treatments were received but not recorded on the card by the community health worker, or that caregivers did not accurately recall the exact number of treatments. In the cases where the caregiver said the child had not received any SMC, but there were several SMC treatments recorded on the card, it is possible that the respondent was not the same person that cared for the child during the SMC campaigns, or that cards for different children had been swapped during SMC delivery. Overall however, there was a high level of agreement between recall and card, as has been observed in previous surveys.

In most of the cases where there was disagreement between card and register, and between caregiver recall and the register, the number of treatments was greater according to the register, that is, there were more treatments in the register than according to either the card or the caregiver. This could occur if health workers enter treatments in the register but omit to record on the card. It is possible registers are completed before children have been treated, and then the child is not treated, but we have no independent evidence of this happening. There could also be linkage errors, the wrong record in the register being used.

In this report, we have used a combination of recall, card and register; the child was assumed to have been treated in a particular month if there was a treatment recorded on the card (even if the caregiver disagreed), and if there was a record in the register (even if not on the card, or the caregiver disagreed). If the caregiver stated the child had been treated, but there was no record in the card, it was assumed the child had been treated but the treatment had not been recorded.

Training, piloting and data collection

Training took place over 2 days, 26-27 November 2020. The training covered the use of the survey tools, understanding the questionnaires, and field methods. 26 participants participated in the training: 21 interviewers, 1 Global Fund staff, 2 supervisors, and 2 trainers. The first day covered operation of tablet PCs, tablet settings, and the use of the data entry software, and comprehension and practice in the use of the data entry forms. The second day covered taking photographs of SMC cards, recording GPS coordinates, saving and finalizing a form, making corrections and field methods. Data collection was then piloted in the field on Dec 1-2, 2020, teams were trained in identifying segments of the survey villages, and administration of survey questionnaires. For the main survey, which started Dec 3 and ended on Dec 22 2020, survey staff were organised in 7 teams.

Data management

Data were collected using Android tablets (Nexus 7 (4 devices) and Samsung T285 Galaxy Tab A (17 devices)). Software used was ODK. The ODK form metadata are available from the authors. The form used nested repeat structures to enable the capture of data at the household, caregiver and child levels – with linkage between the levels implemented directly through the ODK tool. The ODK aggregate server was based at the London School of Hygiene and Tropical Medicine. The devices used strong encryption so that if devices were lost the data could not be seen by non-team members. Encryption was also used on the aggregate server, and the only way to retrieve the meaningful data was by using suitably setup ODK Briefcase – which allowed the decryption of the data from the server. The data were delivered as CSV files (in UTF 8 format). These files were then inserted into spreadsheet workbooks (separate sheet for each level). These spreadsheets were made available to members of LSHTM team and the data manager based in Guinea so that the data could be reviewed (for cleaning purposes) and for analysis. A separate MS Access version of the data sets was created, again using the source csv files, so that the images of the cards could also be reviewed against the data entered. This was used to identify missing data from the cards. The MS Access database became the cleaned version of the database, and it was the source used for analysis. The data were extracted from the Access database using MS PowerBI – which enabled the decoding of the data gathered into the meaningful labels (e.g. so Male and Female were generated, rather than 1 and 2), and the merging of the data from the different levels. All data sharing between teams was implemented using MyFiles – the secure sharing platform used by LSHTM.

RESULTS

Layout of the results

Results for the key indicators are presented overall (average value for all 17 prefectures), and for each of five areas defined as follows:
Area 1 - prefectures which started SMC in 2015 (Gaoual, Koundara, Koubia, Mali, Dinguiraye, Tougué);
Area 2 – prefectures which started SMC in 2016 (Mandiana and Siguiri)
Area 3 – prefectures which started SMC in 2017 (Labé, Lelouma)
Area 4 – prefectures which started SMC in 2018 (Dabola, Kouroussa, Kankan)
Area 5 – prefectures which started SMC in 2020 (Pita,Dalaba,Mamou,Faranah)

Areas 1 and 3 are supported by PMI and Areas 2,4 and 5, Global Fund.

Estimates for each prefecture separately are also provided but for some prefectures the number of clusters is small and the survey is not designed to produce reliable estimates in these prefectures.

95% confidence intervals are presented for the key indicators which show the degree of uncertainty in the estimated value.

Response rates

A total of 1,374 households participated in the survey (Table 4), 90% of all households visited. The location of the clusters is shown in Figure 1B. A total of 3398 children were included, of these 2447 were aged 3-59 months at the time of cycle 1 and hence eligible to have received four SMC treatments. 465 children were aged 6-7 years when the survey was done and so were above 5 years of age at the time of SMC cycle 1.

Table 4: Response rates and the number of households, children and other household members surveyed:

Households surveyed:	No. of households	%
Agreed to participate	1374	90.3%
No children of eligible age	81	5.3%
Refused to participate	6	0.4%
Unable to find someone to speak with/no access	60	4.0%
TOTAL	1521	
Response rate by area:		
Dinguiraye Gaoual Koubia Koundara Mali Tougue	318	89.3%
Labe Lelouma	159	62.9%
Siguiri Mandiana	247	98.0%
Dabola Kankan Kouroussa	438	97.5%
Dalaba Pita Mamou Faranah	359	89.4%
Children surveyed:	No. of children	
Aged 3-59 months at cycle 1 (eligible for 4 SMC treatments)	2447	
Aged 5-6 years at survey	486	
Aged 6-7 years at survey (more than 5 years of age at cycle 1)	465	
TOTAL (3 months to 7 years at survey)	3398	
Children surveyed, by area:	(eligible for 4 treatments)	
Dinguiraye Gaoual Koubia Koundara Mali Tougue	450	
Labe Lelouma	134	
Siguiri Mandiana	544	
Dabola Kankan Kouroussa	786	
Dalaba Pita Mamou Faranah	533	
Caregivers surveyed:	1497	
Slept in the household the night before, by age and gender:		
Age group	Female	Male
0-4yrs	1,259	1,238
5-9yrs	611	646
10-14yrs	193	195
15-19yrs	194	84
20-24yrs	271	34
25-29yrs	412	100
30-34yrs	325	173
35-39yrs	235	214
>=40yrs	225	619
Total	3,725	3,303

Timing of SMC cycles

SMC treatments provide a high degree of protection for 28 days, after this time protection decreases rapidly. SMC cycles should therefore take place at intervals of 28 days (the first day of the cycle starting 28 days after the first day of the previous cycle), to ensure children remain protected. Cycle 1 took place in July, cycle 2 in August, cycle 3 in September and cycle 4 in October (Figure 4, Table 5). The median interval between treatments, based on dates recorded on SMC cards, was 33 days between cycle 1 and cycle 2, and 32 days between cycle 2 and 3, and 32 days between cycles 3 and 4 (Table 6, Figure 5). These intervals should be reduced to 28 days. Cases will increase in the 5th week as protection wanes rapidly after 4 weeks.

Table 5: Planned timing of cycles:

1	2	3	4
3 Jul-7 Jul	5 Aug-9 Aug	5 Sep-9 Sep	1 Oct-5 Oct
	7 Aug-11 Aug	7 Sep-11 Sep	9 Oct-13 Oct
Dates from SMC cards:			
3 Jul-7 Jul	5 Aug-12 Aug	3 Sep-10 Sep	1 Oct-12 Oct

Table 6: Median interval between treatments (min-max), in days, determined from dates SMC record cards

	Days
Cycle 1 to cycle 2	33
Cycle 2 to cycle 3	32
Cycle 3 to cycle 4	32

Figure 4: Timing of cycles

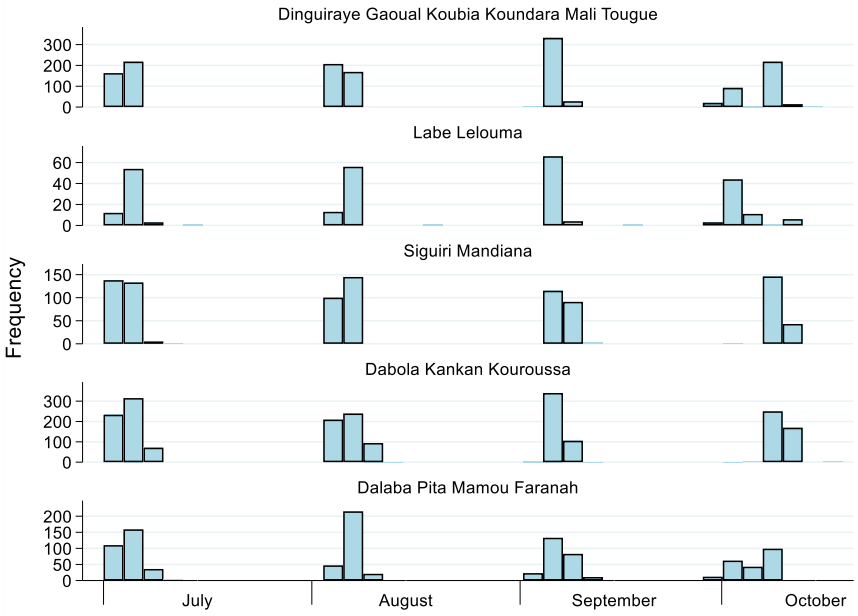
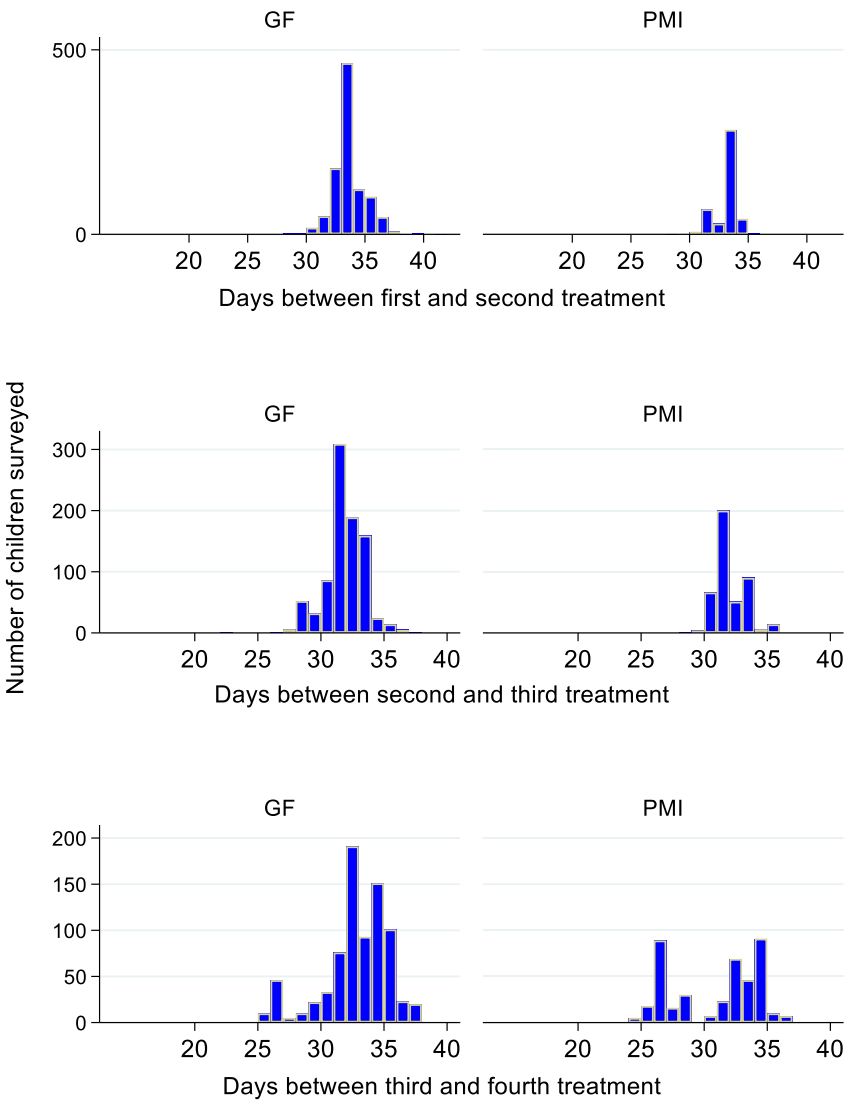


Figure 5: Interval between cycles



Retention of SMC cards

Of 2447 children eligible for 4 SMC treatments who were surveyed, 16.6% did not receive an SMC card, compared with 12% in 2019 and 9% in 2018. 83.4% received a card (88% in 2019, 91% in 2018). Of those who received a card, 71.5% retained the card (76% in 2019, 69% in 2018). A total of 59.6% had a card available for inspection in the survey.

Agreement between caregiver recall, the SMC card, and registers

To assess the reliability of SMC status determined during the survey, the number of SMC treatments reported by the caregiver was compared with the number recorded on the SMC card (for those children who had a card for inspection in the survey), and, for a subset of children, the number recorded in the SMC register. Caregivers were asked about the number of treatments, before looking at the SMC card or register. Out of the 2447 children in the survey who were eligible for four treatments, a total of 1503 children had a card for inspection in the survey (Table 7). In all clusters but 1, an attempt was made to find entries in the SMC register for all children in the survey. This was possible for 438/944 (46%) children without a card. The survey estimate, based on caregiver recall, of the percentage of children who received SMC at least once, among those who did not have a card available for inspection at the survey, was 42%. Therefore the number found in registers is what we would have expected, bearing in mind that most children who did not receive SMC are not included in registers. Register entries were also found for some children who had an SMC card (885/1503, 59%) although this was not done for all children with a card.

Table 7: Number of eligible children whose SMC status was confirmed by card and from registers

	Card seen	No card	Total
Eligible for 4 treatments	1503	944	2447
Found in register	885	438	1323

The percentage agreement between caregiver's recall and SMC record card, with regard to the number of treatments, for the 1,503 children with a card, was 63% (compared with 83% in 2019). Of 251 children in Table 8 where the caregiver said the child had no SMC, for whom all but 2 had SMC marked on the card, 175 were found in the register, and of these 175, 169 had received SMC 4 times according to the register, 1 had SMC 3 times, 4 had SMC twice and one had SMC once.

Table 8: Agreement between recall and card, for children in the survey with an SMC card:

	Number of treatments on the SMC card					
	0	1	2	3	4	Total
Number of treatments according to caregiver						
0	2	26	18	14	191	251
1	0	36	2	0	1	39
2	0	24	32	6	13	75
3	0	34	34	87	21	176
4	2	58	66	46	790	962
Total	4	178	152	153	1,016	1,503

For those children who did not have an SMC record card, agreement between caregiver's recall and the register, in the 438/944 children who could be found in registers, was 53% (Table 9).

Table 9: Agreement between recall and register, for children without an SMC record card:

	Number of treatments in the SMC register					
	0	1	2	3	4	Total
Number of treatments according to caregiver						
0	0	1	1	9	129	140
1	1	3	0	1	5	10
2	0	1	11	5	6	23
3	0	0	0	20	28	48
4	0	1	7	10	199	217
Total	1	6	19	45	367	438

Children who did not receive SMC at all, will not be listed in registers (except those few who were seen by the CHW, entered in the register, but did not get SMC). Out of the 944 children who did not have a card, 438 were found in the register and 506 were not found in the register. Of the 506 who were not found, 74% (374/506) did not receive SMC according to the caregiver, compared to 32% (140/438) of those who were found in the register.

For those that had a card and were found in the register, agreement between the card and register was 66% (Table 10). Where there was disagreement, there tended to be more treatments in the register than on the card, suggesting that CHWs may not always record treatments on the card. There were few cases where treatments were recorded on the card but not in the register. However, the survey team did not attempt to find register entries for every child who had a card so these data may not be representative.

Table 10: Agreement between card and register:

	Number of treatments in the SMC register					
	0	1	2	3	4	Total
Number of treatments according to SMC card						
0	0	0	0	1	3	4
1	1	13	9	24	98	145
2	0	1	15	18	71	105
3	0	1	2	28	58	89
4	0	0	2	15	525	542
Total	1	15	28	86	755	885

The SMC card is a record and reminder for the caregiver, so it is important that it is completed. Caregivers may use the card to check if their child's treatments are complete, they could then seek treatment at the health centre if they missed the door-to-door campaign. Training of CHWs should emphasise the importance of recording treatments on the SMC card as well as in the register, and the need to remind caregivers to use and retain the card.

When caregivers reported more SMC treatments than were recorded on the SMC card, it is plausible that treatments were received but not recorded on the card by the community health worker, or that caregivers did not accurately recall the exact number of treatments. In the cases where the caregiver said the child had not received any SMC, but there were several SMC treatments recorded on the card, it is possible that the respondent was not the same person that cared for the child during the SMC campaigns, or that cards for different children had been swapped during SMC delivery. Overall however, there was a high level of agreement between recall and card, as has been observed in previous surveys.

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Awareness about the SMC campaign

Caregivers should be to be aware of the purpose of the SMC programme and need to know the day when SMC will be distributed in their area in order to ensure they are available on that day. The survey asked one caregiver in each household if the household was aware about SMC and, for the most recent cycle if they knew in advance the date the health workers would come. Overall, 93.6% of households were aware of the SMC campaign and 92.1% said they knew in advance the date of the campaign (Table 11).

Table 11: Public awareness about SMC: the percentage of households that were aware of the SMC programme, and the percentage that heard the last campaign date in advance.

Area	% households aware of SMC (95%CI)	% households who heard date of last cycle in advance (95%CI)
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	95.1% (91.2%,97.3%)	94.7% (89.6%,97.4%)
Labe, Lelouma	98.4% (92.7%,99.7%)	96.7% (92.3%,98.6%)
Siguiri, Mandiana	81.5% (68.6%,89.9%)	79.1% (64.1%,89.0%)
Dabola, Kankan, Kouroussa	98.9% (97.5%,99.6%)	98.4% (96.5%,99.3%)
Pita,Mamou,Dalaba,Faranah	93.2% (87.3%,96.5%)	90.9% (83.0%,95.3%)
Total	93.6% (90.6%,95.6%)	92.1% (88.5%,94.6%)

The most common sources of information about campaign dates were health workers, friends and neighbours, criers, the radio, and the mosque or church (Table 12, Figure 6). Radio messages reached about 45% of households.

Table 12: Public awareness about SMC: sources of information

	From a health worker	From friends/ neighbours	From public crier	From banners posters	On the radio	On TV	At the mosque/ church	Other
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	88.5%	37.4%	29.0%	0.0%	36.6%	1.2%	40.9%	1.4%
Labe, Lelouma	31.1%	64.7%	37.2%	5.2%	60.7%	8.1%	36.0%	0.0%
Siguiri, Mandiana	63.1%	59.2%	56.7%	0.0%	46.3%	2.7%	46.0%	3.3%
Dabola, Kankan, Kouroussa	80.1%	61.7%	60.0%	5.3%	21.3%	3.4%	50.6%	12.7%
Pita,Mamou,Dalaba,Faranah	39.9%	59.5%	41.3%	10.1%	66.7%	4.0%	50.7%	2.2%
Total	63.4%	56.0%	45.5%	4.7%	44.6%	3.5%	46.3%	4.7%

Figure 6: Sources of information about SMC campaigns

Characteristics of caregivers

The caregiver was usually the child's mother. 24% of caregivers looked after one child under the age of 5 years, 41% two children under 5, and 35% three or more children under 5. When asked how long they had been resident in the area, almost all (>99%) said they had lived there for at least 6 months. Only 39% of caregivers had had any formal education (Koranic or other) (Table 13).

Table 13: Characteristics of caregivers

Characteristic	Categories		%
Gender	Male		2.1%
	Female		97.9%
Relationship to child	Parent		95.5%
	Sister/Brother		0.1%
	Aunt/Uncle		0.5%
	Grandparent		3.8%
	Neighbour		0.1%
	Other		0.1%
Resident	<6months		1.0%
	6months+		99.0%
No. of children <5yrs in their care		0	0.1%
		1	24.2%
		2	41.0%
		3	22.8%
		4	8.6%
		5	2.2%
		6	0.7%
		7	0.4%
		8	0.0%
		9	0.1%
Any education	None		61.1%
	Any formal/Koranic education		38.9%
Years of education	None		60.7%
	1-5yrs		23.7%
	6-10yrs		12.2%
	11+yrs		3.4%
Marital status	Unmarried		0.8%
	Married		96.1%
	Widowed		2.6%
	Divorced		0.5%

Caregivers' knowledge about SMC

Caregivers were asked if they understood key aspects of SMC, they scored 66% overall on a 10-point questionnaire (Table 14, 15). Most caregivers (77%) knew that SMC is used to prevent malaria and most (76%) knew that there are 2 tablets to be taken on the first day and one on each of the next two days (85%). However there was a widespread view that SMC drugs could be used for treatment if there was someone unwell in the household (only 36% of caregivers gave the correct response, that SMC drugs should not be used in this way), and only 63% of caregivers appreciated the importance of completing the 3-day course of treatment (Table 16, 17).

Table 14: Caregivers' knowledge about SMC:

	Question	Correct response
1	For how many months should the child take SMC	4
2	SMC is given to prevent malaria	Yes
3	SMC can prevent other diseases	No
4	How many tablets should the child take on the first day?	2
5	How many tablets should the child take on the second day?	1
6	How many tablets should the child take on the third day?	1
7	The child should swallow all the medication	Yes
8	I can give the tablets to someone else who is unwell	No
9	The child should complete the 3-day course of treatment	Yes
10	I should take the child to the health centre if unwell after SMC	Yes
		Maximum score: 10

Table 15: Caregivers' knowledge scores on SMC and adherence to guidelines by CHW:

Area	Average caregiver knowledge score (out of 10) (95%CI)	Average CHW score for adherence to guidelines (out of 8) (95%CI)
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	7.6 (7.0,8.3)	7.4 (6.9,7.8)
Labe, Lelouma	5.6 (4.9,6.4)	6.2 (5.7,6.6)
Siguiri, Mandiana	6.1 (5.5,6.6)	5.7 (4.7,6.7)
Dabola, Kankan, Kouroussa	6.9 (6.6,7.3)	5.5 (4.9,6.2)
Pita,Mamou,Dalaba,Faranah	6.5 (5.9,7.1)	6.6 (6.3,7.0)
TOTAL	6.6 (6.3,6.9)	6.3 (6.0,6.6)

Table 16: Caregiver knowledge, % correct answers to each question

	% correct		
Question	2018	2019	2020
For how many months should the child take SMC (4)	59.9%	61.1%	49.7%
SMC is given to prevent malaria	82.0%	83.5%	77.3%
SMC can prevent other diseases (correct answer No)	68.9%	70.2%	67.1%
How many tablets should the child take on the first day? (2)	79.4%	80.9%	76.2%
How many tablets should the child take on the second day? (1)	82.8%	84.3%	84.5%
How many tablets should the child take on the third day? (1)	82.8%	84.3%	85.0%
The child should swallow all the medication (Yes)	67.7%	68.9%	69.0%
I can give the tablets to someone else who is unwell (No)	43.7%	44.4%	36.4%
The child should complete the 3-day course of treatment	60.9%	61.7%	63.3%
I should take the child to the health centre if unwell after SMC	62.3%	63.4%	54.8%

Table 17: Caregiver knowledge, % correct answers to each question, by area

Question	**Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue**	**Labe, Lelouma**	**Siguiri, Mandiana**	**Dabola, Kankan, Kouroussa**	**Pita, Mamou, Dalaba, Faranah**
For how many months should the child take SMC	52%	50%	21%	62%	53%
SMC is given to prevent malaria	83%	60%	74%	83%	80%
SMC can prevent other diseases	86%	44%	93%	67%	54%
How many tablets should the child take					
on the first day?	79%	60%	67%	93%	74%
on the second day?	86%	60%	91%	95%	84%
on the third day?	86%	60%	92%	96%	85%
The child should swallow all the medication	82%	60%	58%	76%	65%
I can give the tablets to someone else who is unwell	58%	53%	21%	7%	43%
The child should complete the 3-day treatment	78%	58%	48%	64%	64%
I should take child to the health centre if unwell	74%	59%	42%	52%	49%

Community Health Worker adherence to SMC guidelines, as reported by caregivers

CHW's should check the child's age, and before administering the treatment should ask about illness and refer the child if they are unwell, and should check the child has not had severe side effects to SMC before. They are also trained to explain to the caregiver how to administer the amodiaquine tablets on the next two days, and to advise caregivers about potential side effects and to bring the child to a health worker if they are become unwell after SMC. Caregivers of children who had received SMC, reported that the CHW generally followed these guidelines correctly, but were less likely to check for previous side effects to SMC or other medicines (Table 18, 19).

Table 18: CHW adherence to guidelines

	Action	% of caregivers who reported that the CHW performed the action at the last visit:			
		2017	2018	2019	2020
1	Check the child's age	100.0%	80.1%	99.7%	98.0%
2	Explain how to administer tablets	99.6%	79.8%	99.6%	99.2%
3	Check for illness or fever	98.9%	79.6%	99.1%	91.9%
4	Explain the common side effects of SMC drugs	97.0%	75.7%	94.7%	74.6%
5	Advise to bring the child to the health centre if they are unwell	97.0%	77.5%	96.6%	76.0%
6	Ask if the child had taken other medicines in the last 4 weeks	95.8%	71.1%	89.2%	71.5%
7	Ask if the child had side effects to SMC before	92.9%	70.1%	88.1%	57.4%
8	Ask about allergies to medicines	91.7%	72.8%	90.9%	62.6%

Table 19: CHW adherence to guidelines, by area

Action	Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	Labe, Lelouma	Siguiri, Mandiana	Dabola, Kankan, Kouroussa	Pita, Mamou Dalaba, Faranah
Check the child's age	99.2%	100.0%	98.9%	95.6%	98.2%
Explain how to administer tablets	99.3%	100.0%	99.3%	99.1%	98.9%
Check for illness or fever	90.9%	100.0%	84.7%	90.5%	94.3%
Explain the common side effects of SMC drugs	90.8%	96.9%	54.5%	51.3%	86.5%
Advise to bring the child to the health centre if they are unwell	90.6%	76.2%	56.4%	62.2%	87.7%
Ask if the child had taken other medicines in the last 4 weeks	94.3%	41.0%	75.8%	66.0%	70.3%
Ask if the child had side effects to SMC before	84.5%	41.0%	50.3%	44.7%	60.0%
Ask about allergies to medicines	86.2%	60.2%	51.4%	45.5%	68.5%

SMC administration at the last cycle before the survey (cycle 4)

Caregiver's recall is likely to be most accurate about the last SMC treatment, so questions about administration of SMC drugs were asked specifically about SMC treatment at the fourth cycle.

In 99.5% of treated children, the first dose was directly observed (administered by the CHW (87.4%) or by the caregiver in the presence of the CHW (12.2%)), Table 20. A small number of children (0.2%) received the first dose from the caregiver later, not observed by the CHW. And for 0.3% of children, the caregiver received the blister pack but did not administer the first dose (Table 21).

Table 20: Percentage of SMC treatments directly observed (cycle 4)

Area	% of treatments with first dose directly observed (DoT)
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	100.0%
Labe, Lelouma	100.0%
Siguiri, Mandiana	99.7%
Dabola, Kankan, Kouroussa	99.1%
Pita,Mamou,Dalaba,Faranah	99.4%
TOTAL	99.5%

Table 21:Administration of the first daily dose of cycle 4

Administration of the first dose of Cycle 4	% of children
By the CHW	87.4%
By caregiver, observed by CHW	12.2%
By caregiver, unobserved	0.2%
By caregiver, but not done	0.3%

Adherence

Reported adherence to the unsupervised doses of amodiaquine was very high. Of eligible children treated at cycle 4, caregivers reported that 96.8% received all three daily doses. Caregivers were asked if the child swallowed all the medicine, spat out some medicine, or vomitted all the medicine. Most responded the child swallowed the medicine without vomitting. Of those who were treated, a total of 95.2% of children were reported to have received and swallowed the 3 daily doses without vomitting. The most common reasons for not receiving SMC at cycle 4 were that the child or caregiver was away (Table 22, 23).

Table 22: Reasons for missed treatments

Reason	%
Child was away at the time	54.2%
Child was living away from home	14.4%
Caregiver not available	11.9%
Other	6.0%
Child was unwell	4.4%
Family refused: state reason	3.9%
Not eligible	1.7%
The health worker did not visit the household	1.6%
Too young	1.2%
Child has history of allergies to drugs	0.4%
Side effects	0.2%
Child died	0.2%
Number of responses:	536

Table 23: Reason not received at most recent cycle, by zone:

	Dinguiraye Gaoual Koubia Koundara Mali Tougue	Labe Lelouma	Siguiri Mandiana	Dabola Kankan Kouroussa	Dalaba Pita Mamou Faranah
Child was away at the time	55.6%	25.5%	82.7%	37.9%	31.0%
Child was living away from home	4.9%	34.8%	2.1%	11.2%	30.3%
Caregiver not available	8.9%	13.9%	0.3%	28.7%	19.9%
Child was unwell	11.4%	17.6%	1.9%	4.7%	3.1%
Other	10.0%		8.0%	3.7%	3.5%
Family refused		1.8%	1.7%		9.2%
Not eligible	2.6%		2.3%	4.3%	
Too young	5.4%		0.4%	2.8%	
The health worker did not visit the household				5.5%	3.0%
Child has history of allergies to drugs		6.5%		1.4%	
Child died	1.3%				
Side effects			0.5%		
Number of responses:	80	17	180	83	176

Total number of SMC treatments received by each child

Children aged 3 to 59 months at the time of cycle 1 are eligible to receive SMC four times, and should receive all of these treatments to maximise their protection. The mean number of treatments per child was 3.1. Overall, 78.2% of children received SMC at cycle 1, 79.9% at cycle 2, 77.4% at cycle 3 and 77.2% at cycle 4 (Table 24, 25), and 70.8% received four treatments (Table 27). Overall, 17.6% of children did not receive any SMC treatments. SMC was equitable in terms of wealth ranking and gender (Tables 29, 30).

SMC coverage in each year since 2015 is compared in Table 26.

Table 24: SMC coverage among children eligible for four treatments, by area (with 95%CI)

Area	Mean treatments per child	Mean coverage	Cycle 1	Cycle 2	Cycle 3	Cycle 4
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	3.3	81.9%	82.4%	83.0%	82.6%	79.8%
Labe, Lelouma	3.6	89.0%	87.3%	90.4%	89.1%	89.3%
Siguiri, Mandiana	2.2	54.8%	55.2%	55.6%	53.1%	55.5%
Dabola, Kankan, Kouroussa	3.6	90.0%	88.4%	91.3%	89.3%	90.9%
Pita,Mamou,Dalaba,Faranah	3.2	80.4%	81.7%	83.5%	79.3%	76.9%
TOTAL	3.1	78.2%	78.2%	79.9%	77.4%	77.2%

Table 25: Coverage in each cycle, by prefecture

Prefecture	No. children surveyed	C1	C2	C3	C4
Dinguiraye	181	71.9%	72.9%	72.4%	72.4%
Gaoual	87	88.7%	87.1%	86.8%	86.8%
Koubia	14	85.7%	92.9%	92.9%	50.0%
Koundara	44	88.6%	88.6%	88.6%	88.6%
Mali	81	93.7%	94.8%	94.8%	94.8%
Tougue	43	86.0%	86.0%	83.8%	72.5%
Labe	104	87.4%	90.5%	88.5%	88.9%
Lelouma	30	87.0%	90.2%	90.2%	90.2%
Siguiri	345	46.4%	46.4%	46.9%	46.9%
Mandiana	199	79.6%	81.4%	70.4%	79.8%
Dabola	88	81.2%	83.0%	80.1%	81.0%
Kankan	426	96.3%	96.5%	95.9%	95.0%
Kouroussa	272	73.9%	83.0%	78.4%	85.6%
Mamou	93	83.6%	77.4%	66.7%	56.1%
Pita	95	73.9%	77.9%	68.8%	66.9%
Dalaba	46	98.2%	98.2%	98.2%	98.2%
Faranah	299	80.2%	83.7%	81.3%	80.1%

Table 26: Comparison of coverage 2015-2020: mean number of treatments per child in each year

Prefecture	2015	2016	2017	2018	2019	2020
Dinguiraye	3.25	3.65	3.99	3.82	3.29	2.90
Gaoual	2.46	3.29	3.10	3.31	2.63	3.49
Koubia	3.26	3.52	3.54	3.36	3.00	3.21
Koundara	3.16	2.75	2.49	3.41	2.42	3.54
Labé			3.04	3.33	2.92	3.55
Lelouma			3.83	3.25	3.03	3.58
Mali	3.20	3.40	2.97	3.80	2.92	3.78
Mandiana		3.46	3.49	3.85	3.37	3.11
Siguiri		3.48	2.12	1.43	1.78	1.87
Tougé	3.50	3.89	3.79	3.58	3.02	3.28
Dabola				3.30	3.85	3.25
Kouroussa				3.67	3.49	3.21
Kankan				3.29	3.20	3.84
Pita						2.88
Mamou						2.84
Dalaba						3.93
Faranah						3.25
TOTAL	3.15	3.46	2.93	2.90	2.90	3.13

Table 27: Number of SMC treatments: percentage of children who received SMC 0,1,2,3,or 4 times

Number of SMC:	Dinguiraye Gaoual Koubia Koundara Mali Tougue	Labe Lelouma	Siguiri Mandiana	Dabola Kankan Kouroussa	Dalaba Pita Mamou Faranah	TOTAL
0	15.5%	9.4%	42.2%	5.1%	13.2%	17.6%
1	0.7%	0.0%	0.4%	0.9%	2.7%	1.2%
2	2.1%	0.9%	2.9%	3.4%	4.2%	3.1%
3	4.0%	4.4%	4.9%	10.2%	9.5%	7.4%
4	77.7%	85.3%	49.6%	80.4%	70.4%	70.8%
At least 1	84.5%	90.6%	57.8%	94.9%	86.8%	82.4%

SMC coverage in Siguiri: The prefecture with the lowest coverage is Siguiri. Out of 11 survey clusters in Siguiri, three were three where none of the children surveyed had received SMC: Balato, Fatoya, Franwalia Centre. In four villages, Kignekourou, Kouremale, Nanen Traore, and Talabe, less than 50% of children received SMC in each cycle.

Figure 7: SMC coverage in 2020, by zone. Coverage per cycle and the percentage of children who received four SMC treatments.

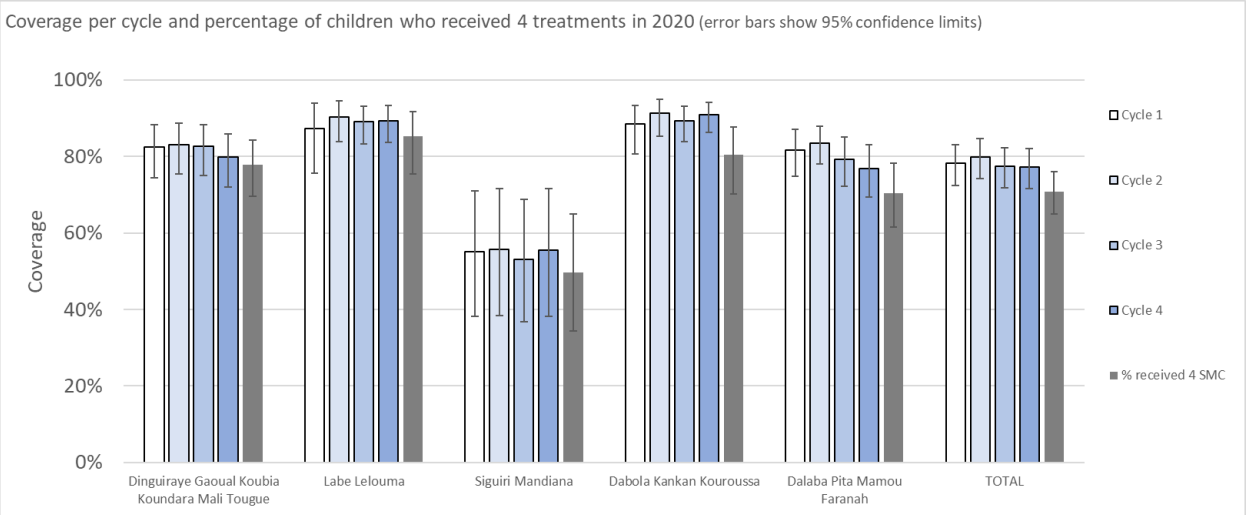
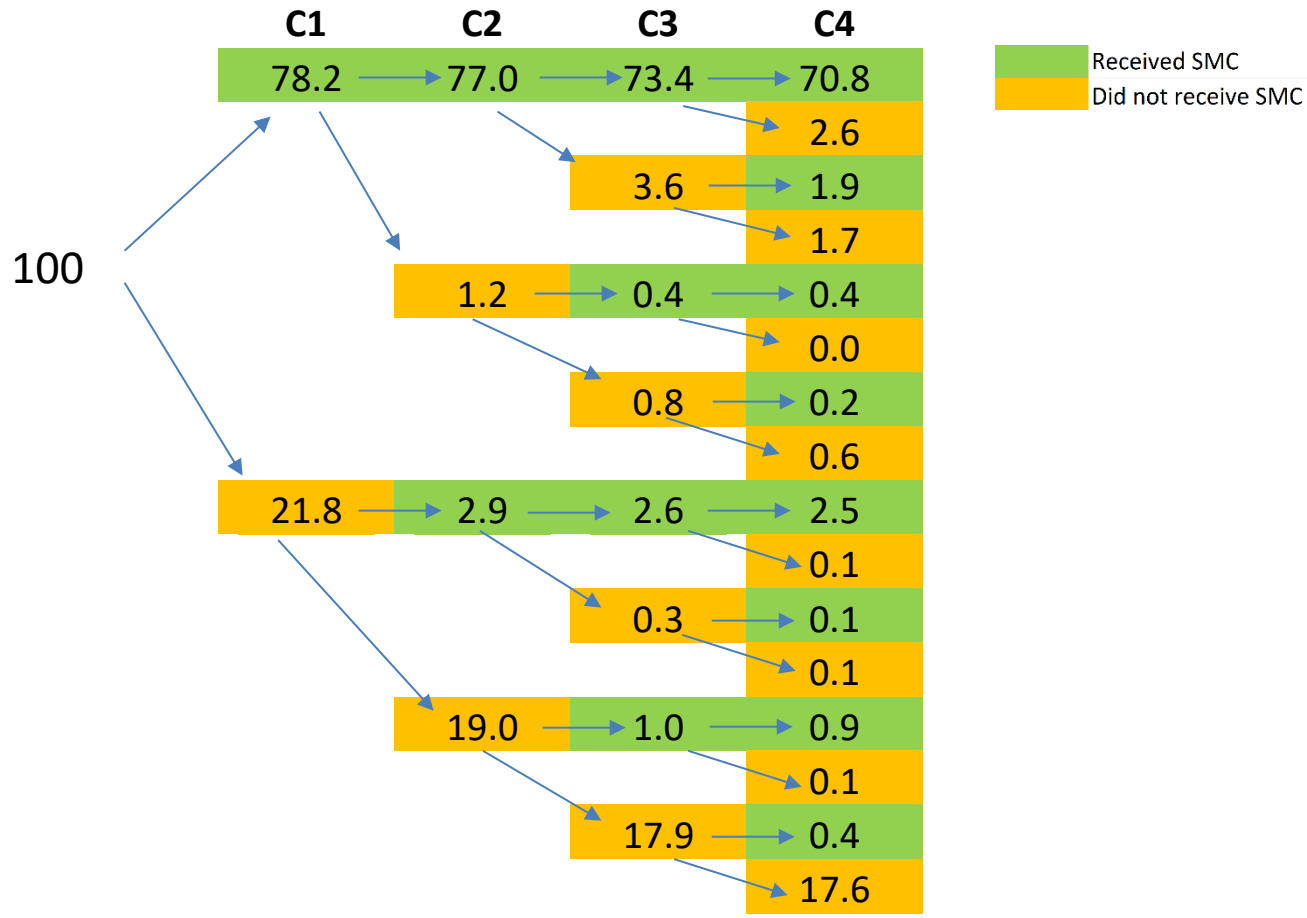


Table 28: Probability tree for receiving SMC in each month.

A total of 78.2% of eligible children received SMC in the first cycle, 77% received SMC at cycle 1 and cycle 2, 73.4% received SMC at cycles 1,2 and 3, and 70.8 received all four cycles. At cycle 1, 21.8% did not receive SMC and most of these (17.6%) were also missed at cycle 2, 3 and 4. Few children who were missed at cycle 1 received SMC in later cycles. To improve coverage it is important to maximise the number of children seen at cycle 1.



Equitability of SMC coverage

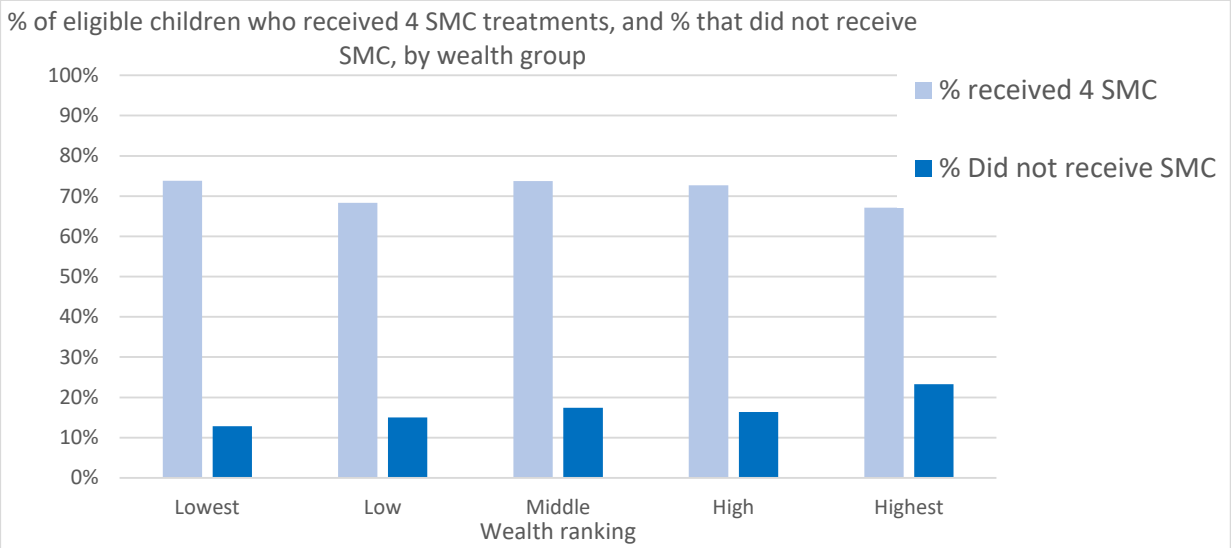
Table 29: SMC treatment by wealth ranking

SES	Mean number of SMC treatments (95%CI)	% that received four SMC treatments	% that received no SMC
Lowest	3.28	73.8%	12.8%
Low	3.15	68.3%	15.0%
Middle	3.19	73.7%	17.4%
High	3.19	72.7%	16.4%
Highest	2.92	67.1%	23.3%

Table 30: SMC treatment by gender

Gender	Mean number of SMC treatments	% that received four SMC treatments	% that received no SMC
Boys	3.1	90.8%	18.0%
Girls	3.1	70.8%	17.1%

Figure 8: The % of eligible children that received 4 treatments, and that did not receive SMC, by socio-economic status



Treatment of children above the age of 5

Children who are 5 years of age and above at the time of the first SMC cycle, should not receive SMC. The dose has been calculated according to age and if children above the age of 5 are given the blister pack intended for the 12-59-month group, they may be under-dosed, this can select for resistance as parasites are exposed to sub-therapeutic doses of SMC drugs. Children aged above 6 years at the time of the survey, should not have received SMC.

465 children 6years and above were surveyed. 6.3% received an SMC card. 5.2% received SMC at each cycle (Table 31)

Table 31: Treatment of children above the age limit for SMC (aged 6-7 years at the survey)

		Treated at cycle:					
Year	**Mean number of treatments**	**1**	**2**	**3**	**4**	**Given an SMC card**	**Number surveyed**
2017	1.68	42.8%	43.9%	43.5%	38.2%	53.8%	189
2018	0.63	16.3%	16.5%	15.3%	14.9%	17.5%	327
2019	0.32	10.9%	9.6%	10.2%	1.8%	13.9%	244
2020	0.21	5.2%	5.2%	5.2%	5.2%	6.3%	465

Bednet use by children and other household members

A total of 7,028 household members who slept in the household the night before the survey, were surveyed in 1,374 households. (Note that the survey was limited to households that had at least one child under 7 years of age and aged at least 3 months and so is not fully representative of the total population).

Bednet use in children under 5 yrs of age:

In the survey after the 2017 SMC campaign, 43% of children in the survey (children eligible to receive SMC) were reported to have slept under a bednet the night before the survey. In the 2018 survey, 30.2% of children slept under a net the night before the survey. In the 2019 survey, 86% (95%CI 79%,90%) of children slept under an LLIN the night before the survey. In the 2020 survey, 66% of children under 5 slept under an LLIN (Table 32).

Table 32: Percentage of children 3-59months who slept under a LLIN the night before the survey, in 2019 and 2020

Area	% slept under a LLIN last night (95%CI)	
	2019	2020
Dinguiraye, Gaoual, Koubia, Koundara, Mali, Tougue	87.1% (78.8%,92.4%)	76.6% (66.0%,84.7%)
Labe, Lelouma	92.3% (88.4%,95.0%)	87.5% (72.3%,94.9%)
Siguiri, Mandiana	75.9% (56.9%,88.3%)	38.7% (25.4%,54.0%)
Dabola, Kankan, Kouroussa	90.7% (86.4%,93.8%)	73.1% (66.6%,78.8%)
Pita,Mamou,Dalaba,Faranah	(not surveyed)	67.7% (59.5%,74.9%)
TOTAL	85.7% (79.2%,90.4%)	66.3% (60.1%,72.0%)

Children above the age of 5 were less likely to use an LLIN than children under 5 (Figure 9, Table 33). LLIN use is lowest at age 7yrs. This drop in LLIN use above the age of 5 was more marked in some areas than others (Figure 11). LLIN use was lower than in 2019, in all age groups and in all areas, the reduction was greatest in Siguiri and Mandiana (Figure 10). Most nets were less than 2 yrs old (Figure 12).

Figure 9: LLIN use by age group, wealth ranking, and geographical area

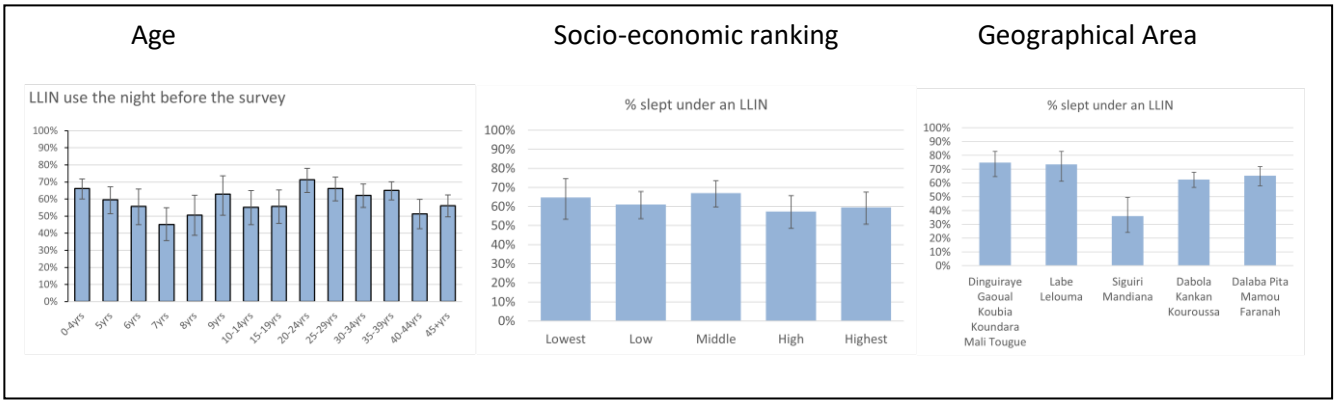


Figure 10: LLIN use by age group, wealth ranking, and geographical area: comparison with 2019

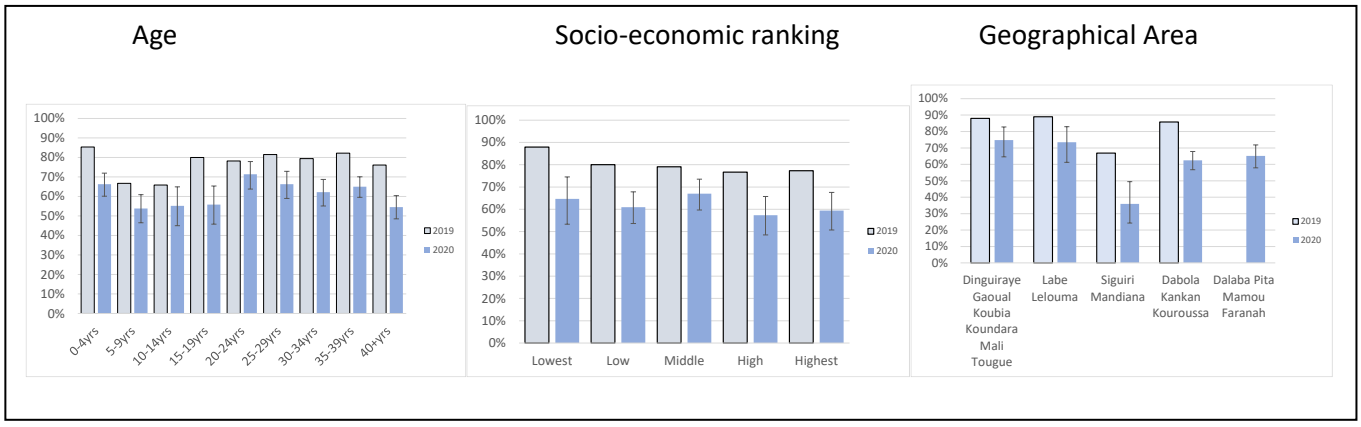


Figure 11: Comparison of LLIN use by age group by zone:

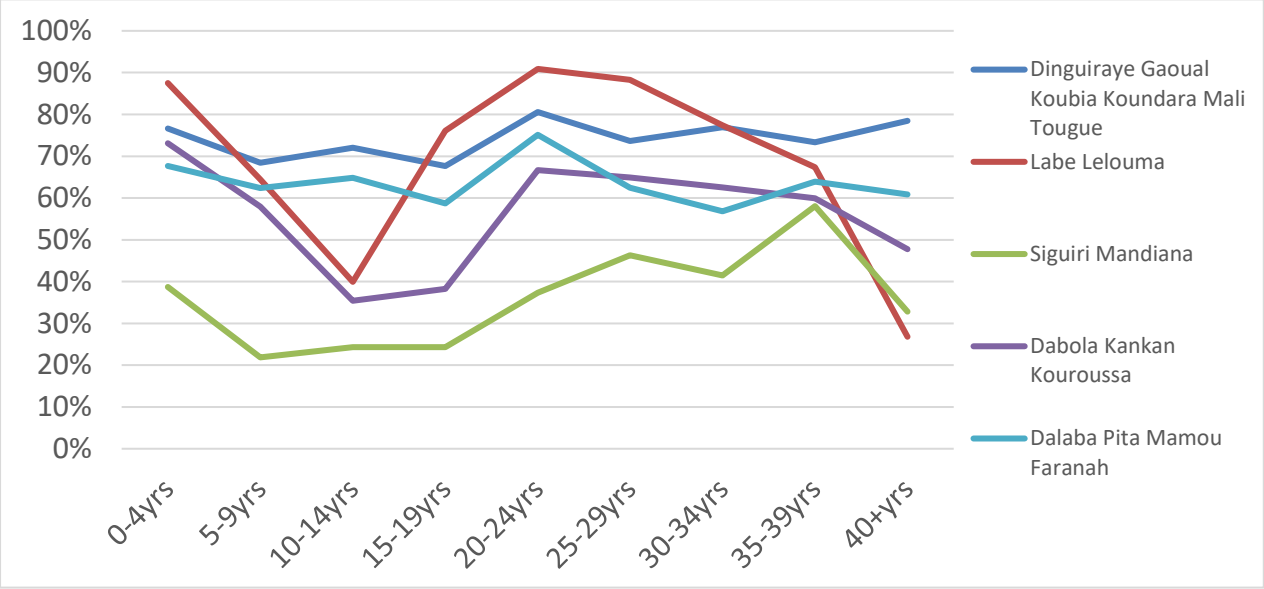


Figure 12: Age of bednets, by survey zone

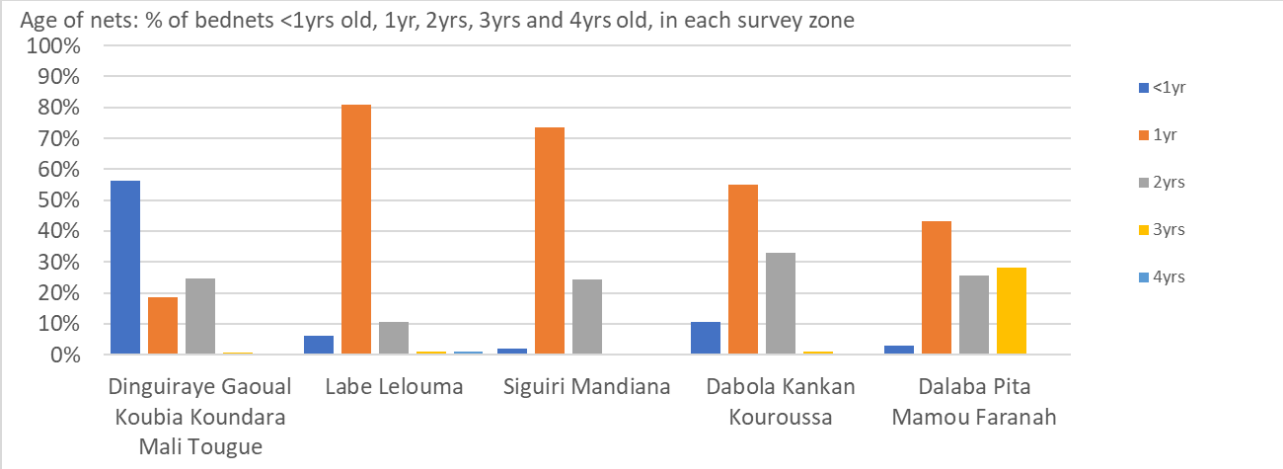


Table 33: LLIN use (% slept under a LLIN the night before the survey) by age

Age	LLIN use (95%CI)
0-4yrs	66.2% (60.0%,71.8%)
5yrs	59.6% (51.5%,67.3%)
6yrs	55.8% (45.1%,65.9%)
7yrs	45.1% (35.7%,54.9%)
8yrs	50.6% (38.8%,62.3%)
9yrs	62.8% (50.5%,73.7%)
10-14yrs	55.2% (45.0%,64.9%)
15-19yrs	55.8% (45.8%,65.4%)
20-24yrs	71.4% (63.8%,77.9%)
25-29yrs	66.3% (59.0%,72.9%)
30-34yrs	62.2% (55.1%,68.8%)
35-39yrs	65.0% (59.6%,70.1%)
40-44yrs	51.3% (42.7%,59.8%)
45+yrs	56.1% (49.6%,62.3%)

Of 1,377 households surveyed, 73.5% had at least one LLIN and 23.4% had one LLIN for every 2 persons. This compares with 89.8% had at least one LLIN and 36.8% had one LLIN for every 2 persons in the household, in 2019 (Table 34).

Table 34: Access to a bednet: % of households with at least one net, and % of households with at least one net for every two people who slept in the household the night before the survey

		% households (95% CI)
At least one net per household	2020	73.5% (68.4%,78.6%)
	2019	89.8% (84.7%,94.8%)
	2018	39.7% (29.8%,49.5%)
At least one net for every two persons	2020	23.4% (19.2%,27.5%)
	2019	36.8% (30.6%,42.9%)
	2018	13.1% (7.5%,18.7%)

Access to a LLIN, the percentage of the population who could sleep under a LLIN if there were two people per net, was 25.4% in 2018. This increased to 68.2% in 2019, and decreased 52.3% to the current survey (Table 35).

Table 35: Access to a LLIN. Percentage of the population who slept in the household the night before the survey, who could sleep under a net if two people slept under each net.

(values in the main part of the table are row percentages).

	No. of nets (LLIN) in the household										
	0	1	2	3	4	5	6	7	11		
Number who slept in the household the night before the survey										No. of HH	% who could sleep under a net if 2/net
1	66.9%	33.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	33.1%
2	6.1%	88.0%	2.5%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	30	93.9%
3	25.0%	59.5%	13.8%	1.3%	0.4%	0.0%	0.0%	0.0%	0.0%	210	55.2%
4	30.1%	34.3%	30.8%	3.0%	1.5%	0.3%	0.0%	0.0%	0.0%	365	52.7%
5	22.2%	22.9%	36.7%	16.3%	0.4%	0.0%	1.5%	0.0%	0.0%	320	56.7%
6	30.3%	16.7%	29.6%	16.3%	3.7%	3.4%	0.0%	0.0%	0.0%	195	48.7%
7	21.5%	12.5%	28.2%	27.6%	6.1%	3.3%	0.9%	0.0%	0.0%	119	53.6%
8+	31.4%	6.4%	15.0%	25.5%	9.2%	5.7%	4.6%	1.4%	0.9%	135	45.1%
Total	66.9%	33.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1377	52.3%

COVID-19

Caregivers were asked if they had experienced three or more of the following symptoms at the same time in the past 6 months: fever, cough, sore throat, shortness of breath, fatigue, aches and pains, headaches, runny nose, and if they had any of these symptoms now. A total of 0.3% said they had 3 or more of these symptoms now and 2.9% said they had 3 or more symptoms together at some time in the previous 6 months (Table 36).

A total of 7 people (0.6%, 95%CI 0.2%,1.6%) said they had been tested for COVID-19. A total of 4 people (0.2%, 95%CI 0.09%,0.6%) said they thought they had been in contact with someone who had tested positive.

Table 36: Percentage of caregivers reporting symptoms associated with COVID-19:

	Current symptoms % (95%CI)	Symptoms in the last 6 months % (95%CI)
Fever	27.1% (5.5%,70.5%)	63.0% (49.4%,74.8%)
Cough	84.9% (42.5%,97.7%)	32.8% (20.6%,47.7%)
Sore throat	0% (0%,0.3%)	1.6% (0.4%,6.5%)
Shortness of breath	15.9% (1.2%,74.1%)	2.8% (0.4%,16.3%)
Fatigue	22.8% (3.0%,73.7%)	48.1% (34.3%,62.1%)
Aches and pains	16.9% (1.5%,73.1%)	47.7% (34.9%,60.8%)
Headache	38.8% (7.9%,82.5%)	65.7% (51.6%,77.6%)
Runny nose	0% (0%,0.3%)	10.5% (5.2%,20.0%)
At least 3 symptoms at the same time	0.3% (0.1%,0.9%)	2.9% (1.7%, 4.8%)

Annex A: Sampling methods

The primary outcomes to be assessed in the survey were the percentage of eligible children who received SMC in each cycle and the percentage of children who received SMC four times. Children aged 5-7 years were included in the survey to determine the extent of SMC treatment above the age limit. It was also planned to ask about adherence to SMC doses, and reasons for missed treatments, and (for all household members) the use of long-lasting insecticide-treated bednets (LLINs).

The survey was designed to estimate SMC coverage with a precision of about +/-10% in each of four zones:

Zone 1: Dinguiraye, Gaoual, Koubia, Koundara, Labe, Lelouma, Mali, Tougue
Zone 2: Mandiana, Siguiri
Zone 3: Dabola, Kankan, Kouroussa
Zone 4: Pita, Mamou, Dalaba, Faranah

and with a precision of about +/-5% for the overall estimates across the whole SMC area.

Sample size calculation

The margin of error on the survey estimates of SMC coverage, depends on the level of coverage, the number of children surveyed, the number of clusters, and the design effect. Children within the same cluster tend to be similar in terms of the number of SMC treatments they received, the design effect measures the effect of this on the precision of survey estimates of coverage. For a given total sample size, one obtains better precision by having more clusters and fewer children per cluster, but logistic constraints limit the number of clusters, due to travel time and cost, and also because to ensure sampling is not biased, care is needed in each cluster to map where the dwellings are, divide the map into segments, and then to ensure all dwellings in the selected segment are visited.

If the coverage is 80%, the margin of error will be: +/- 1.96x√(Deff)x√[0.8x(1-0.8)/(bxC)] where C is the number of clusters, b the mean number of children surveyed in each cluster, and Deff is the design effect. The design effect is given by: Deff=1+(b-1)roh where roh is the rate of homogeneity. From last year's survey, the roh value for the percentage of children who received SMC per cycle was about 0.3. The average number of children per cluster was 28. The design effect 1+(28-1)x0.3=9.1. If we have 90 clusters, the margin of error on a coverage of 80% will be: 1.96x√[9.1x(0.8x(1-0.8)/(28x90)]=+/-4.7%. A smaller number of children per cluster, reduces the overall sample size but also reduces the design effect, so that a similar level of precision is possible using smaller segments. The average figure of 28 eligible children per cluster resulted from the segmentation which relies on using existing natural features (roads/paths and residential blocks) to demarcate segments. Smaller segments could be created but it is important to have clear segment boundaries to ensure objective selection of households. Within a zone with 24 clusters, the margin of error would be: 1.96x√[9.1)x(0.8x(1-0.8)/(28x24)]=+/-9.1%. Segments should ideally be chosen to include about 10-15 eligible children and as before should also include children age 5-7yrs to be able to determine the extent of treatment of older children. Clusters with 20 children aged 3 months to 7 years would include about 15 children 3-59 months and 5 children 5-7yrs. Thus the total sample size is between 90x20=1800, while clusters with 28 eligible children give a sample size of about 2800.

Survey methods

The survey was conducted in the prefectures of Gaoual, Koundara, Mali, Lelouma, Labe, Koubia, Tougué, Dinguiraye, Siguiri and Mandiana, Dabola, Kouroussa, Kankan, Pita, Mamou, Dalaba and Faranah, which

implemented SMC in 2020. A total of 90 settlements were surveyed in 2020, the same 66 settlements included in the 2019 survey plus an additional 24 settlements from Pita, Mamou, Dalaba and Faranah.

The segmentation process is described in previous reports. Every dwelling within the chosen segment was visited and every child who was aged at least 3 months at the last cycle and was less than 7 years at the time of the survey, who had stayed in the house the night before the survey, was included in the survey. The GPS location of each dwelling visited was automatically recorded by the tablet PC used to collect interview data. The number surveyed in each settlement therefore could vary but the average was expected to be about 20 if the population data were accurate. There were 17 settlements that were selected which were too large for segmentation to be practical, and there was no information available about sub-divisions of these segments that could be used to select a smaller area. For these settlements, the total area was estimated by taking GPS locations around the perimeter of the inhabited area. A single location was then chosen, by randomly generating an x and y coordinate within the settlement (this was done independently of the survey team and the location sent to them by email). Interviewers surveyed houses around this point, recording the GPS location of each dwelling, and continuing outwards, without missing any dwellings, until the required number of children (20) had been reached. In the final dwelling, all children eligible for the survey were included so the final sample size could exceed 20.

Table A1: List of clusters

Prefecture	Sousprefecture	Village	Cluster number	Household response rate	Sampling weight
Dabola	Banko	Dalado - Daffela	1	0.900	374
Dabola	Dabola-centre	Foundeng II - Foula	2	0.938	678
Dabola	Kindoye	Kindoye II - Fissanya	3	0.913	484
Dalaba	Kankalabe	Kankalabé Centre - Dinkoli Dow	4	0.500	1328
Dalaba	Mombeyah	Gali - Lila	5	0.714	969
Dinguiraye	Banora	Boubèrè - Boubèrè Centre	6	1.000	651
Dinguiraye	Diatifere	Mamoudouya I - Bandianya	7	1.000	608
Dinguiraye	Dinguiraye-centre	Tinkisso - Souloukoufalan	8	1.000	754
Dinguiraye	Selouma	Selouma Centre - Sakabari	9	1.000	695
Faranah	Banian	Banankoro - Banankoro Centre	10	1.000	2459
Faranah	Banian	Kouratou - Kouratou Centre	11	1.000	940
Faranah	Beindou	Niako - Niako Centre	12	0.846	1455
Faranah	Faranah-centre	Aviation - Secteur SEG	13	0.917	197
Faranah	Faranah-centre	Marché II - Gbeninkoro	14	1.000	2482
Faranah	Faranah-centre	Sirikoloni II - Secteur III	15	0.800	211
Faranah	Faranah-centre	Tonkolonko II - Secteur Quinsambou	16	1.000	815
Faranah	Heremakonon	Dantilia - Kalia	17	0.941	368
Faranah	Maréla	Boketo - Boketo Centre	18	0.929	96
Faranah	Maréla	Misside Bolia - Dounketo	19	1.000	2528
Faranah	Passayah	Soungbanya - Soungbanya Centre	20	0.917	618
Faranah	Tiro	Almamya - Seceur Mosquée	21	1.000	173
Faranah	sandeniah	Sandénia Mosquée - Secteur II	22	0.923	181
Gaoual	Foulamory	Tabadian - Nyor Nyor	23	0.944	716
Gaoual	Koumbia	Dara Bowé - Dara Bowé Centre	24	0.909	702
Gaoual	Malanta	Kounsi - Peguéty	25	1.000	523
Kankan	Balandougou	Koba - Koba Centre	26	1.000	632
Kankan	Bate-nafadji	Djelibakoro - Total	27	1.000	1146
Kankan	Boula	Kalafilila - Total	28	1.000	636
Kankan	Kankan-centre	Aviation - Total	29	1.000	839
Kankan	Kankan-centre	Briqueterie - Total	30	1.000	488
Kankan	Kankan-centre	Farako I - Total	31	1.000	574
Kankan	Kankan-centre	Hermakonon II - Total	32	1.000	435
Kankan	Kankan-centre	Madina - Secteur II	33	1.000	511
Kankan	Kankan-centre	Salamaninda - Secteur III	34	1.000	642
Kankan	Kankan-centre	Timbo - Secteur II	35	1.000	610
Kankan	Koumban	Koumban I - Koumban I Centre	36	1.000	621
Kankan	Missamana	Djimbala - Secteur III	37	1.000	624
Kankan	Moribayah	Moribaya Centre II - Moribaya II Centre	38	1.000	581
Kankan	Tinti-Oulen	Gbanankoura - Total	39	1.000	636
Kankan	Tokounou	Sansambaya - Sansambaya Centre	40	1.000	595
Koubia	Matakaou	Matakaou Centre - Dougouwoulen	41	0.632	918
Koundara	Guingan	Kifaya - Angona	42	0.929	799
Koundara	Sambailo	Sambailo Centre - Thiuopoutel	43	0.792	820
Kouroussa	Balato	Balato Centre - Fodedou	44	0.913	544

Kouroussa	Banfele	Nafadji - Total	45	0.947	201
Kouroussa	Cissela	Fadoussaba - Total	46	0.933	108
Kouroussa	Cissela	Sonokoro - Total	47	0.947	661
Kouroussa	Doura	Farakoba - Farakoba Centre	48	1.000	635
Kouroussa	Kiniero	Missamana - Total	49	1.000	615
Kouroussa	Kouroussa centre	Doula - Kignedouba	50	0.941	635
Kouroussa	Kouroussa centre	Wassabada - Secteur II (Raiko)	51	1.000	160
Labe	Garambe	Garambé Centre - Bassanya II	52	0.696	865
Labe	Labé centre	Daka II - Secteur II	53	0.731	234
Labe	Labé centre	Madina - Dianyabhè Mosquée	54	0.686	926
Labe	Noussy	Kassangui - Dow Kougue	55	0.750	5379
Labe	Tountouroun	Tounny - Gadha Thiolliwel	56	0.600	618
Lelouma	Lafou	Bombi Bourou - Yalaya	57	0.480	1306
Lelouma	Sagale	Bamikountou - Gnekori	58	0.524	1450
Mali	Donghol Sigon	Dougaya - Dioma Roundé	59	1.000	625
Mali	Fougou	Kansaghel - Laami	60	0.800	667
Mali	Madina Wora	Pellissaré - Donghol Doubhi	61	0.727	678
Mali	Salambande	Koya - Koya Centre	62	0.800	580
Mali	Yembereng	Sinthiourou - Diaguitarè	63	0.900	635
Mamou	Gongoret	Kourou - Hollandé Fougoun	64	1.000	681
Mamou	Mamou centre	Loppé Ecole - Secteur III	65	1.000	717
Mamou	Oure Kaba	Banikoto - Banirè Dionson	66	1.000	677
Mamou	Saramoussaya	Nienouya - Diaberekouré	67	1.000	722
Mandiana	Balandougouba	Sidikila II - Sidikila II Centre	68	0.913	704
Mandiana	Dialakoro	Samory Touré - Samory TOURE	69	0.900	699
Mandiana	Kinieran	Mbalia - Mbalia Centre	70	0.960	64
Mandiana	Koundian	Koundian I - Namafouada	71	1.000	493
Mandiana	Morodou	Samakofara - Samakofara Centre	72	1.000	592
Pita	Bantignel	Bamtighel - Tokossèrè - Golea	73	0.733	963
Pita	Ley-Miro	Fetowol - Loïgou Hakkoundè	74	0.692	710
Pita	Pita centre	Guémé I - Ndantari I	75	1.000	748
Pita	Sintaly	Lalya Mawndé - NDantary Toumanya	76	1.000	717
Pita	Timbi-Touny	Péllel Bantan - Péllel Bantan Centre	77	0.917	799
Siguiri	Doko	Kouremalé - Kouremalé Centre	78	1.000	1882
Siguiri	Franwalia	Franwalia Centre - Franwalia Centre	79	1.000	1756
Siguiri	Kintinian	Balato III - Balato Centre III	80	1.000	1566
Siguiri	Kintinian	Fatoya - Fatoya Centre	81	1.000	1355
Siguiri	Malea	Maléah Centre - Maléah Centre	82	1.000	633
Siguiri	Niagassola	Kignekourou - Faraboloni	83	1.000	592
Siguiri	Norassoba	NanenTraoré - Nanen Traoré Centre	84	1.000	674
Siguiri	Siguiri-centre	Dankakoura - Dankakoura Centre	85	1.000	633
Siguiri	Siguiri-centre	Saourou - Saourou Centre	86	1.000	746
Siguiri	Siguiri-centre	Sougoula - Sougoula Centre	87	1.000	574
Siguiri	Siguirini	Talabé - Talabé Centre	88	1.000	598
Tougue	Konah	Bourouwal - Kounsen	89	0.938	589
Tougue	Tougue centre	Tougué I - Dioloki	90	0.692	654

Annex B: Administrative data

A total of 4.4 million treatments were administered in 2020 (4,355,326 treatments of which 626,433 (14.4%) to infants and 3,728,893 (85.6%) to children), over four cycles. The number treated increased slightly in each successive cycle. The mean number treated per cycle was 1,088,832 (101% of target), and the number that received 4 cycles was 956,559 (89% of the target population). (These administrative estimates compare with survey estimates, detailed in the results section of this report, which are that a total of 82.4% of eligible children were reached (received SMC at least once), and 70.8% of eligible children received 4 cycles.)

Proportion of infants: The average percentage of infants treated over the 4 cycles, ranged from 10.4% (Dabola) to 19.5% (Mali).

Referral: The proportion of infants and children seen during SMC visits who were unwell and were referred for treatment, differed significantly between cycles and between prefectures. In cycle 1, an average of 5.8 per 1000 infants were referred (ranging from 1.1/1000, in Gaoual, to 15.0/1000, in Mamou), and an average of 3.3 per 1000 children were referred (ranging from 0.7/1000, in Labe, to 7.5/1000, in Mamou). In cycle 4, the average proportion referred was 1.3/1000 in infants and 0.5/1000 in children.

Exclusion for other reasons than illness: The proportion of infants excluded in the first cycle for reasons other than illness, was 24.6/1000, ranging from 0/1000 in Siguiri to 90/1000 in Labe, and the proportion of children excluded was 13.3/1000, ranging from 3.8/1000 (Tougue) to 31.7/1000 (Pita). Exclusions fell to 7.9/1000 in infants and 3.6/1000 in children in cycle 4.

Refusals: In cycle 1, there were 3276 refusals, most of these (2499, 76%) were in Siguiri. The overall refusal rate in cycle 1 was 3 per 1000, but 15/1000 in Siguiri. The refusal rate was low in the subsequent cycles (overall, 3.1/1000 in cycle 1, 0.26/1000 in cycle 2, 0.17/1000 in cycle 3 and 0.11/1000 in cycle 4).

Vomitting: The proportion of infants and children who vomitted the first dose (and were given a replacement dose) in the first cycle, differed significantly by prefecture. Overall, 13/1000 infants were given a replacement dose in the first cycle, ranging from 3.8/1000 (Kankan) to 25.9/1000 (Mali), and 4.7/1000 children (ranging from 1.7/1000 (Kankan) to 9.0/1000 (Faranah)). The proportion who vomitted decreased in successive cycles, in cycle 4 in total 6.9/1000 infants and 1.8/1000 children vomited and were given a replacement dose.

Table B1: Number of treatments administered in 2020*

		Number of children treated				Number treated as % of target population				
Prefecture	Target	C1	C2	C3	C4	C1	C2	C3	C4	% received 4 cycles
Dinguiraye	46996	44332	46633	48064	46620	94.3%	99.2%	102.3%	99.2%	92.7%
Gaoual	46300	44667	45634	46174	46650	96.5%	98.6%	99.7%	100.8%	93.1%
Koubia	23860	19751	22021	22865	23007	82.8%	92.3%	95.8%	96.4%	75.7%
Koundara	31122	30178	31739	32101	31959	97.0%	102.0%	103.1%	102.7%	88.3%
Mali	73099	71422	72315	72600	72678	97.7%	98.9%	99.3%	99.4%	88.8%
Tougue	30708	30174	30409	30261	30363	98.3%	99.0%	98.5%	98.9%	91.8%
Labe	75995	67906	74262	75031	75832	89.4%	97.7%	98.7%	99.8%	85.9%
Lelouma	44907	43048	43819	44723	44510	95.9%	97.6%	99.6%	99.1%	92.1%
Siguiri	162041	156520	165769	172682	173627	96.6%	102.3%	106.6%	107.2%	90.5%
Mandiana	80344	85723	90324	93094	92081	106.7%	112.4%	115.9%	114.6%	101.5%
Dabola	43319	41729	43186	44701	44888	96.3%	99.7%	103.2%	103.6%	90.1%
Kankan	112777	109863	114554	115090	115489	97.4%	101.6%	102.1%	102.4%	92.2%
Kouroussa	64191	58267	65781	65990	66078	90.8%	102.5%	102.8%	102.9%	81.0%
Pita	66613	61816	67755	68150	68640	92.8%	101.7%	102.3%	103.0%	86.9%
Dalaba	31951	29929	32894	33527	33035	93.7%	103.0%	104.9%	103.4%	89.9%
Mamou	76244	65368	78722	81536	82421	85.7%	103.2%	106.9%	108.1%	80.9%
Faranah	66998	57554	70762	73420	72613	85.9%	105.6%	109.6%	108.4%	79.4%
Total	1077467	1018247	1096579	1120009	1120491	94.5%	101.8%	103.9%	104.0%	88.8%

*includes a total of 18,091 treatments to non-residents

Figure B1: Number of SMC treatments and proportion of infants, in 2020

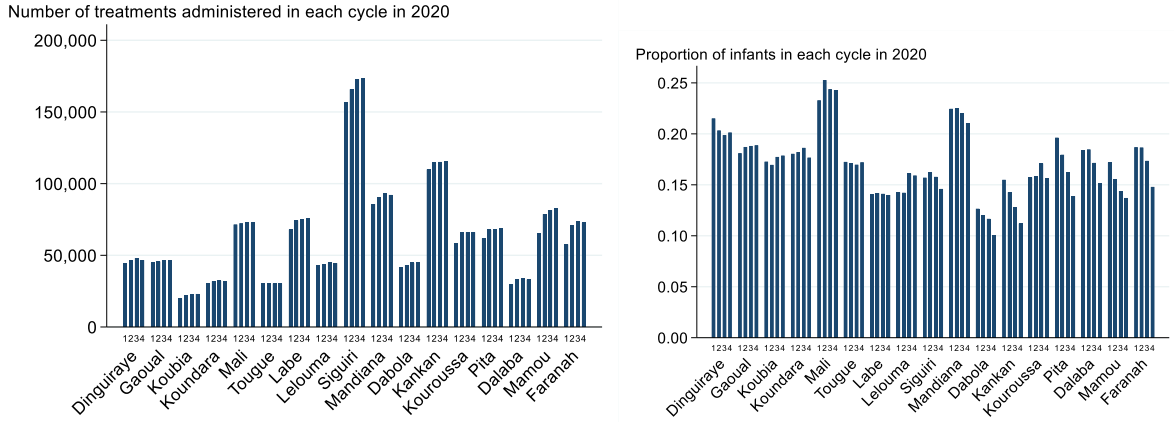


Figure B2: Refusals, referrals and exclusions in cycle 1, by prefecture and age group

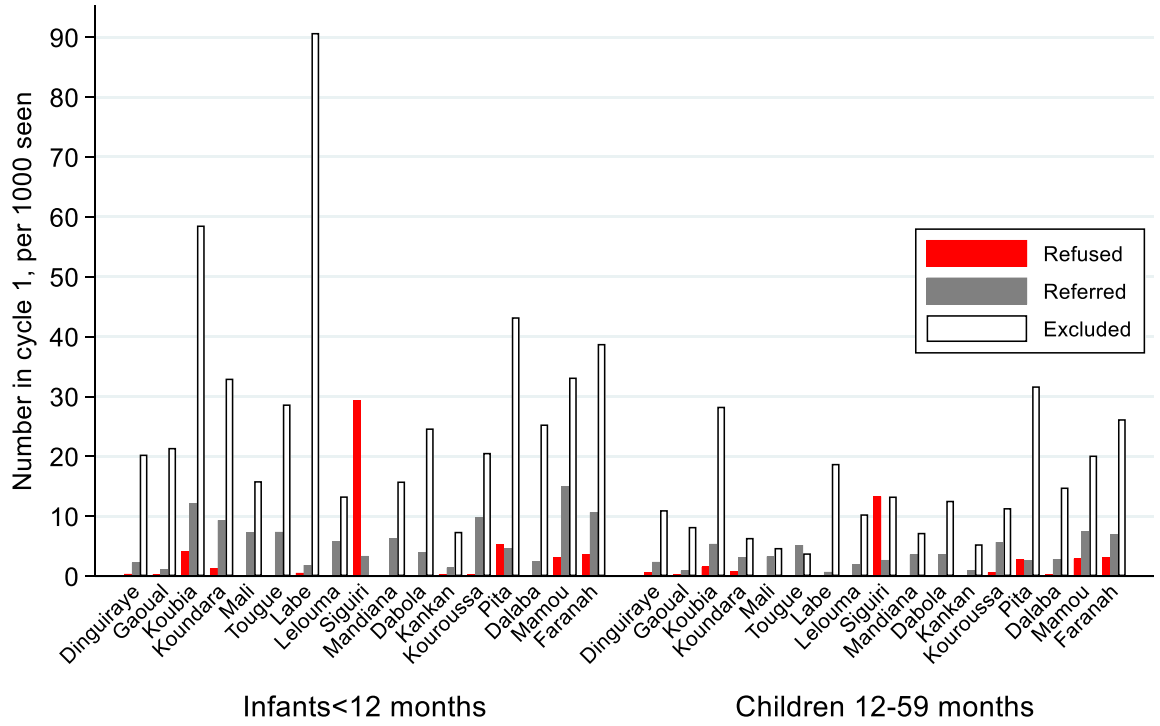
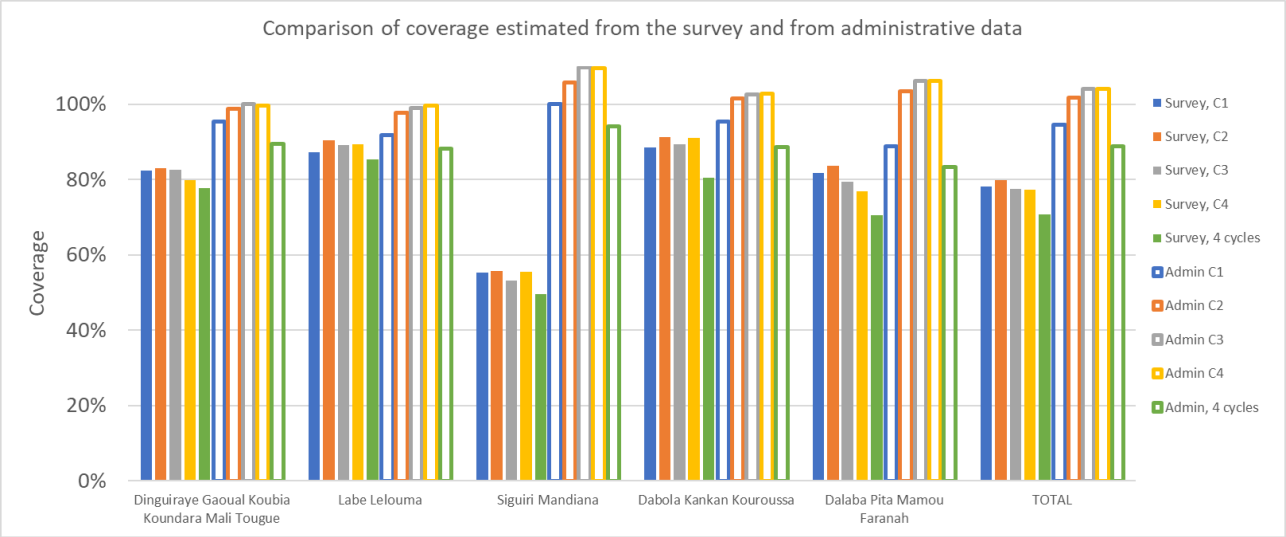


Figure B3: Comparison of survey and administrative estimates of coverage



Annex C: Seasonality of rainfall and malaria incidence

Fig C1: Monthly rainfall patterns

(data from https://en.climate-data.org/)

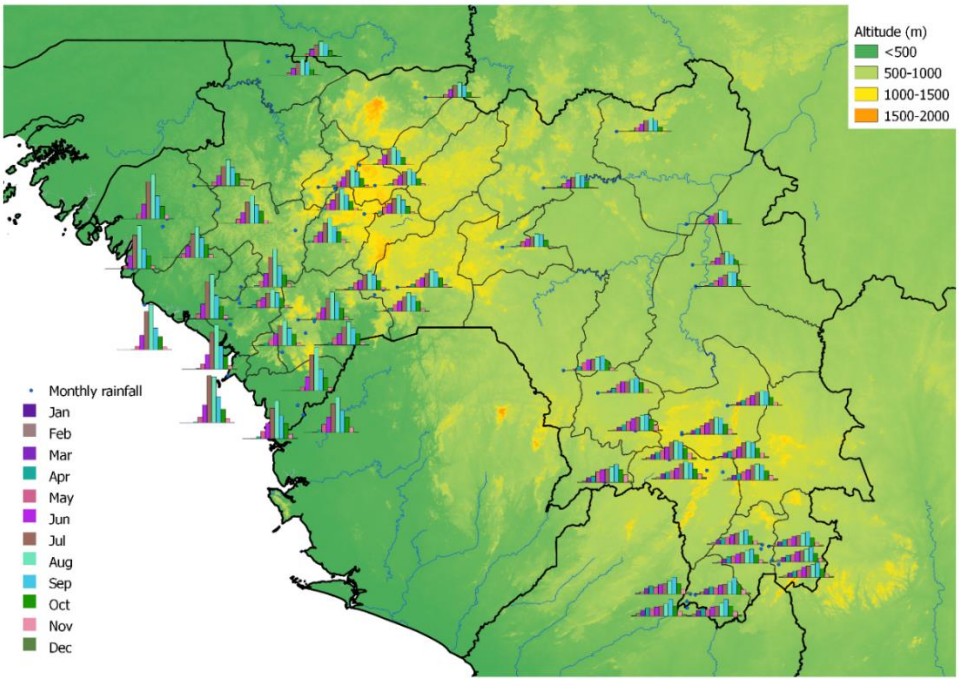
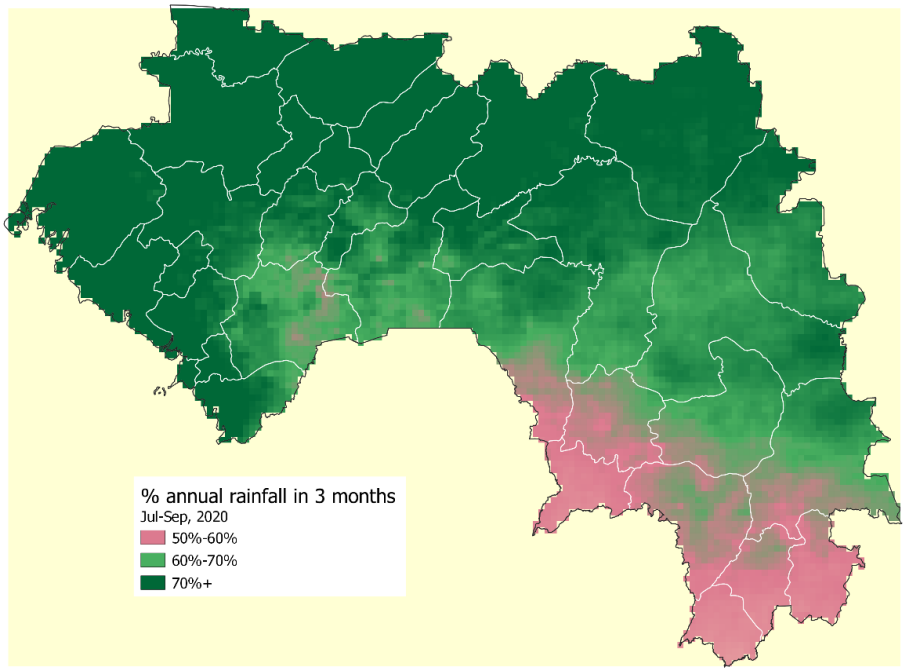


Fig C2: Percentage of annual rainfall that fell in 3 months Jul-Sep in 2020



(data from CHIRPS [18]).

Figure C3: Monthly rainfall (mm) in 2020, data from CHIRPS [18]

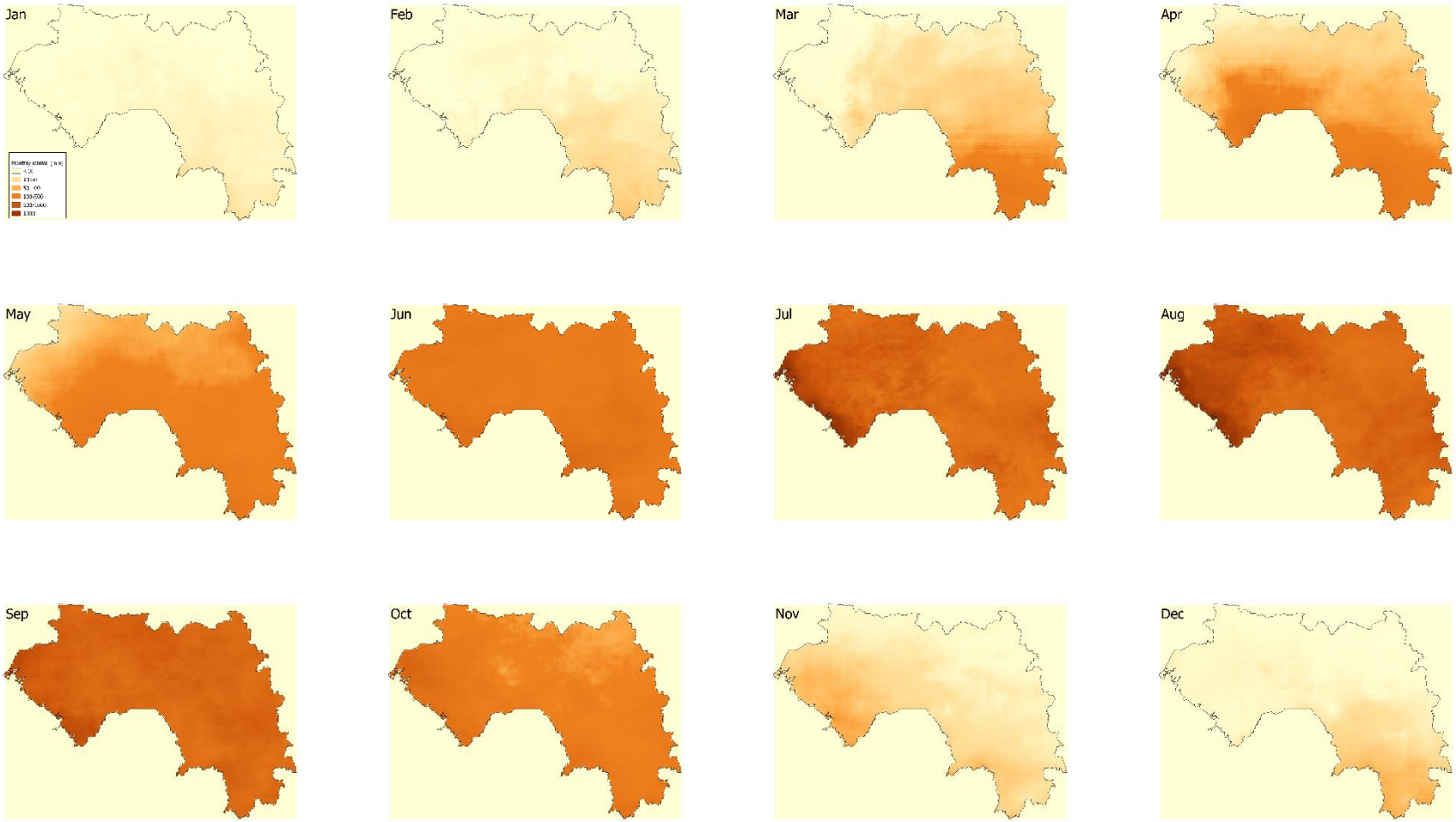


Figure C4: Seasonal pattern in confirmed malaria cases, PNLP data 2015-2018. A: Age group 5 years and above. B: Age group under 5 years.


No. confirmed cases, under 5 years
KOUNDARA
KOUBIA
LABE
MALI
TOUGUE
LELOUMA
GAOUAL
PITA
DABOLA
DALABA
CONAKRY/MATAM
MAMOU
BOKE
DINGUIRAYE
FRIA
CONAKRY/MATOTO
KOUROUSSA
CONAKRY/RATOMA
BOFFA
CONAKRY/KALOUM
KEROUANE
CONAKRY/DIXINN
DUBREKA
TELIMELE
KINDIA
FORECARIAH
LOLA
COYAH
MANDIANA
MACENTA
BEYLA
FARANAH
KANKAN
YOMOU
SIGUIRI
KISSIDOUGOU
NZEREKORE
GUECKEDOU
J F M A M J J A S O N D
2016
2017
2018

Table C1: The percentage of annual cases that occurred in 4 consecutive months, 5 months, and 6 months, in the age group of 5 years and above, 2015-2018.

	% annual cases in 4months				% annual cases in 5months				% annual cases in 6months			
Age group 5+yrs	2015	2016	2017	2018	2015	2016	2017	2018	2015	2016	2017	2018
MALI	55	50	62	75	61	61	71	84	71	68	78	87
KOUNDARA	45	66	71	74	56	74	81	85	65	77	83	86
KOUBIA	66	59	70	74	78	69	78	83	83	77	85	86
LABE	53	60	70	72	69	74	80	84	83	82	88	88
LELOUMA	55	64	64	69	71	75	74	81	81	80	83	86
TOUGUE	58	61	68	68	67	71	79	83	75	81	86	88
GAOUAL	42	52	61	66	55	62	73	78	71	67	76	81
PITA	52	52	57	63	59	62	67	75	67	70	78	80
DALABA	48	56	53	56	61	65	64	67	65	74	75	75
MAMOU	41	57	53	56	45	68	64	66	57	77	73	73
DINGUIRAYE	53	51	52	55	62	63	63	66	69	70	72	74
BOKE	39	53	53	55	44	60	61	66	52	63	66	72
FRIA	50	52	50	54	57	59	59	64	67	67	68	70
DABOLA	53	56	59	53	62	67	71	64	70	77	80	73
KEROUANE	44	37	42	50	48	46	52	59	63	53	60	68
CONAKRY	59	51	49	50	66	58	59	59	74	64	65	65
KOUROUSSA	54	47	49	49	63	56	59	57	69	65	70	64
BOFFA	45	46	47	48	55	53	57	58	60	59	63	63
LOLA	60	41	40	48	65	50	50	54	67	59	59	63
KINDIA	58	45	43	46	67	54	52	55	73	61	60	63
DUBREKA	45	42	44	46	55	51	54	57	64	57	61	63
MACENTA	47	40	40	44	49	49	48	53	64	57	56	60
COYAH	53	43	43	44	59	52	53	55	65	59	60	60
FORECARIAH	52	47	45	43	60	57	56	55	71	64	64	61
TELIMELE	68	40	47	42	75	48	58	50	82	56	67	58
YOMOU		36	40	42		44	48	52		55	56	61
FARANAH	45	47	42	40	58	58	53	50	67	66	64	58
BEYLA	38	44	44	40	46	54	53	49	54	62	62	58
SIGUIRI	45	44	40	39	50	53	48	47	52	60	56	54
MANDIANA			46	39			55	48			63	56
NZEREKORE	53	45	40	38	64	55	49	47	71	63	58	56
GUECKEDOU	41	35	36	37	45	42	45	47	47	51	53	55
KISSIDOUGOU	49	39	42	36	58	48	53	45	64	57	63	54
KANKAN	40	42	46	36	48	52	56	44	54	60	64	53
CONAKRY/DIXINN	59	57	49	42	68	62	59	48	78	67	65	58
CONAKRY/KALOUM	70	51	42	52	76	59	51	63	84	64	57	70
CONAKRY/MATAM	65	56	54	55	70	62	63	64	77	67	68	69
CONAKRY/MATOTO	50	42	51	50	59	50	62	59	60	59	69	63
CONAKRY/RATOMA	53	48	47	49	57	57	58	59	68	64	65	64

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