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Proactive and reactive case detection to optimise integrated community case management of malaria in a high transmission setting of Cameroon

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Abstract

Objective: Integrated community case management (iCCM) of childhood illness is a powerful intervention to reduce mortality. Yet, less than 20% of children with fever in sub-Saharan Africa have access to malaria testing. We sought to explore how incorporating proactive and reactive case detection of malaria into iCCM could help accelerate coverage.

Design: A community-led project to proactively screen febrile children under five years for malaria using rapid diagnostic testing and then using index cases to reactively detect more cases

Setting: Four primary schools, 4 health facilities and 13 neighbourhoods of the rural community of Bare-Bakem in Cameroon

Participants: Children and adults with fever

Intervention: Proactive and reactive case detection of malaria between 12 weeks between April and June 2018

Primary and secondary outcome measures: The proportion of index and secondary malaria cases detected during iCCM compared to the intervention

Results: We screened a total of 501 febrile cases of whom *Plasmodium* infection was confirmed in 425 (84.8%) cases including 176 (83.4%) among index cases and 249 (85.9%) among secondary cases. Of the 425 confirmed cases, 102 (24.0%) were index cases identified in the community during routine iCCM activity; 38 (8.9%) were index cases identified proactively in schools; 36 (8.5%) were index cases located in health facilities; and 249 (58.6%) were additional cases detected in the homes of index cases by RACD - showing the value of RACD over iCCM alone. Overall, by incorporating an active case detection approach, iCCM must have been improved by 67.5% to manage malaria cases in the community.

Conclusion: Most symptomatic cases of malaria remain undetected in the community despite the introduction of community case management of malaria but these undiagnosed cases can be mopped-up by adopting a proactive and reactive case detection approach. This approach should be targeted to schools, older children and large households.

Article Summary

Strengths and Limitations of this study

- The first study to show the clinical relevance of a reactive case detection strategy in a high malaria transmission area
- The study used existing community resources but in a more target manner to maximise access to malaria treatment in a poor and rural community

- A small-scale study with no control arm carried out during a relatively short period and during the high transmission season thus inclined towards over-estimating the value of the intervention

Introduction

In Cameroon, malaria-related morbidity has reduced from 40.6% in 2008 to 23.6% in 2016 while malaria mortality has reduced from 17.6% in 2000 to 12.4% in 2016[1-3]. Despite this remarkable effort, malaria remains a major public health problem in Cameroon where the entire population of more than 25 million inhabitants is at risk, with 71% living in high transmission areas[4]. In 2016, approximately 1.7 million malaria cases and 2637 deaths from malaria were recorded in health facilities in Cameroon. Children under five years of age were the most affected group in whom malaria was responsible for 41% of all case morbidity, 55% of hospital admissions and 69.7% of all malaria-attributed deaths in 2015[2]. To reduce childhood mortality, Cameroon and her development partners began implementing integrated community case management (iCCM) of pneumonia, diarrhoea, and malaria in 2009 to target communities with difficult access to health services. Community case management (CCM) of malaria can reduce overall and malaria-specific under-five mortality by 40% and 60%, respectively, and severe malaria morbidity by 53%[5, 6]. Yet in 2011, less than 20% of children with fever in sub-Saharan Africa received a finger/heel stick for malaria testing[7]. In some localities of Cameroon, iCCM strategy has been reported to have increased treatment rate for malaria, increased care seeking for fever and reduced burden on healthcare facilities[8, 9]. However, data from a community needs assessment conducted in 2016 in the rural community of Bare-Bakem in the Littoral Region of Cameroon indicated that malaria represented up to 80% of all-cause morbidity across health centres and that iCCM has been facing significant challenges including: passiveness in operation; low uptake, underutilisation and attrition of trained community health workers (CHW); prolonged and frequent stockouts of commodities for malaria diagnosis and treatment; inadequate supervision and motivation. School children though typically constituting the group with the highest prevalence of Plasmodium infection, have been virtually left out of this intervention despite receiving increasing attention recently[10-12]. In response to these challenges that threaten to reverse the initial iCCM gains, Peace Corps Cameroon has been supporting rural communities in Cameroon to effectively fight malaria. In 2018, the Peace Corps community of Bare-Bakem introduced a proactive and reactive case detection approach into the existing iCCM system with the objective to reduce malaria burden by expanding access to prompt malaria case management in the community. Integrating active (proactive and/or reactive) case detection strategy with iCCM has not yet been documented in high transmission settings. We report how in this community-led project, CHW proactively searched for cases of malaria in children under five in schools, health facilities and households; and then using index cases, they reactively detected and treated even more cases in the community by visiting the households of the sick children with confirmed malaria.

Methods

Intervention site and priority setting

The intervention was carried out in the rural town of Baré, the headquarters of Baré -Bakem municipality with a population of about 20000 inhabitants occupying a surface area of about 200km². Bare is situated at approximately 10 km from Nkongsamba (the divisional capital) and 120 km from the coastal city of Douala (the regional capital). It has 13 neighbourhoods: Bareko, Ebouth, Axe-Lourde, A, A bis, B, B bis, C, D, E, E bis, F and F bis. The locality's low elevation and its equatorial warm and wet climate are conducive for the multiplication of mosquitoes and eventually malaria endemicity. The town is host to a Peace Corps Volunteer (PCV) for the period between 2016 and 2018 with the mission to support efforts to fight infant and maternal mortality, malnutrition, malaria and HIV/AIDS. On average, across all the four health facilities in Baré, malaria made up approximately 40% of all sicknesses reported in 2016. Cases of malaria can even represent up to 80% of all sicknesses during the wet season. A Community Needs Assessment (CNA) carried out in December 2016 and January 2017 prior to the intervention indicated that malaria was the number one health priority for the community. Of the 250 people that were interviewed, 84% claimed that malaria was Baré's most important health problem. Malaria has a particularly devastating effect on children under the age of five, over 50% of consultations for children under five years old are confirmed cases of malaria. Despite the recognition that malaria is the community's top health priority – only 34% of participants could correctly explain the mode of transmission of malaria. Similarly, there is very limited access to health facilities and inadequate health-seeking behaviour for malaria treatment. About 80% of the population indicated that they initially seek care from traditional healers or road-side drug vendors. This is why a focus on malaria prevention and education is important but prompt and expanded access to malaria treatment so critical in Baré.

Intervention description and evaluation

During 8 weeks of the high transmission period between April and June 2018, Baré's six CHW locally known in French as "*Agent de Santé Communautaire* (ASC)" conducted an active malaria case detection (ACD) involving both a proactive case detection (PACD) phase and a reactive case detection (RACD) phase.

Before launching, the project trained 25 primary and nursery school teachers on malaria detection and the promotion of prevention & care seeking behaviour. Each ASC was assigned to a school and a collaborative system among teachers and ASCs working together to detect sick children was developed. Consent forms were distributed to the teachers to pass along to parents of pupils for their approval to test their children. The four health centres were also invited to the training in order to build working relations with ASCs and all the health centres in Baré. The ASCs had been trained repeatedly over the past years by the National Malaria Control Programme (NMCP) on community management of malaria, iCCM but they were briefed alongside two supervisors on the specificities of this project. One supervisor was in charge of correct data collection, while the other inspected schools and visited households to ensure effectiveness of field work.

PACD was undertaken in 12 primary & nursery schools, 4 health centres, and 13 community neighbourhoods on a weekly basis. Each week on a Thursday, ASCs visited assigned schools and health centres for a febrile screening. Upon arriving at their schools, the trained teachers will indicate the pupils under five who recently had a fever (axillary temperature of 38°C or more). Health workers similarly helped to identify febrile children admitted in health facilities. Children with fever were identified as index cases, tested freely for Plasmodium infection using rapid diagnostic tests (RDT) approved and supplied by the NMCP. Those tested positive for malaria were further classified as either uncomplicated or severe malaria. Uncomplicated malaria cases were immediately treated with amodiaquine + artesunate, the first-line artemisinin-based combination therapy (ACT) recommended and supplied by the NMCP. Severe cases and RDT-negative cases were referred to health facilities for further investigation and management as per the NCMP guidelines. If an index case was absent from school the day the ASC arrived, the teacher would tell the ASC where the child lives. The ASC would visit the household and proceed as above. In the community however, ASCs continued to identify febrile children as per the conventional iCCM guidelines.

As malaria cases tend to cluster geographically and temporally[13-16], ASCs then proceeded with the RACD method to visit the home of an index case of confirmed malaria to find more cases who presented symptoms of malaria in the past week. These secondary cases or contacts would then be tested for free, classified and treated or referred to the nearest health centre in a similar way like the index case.

Data was collected using paper registers and later transcribed into a Microsoft Excel electronic database available as a Supplementary File 1. Data collected from the index case during PACD included: age, gender, place of residence, presence of fever, date of onset of fever, date and location seen by an ASC, results of RDT for malaria, severity of malaria and treatment received. During household visits, the same data were collected from febrile contacts in addition to data pertaining to household size, long-lasting treated bed nets ownership and current usage. Health facility malaria surveillance registers and ASC registers were used as sources to abstract data on malaria cases notified between 2015 and 2018.

Data analyses were performed using Stata version 14.2 (StataCorp. LP, College Station, United States of America) and Microsoft Excel 2016 (Microsoft Corporation, Redmond, USA) was used to plot curves. The data set was checked for logical inconsistencies, invalid codes, omissions and improbable data by tabulating, summarizing, describing and plotting variables, depending on their nature. Missing observations were systematically excluded.

The value of PACD and RACD over iCCM alone was measured by the proportion of additional cases detected.

To describe similarities or differences between index cases and contacts, summary statistics were presented as proportions for categorical variables, as means and standard deviations for normally distributed continuous variables and as medians and interquartile ranges (IQRs) for continuous variables with a skewed distribution. Associations between categorical variables were assessed using Pearson's $\chi 2$ test or Fisher's exact test for small samples, as appropriate. For continuous variables, mean differences between index cases and contacts were assessed using Student's t test. Associations between exposure variables and the likelihood of finding a contact were evaluated by a univariate logistic regression model; crude odd ratios, 95% confidence intervals (CIs) were reported. Subsequently, factors associated with the odds of a finding a contact in the univariate analysis at a significance level below 5% were included in a multiple logistic regression model with mixed effects to account for the variability in CHW performance. Backward elimination based on a p-value lower than 0.05 was used to retain variables that were independently associated with contact tracing; the corresponding adjusted odds ratios (aORs) and 95% CIs for the final model were reported.

In late May we conducted one comparative sweep of three purposefully selected neighbourhoods (Ebouh, Bareko, and B Bis) to assess how many cases of malaria were detected using our strategy relative to a full door-to-door sweep.

Patient and public involvement statement

As a community-led project, the public and patients were involved in the project planning, implementation and data collection.

The study was approved by the Cameroon National Ethics Review Committee and Peace Corps Cameroon. Individual and parental consent was sought and all information was anonymised and de-identified prior to analysis.

Results

Detection and management of febrile cases

At the end of the three-month pilot study, we screened a total of 501 febrile cases of whom 211 were index cases with a mean age of 3.4 ± 0.1 years who triggered a further screening by RACD of 290 contacts of mean age 19.9 ± 1.1 years (Table 1). Out of these index cases, 65 (30.8%) children from schools led to additional 55 (19.0%) cases, 36 (17.1%) from health facilities led to a further 35 (12.0%) cases, and 110 (52.1%) cases from the community led to 200 (69.0%) secondary cases. On average, index cases were reached within 2.4 ± 0.2 days after onset of fever. Of those screened, 65 index cases were likely to be boys (60.2%) while secondary cases were mostly girls under five years but no gender specificity among older secondary cases. The prevalence of malaria as demonstrated by a positive RDT, was very high in both the index (83.4%) and the secondary cases (85.9%). Of these 425 confirmed malaria cases, 354 (83.3%) were classified as uncomplicated malaria cases who received ACT immediately from the ASCs including 142 (67.3%) from the index cases and 212 (73.1%) from the secondary cases. The 147 cases who did not receive immediate ACT, were classified as either RDT negative in 76 (15.2%) or as having severe malaria in 71 (16.7%) cases. A total of 113 cases who did not receive ACT were referred to the nearest health centre for further management including all the remaining 35 RDT negative index cases and 78 secondary cases.

Table 1. Characteristics of index and secondary cases of fever detected between April and June 2018

Characteristics		Index cases (n = 211)	Contacts (n = 290)	P-value of the difference between the groups
Reactive cases found per index case source				
	School	65 (30.8)	55 (19.0)	
	Health facility	36 (17.1)	35 (12.0)	
	Community	110 (52.1)	200 (69.0)	
	Total	211 (100)	290 (100)	<0.001
Gender, n (%)				
	Male	127 (60.2)	144 (49.7)	
	Female	84 (39.8)	146 (50.3)	
	Total	211 (100)	290 (100)	0.019
Age, mean(SD) years		3.4 (0.1)	19.9 (1.1)	<0.0001
Confirmed malaria, n (%)				
	RDT positive	176 (83.4)	249 (85.9)	
	RDT negative	35 (16.6)	41 (14.1)	
	Total	211 (100)	290 (100)	0.450
Immediate malaria treatment, n (%)				
	ACT	142 (67.3)	212 (73.1)	
	No ACT	69 (32.7)	78 (26.9)	
	Total	211 (100)	290 (100)	0.159
Referrals, n (%)				
	Yes	35 (16.6)	78 (26.9)	
	No	176 (83.4)	212 (73.1)	
	Total	211 (100)	290 (100)	0.006
Household size, mean (95%CI)		6.3 (6.0 – 6.5)		
Household LLIN ownership, mean (95%CI)		2.3 (2.2 – 2.4)		
LLIN coverage per household member (95%CI)		0.37 (0.35 – 0.38)		
LLIN in use per household member (95%CI)		0.33 (0.31 – 0.35)		

Proactive and Reactive case detection of confirmed malaria

During the RACD triggered by 176 index cases of confirmed malaria in children under five, 132 (75%) of these index cases investigated led to at least one additional case of confirmed malaria and a total of 249 secondary cases identified within 176 households visited. After a lag phase during the first half of the project, the number of cases detected increased sharply over the second half before returning to the initial stable level (Figure 1).

Figure 1. Trend in the number of cases of confirmed malaria between April and June 2018

There were approximately 6 persons on average per household with a bed net ownership of about 2 LLINs per household leading to a bed net coverage of about 1 LLIN for 3 persons. Of all the 425 confirmed cases, 38 (8.9%) were index cases identified proactively in schools and led to find 50 (11.8%) more cases; 36 (8.5%) were index cases located in health facilities and led to a further 24 (5.6%) cases; and 102 (24.0%) were index cases identified during routine iCCM activity and led to 175 (41.2%) additional cases showing the value of RACD over iCCM alone (Figure 2). Overall, this active case detection (ACD) strategy based on PACD and RACD identified 287 of the 425 cases thus indicating that the ongoing iCCM must have been improved by 67.5% to manage malaria cases in the community.

Across these three neighbourhoods in May 2018, there was a total of 86 confirmed cases of malaria of whom our project found 50 while the door-to-door sweep caught an additional 36 cases. Thus, suggesting that this project succeeded at detecting 63% of the cases that could be captured by an exhaustive door-to-door strategy.

Seasonally, across 12 weeks in April, May, and June in 2017 the ASCs detected 238 cases of malaria at a rate of ~20 cases per week. During our 8-week project across April, May and June in 2018, the ASCs detected 365 cases of malaria at a rate of ~45 cases per week computing to a 125% increase.

Figure 2. Relative contribution of active case detection strategies

The odds of finding a secondary case by RACD increased by 70% if the index case was one year younger (adjusted odd ratio (aOR) = 1.7, 95% CI: 1.5 – 1.9) and by 20% if a household increased by one person (aOR = 1.2, 95% CI: 1.1 – 1.3). Though RACD was likely to find female cases, the evidence to support gender discrimination was rejected in the multiple regression model in Table 2 (aOR = 1.2, 95% CI: 0.7 – 2.1).

Table 2. Multiple logistic regression model of factors associated with secondary case detection (N = 425)

Factor		**Number of confirmed secondary cases, n (%)**	**Crude OR (95%CI)**	**p-value**	**Adjusted OR (95%)**	**p-value**
Gender						
	Male	124 (53.7)	Reference		Reference	
	Female	125 (64.4)	1.6 (1.1 – 2.3)	0.024	1.2 (0.7 – 2.1)	0.477
Additional one year of age			1.7 (1.5 – 1.9)	<0.001	1.7 (1.5 – 1.9)	<0.001
Additional one household member			1.2 (1.1 – 1.3)	<0.001	1.2 (1.1 – 1.3)	0.015

Discussion

In this small-case quality improvement study, we sought to demonstrate in a high transmission area, the feasibility of embedding both the proactive and reactive case detection strategies into integrated community case management in order to maximise malaria case detection and prompt treatment. The study has indicated that by proactively searching for children under five years with malaria as index cases, and by reactively searching for more cases in the households of index cases, iCCM must have been improved by approximately 67.5%. The study has also confirmed that the burden of malaria lies in the community with only the tip of the iceberg seen in health facilities. While iCCM was introduced to respond to this challenge, it was currently underperforming in this rural setting. This project has suggested that iCCM can be adapted to achieve optimal results. While on one hand it may appear obvious that the malaria component of iCCM can be adapted to or opt for a PACD strategy, implementing RACD in a high transmission setting on the other hand may seem experimental or even controversial to some extent. This is because RACD is a surveillance approach recommended in low transmission or pre-elimination settings to disrupt transmission and is thought to be inefficient and unfeasible in high transmission settings. Conversely, RACD may also waste time and money when cases are few and sporadic[17-20].

Therefore, the choice of RACD as an approach depends on the objective to be attained, the proportion of cases it can detect and the resources needed. Our project was feasible and efficient because our aim was not to eliminate malaria but to detect and treat the maximum possible number of cases during a high transmission season when the proportion of cases is highest using resources already made available for iCCM in a rural setting where access to health services is limited. The extra resource needed is the time to visit schools, health facilities and households. CHWs told us that by conducting only a one-day visit per week to these facilities and only to households of index cases was more productive and made them more useful in their community. This strategy was not much different from what they were doing before, just a more targeted approach: - targeting schools, targeting households of index cases and targeting high transmission season when fever is likely to be caused by a *Plasmodium* infection as confirmed in this study where RDT was positive in 85% of persons screened for fever and with a probability of 75% that every index case led to at least one more case. Beyond CHW job satisfaction, teachers also expressed their satisfaction and were of great support in detecting fever or a history of fever amongst their pupils. Moreover, we found that teachers were far more likely to help CHW finding the households of sick children than healthcare workers. We thus strongly believe that RACD can be both feasible and efficient in a high transmission setting to maximise clinical case management. Consequently, we recommend that PACD and RACD become part of the ongoing iCCM strategy in Cameroon as an approach to optimise case detection. Yet incorporating PACD and RACD into iCCM will entail building a strong collaboration among CWH, HCW and teachers. Such a partnership already exists between the ministries of health and education in Cameroon in their concerted effort to fight neglected tropical diseases specifically soil-transmitted helminthiasis in school children[21]. The recurrent problem of stockouts of commodities will need to be resolved by the NMCP and field monitoring and supervision should become regular by iCCM programme coordination. Resolving these issues of multisector collaboration, delivery of commodities and field coordination were crucial as bottlenecks and explain in part why progress was slow in the first half of the project.

This study has further indicated that, while index cases were likely to be boys, RACD was likely to find girls and women in univariate analysis though such claims were not supported by evidence from multivariate analysis. Boys make up the majority of school children in Cameroon especially in the rural areas and this might be a reflection of this observation[22]. However, it is plausible that gender norms and values that determine the division of labour, leisure patterns, pregnancy, and sex-segregation of sleeping arrangements may lead to different patterns of exposure to mosquitoes for men and women[22-24].

Secondary cases were likely to be older than index cases and to be located in larger households of the index case. Given that we purposely targeted children under five years, it became obvious that we may likely find more of older children and adults as contacts. Clustering of cases has previously been demonstrated in households of the contacts and malaria eradication is thought to be feasible when household size drops below four persons [25, 26]. The average household size in this study was six persons thus explaining while it was very likely to find more cases in the community during RACD.

This study had some limitations so that the results should be interpreted with caution. The duration and period of the study was limited to only three months and to the first half of the wet season. We could not therefore account for neither seasonality in malaria transmission nor account for sustainability throughout the year. Older children and adults were not included as index cases thus creating an outright difference between index and secondary cases. This must have led to an overestimation of the value of RACD over iCCM in this field study because in routine practice however, adults would be index cases as well. Targeting school children for malaria treatment must have been a laudable effort but older school children were also left out as index cases though they constitute a group with a higher plasmodium infection prevalence than in the targeted younger age group[10]. However, these children were among those screened in the community. We did not measure the effect of this strategy on the pneumonia and diarrhoea components of iCCM but we believe that being an integral part of the package of interventions, these two components were likely to have been improved as well. We did not attempt to measure effect on malaria transmission as most studies have done.

Conclusion

This study has shown that most symptomatic cases of malaria remain undetected in the community despite the introduction of integrated community management of malaria. Schools are an important portal to locate children with undiagnosed malaria. Active case detection based on a proactive and reactive case detection approaches is feasible in a high transmission setting and has been shown to enhance in a synergistic manner the efficiency of integrated community case management of malaria. We recommend that national malaria control programs adopt and implement this modified form of iCCM in similar settings to reduce the burden of malaria in our communities.

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Footnotes

Ethics approval and consent to participate

The study was approved by the National Ethics Review Board of Cameroon, Peace Corps Cameroon and local administrative and health authorities. Verbal consent was obtained from household members after making public announcements and providing an information leaflets to explain the objectives of the project.

Consent for publication

Not Applicable

Availability of data and material

The datasets used and/or analysed during the current study are available as a supplementary file.

Competing interests

The authors declare that they have no competing interests

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Author Contributions

Conception, design and implementation: TDW, CEB

Data collection, analysis and interpretation: TDW, CEB

Drafting the manuscript: CEB

All authors read and approved the final manuscript

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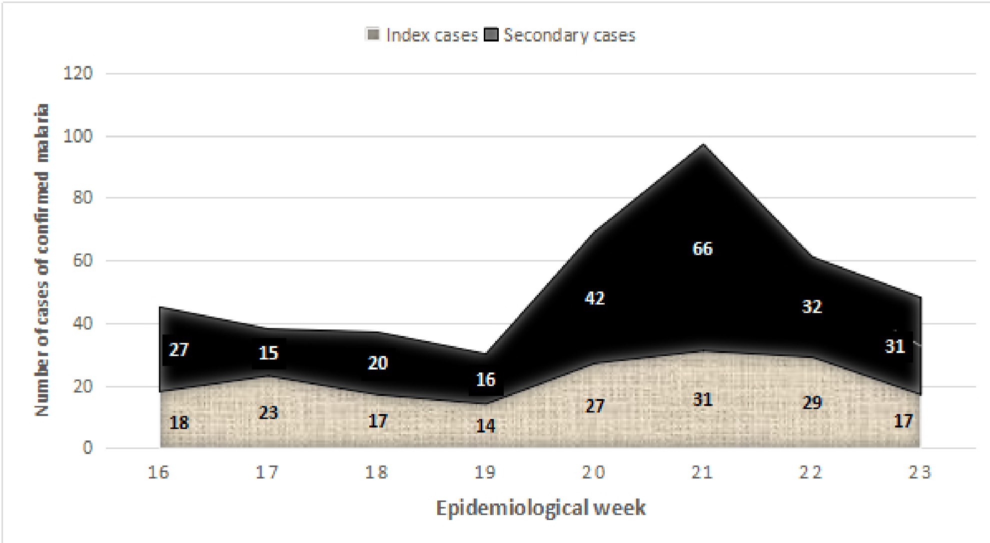

Figure 1

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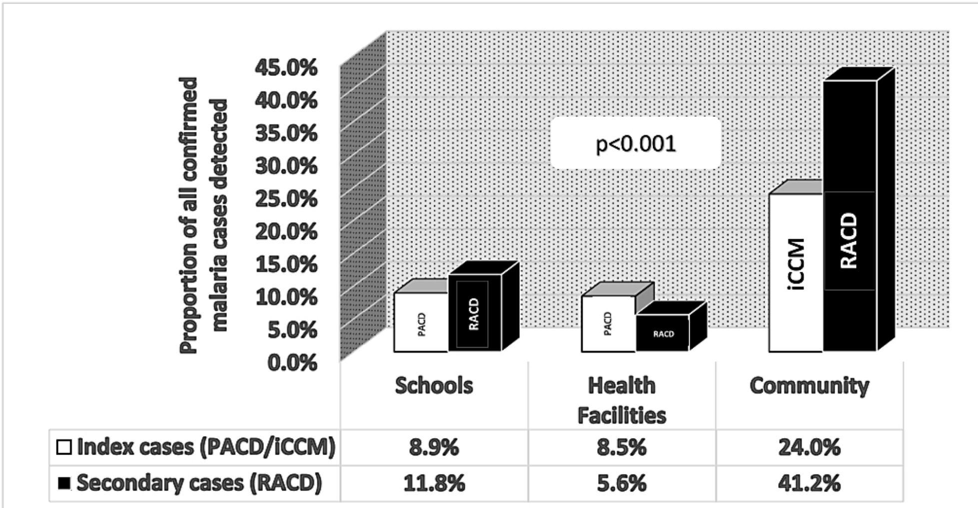

Figure 2

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		Reporting Item	Page Number
	#1	Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patientcenteredness, timeliness, cost, efficiency, and equity of healthcare)	1
	#02a	Provide adequate information to aid in searching and indexing	1
	#02b	Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions	2
Problem description	#3	Nature and significance of the local problem	3
Available knowledge	#4	Summary of what is currently known about the problem, including relevant previous studies	3
Rationale	#5	Informal or formal frameworks, models, concepts, and / or theories used to explain the problem, any reasons or	3

		assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work	
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Context	#7	Contextual elements considered important at the outset of introducing the intervention(s)	4
Intervention(s)	#08a	Description of the intervention(s) in sufficient detail that others could reproduce it	5,6
	#08b	Specifics of the team involved in the work	5
Study of the Intervention(s)	#09a	Approach chosen for assessing the impact of the intervention(s)	6,7
	#09b	Approach used to establish whether the observed outcomes were due to the intervention(s)	6,7
Measures	#10a	Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability	6
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	#13a	Initial steps of the intervention(s) and their evolution over time (e.g., time-line diagram, flow chart, or table), including modifications made to the intervention during the project	n/a
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interpretation, and reporting

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Adding proactive and reactive case detection into the integrated community case management system (iCCM+) to optimise diagnosis and treatment of malaria in a high transmission setting of Cameroon

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Adding proactive and reactive case detection into the integrated community case management system (iCCM+) to optimise diagnosis and treatment of malaria in a high transmission setting of Cameroon

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Abstract

Objective: Integrated community case management (iCCM) of childhood illness is a powerful intervention to reduce mortality. Yet, less than 20% of children with fever in sub-Saharan Africa have access to malaria testing. We conducted an action research to explore how iCCM+ based on incorporating proactive and reactive case detection of malaria into iCCM could help accelerate coverage.

Design: A community-led cross-sectional survey to measure the proportion of *Plasmodium* infection detected under iCCM+ compared with iCCM alone.

Setting: Four primary schools, 4 health facilities and 13 neighbourhoods of the rural community of Bare-Bakem in Cameroon

Participants: Children and adults with fever between April and June 2018

Intervention: A modified iCCM programme (iCCM+) comprised of a proactive screening of febrile children under five years old for malaria using rapid diagnostic testing to identify index cases and a reactive screening triggered by these index cases to detect secondary cases in the community

Primary and secondary outcome measures: The proportion of index and secondary malaria cases detected by iCCM+ compared with iCCM alone.

Results: We screened a total of 501 febrile patients of whom *Plasmodium* infection was confirmed in 425 (84.8%) cases including 176 (83.4%) index cases and 249 (85.9%) secondary cases. Of these cases, 102 (24.0%) were index cases identified in the community during routine iCCM activity and 36 (8.5%) cases detected passively in health facilities; 38 (8.9%) were index cases identified proactively in schools; and 249 (58.6%) were additional cases detected in the homes of index cases by RACD – computing to a total of 287 (67.5%) additional cases found by iCCM+ showing the added value of iCCM+ over iCCM alone.

Conclusion: Most symptomatic cases of malaria remain undetected in the community despite the introduction of community case management of malaria but most of these undiagnosed cases can be mopped-up by iCCM+.

Article Summary

Strengths and Limitations of this study

- The first study to show the clinical significance of a reactive case detection strategy in a high malaria transmission area
- The study used existing community resources but in a more targeted manner to maximise access to malaria treatment in a poor and rural community
- A small-scale study with no control arm carried out during a relatively short period and during the high transmission season thus inclined towards over-estimating the value of the intervention

Introduction

In Cameroon, malaria-related morbidity has reduced from 40.6% in 2008 to 23.6% in 2016 while malaria proportionate mortality has reduced from 17.6% in 2000 to 12.4% in 2016[1-3]. Despite this remarkable effort, malaria remains a major public health problem in Cameroon where the entire population of more than 25 million inhabitants is at risk, with 71% living in high transmission areas[4]. In 2016, approximately 1.7 million malaria cases and 2637 deaths from malaria were recorded in health facilities in Cameroon. Children under five years of age were the most affected group in whom malaria was responsible for 41% of all-cause morbidity, 55% of hospital admissions and 69.7% of all malaria-attributed deaths in 2015[2]. To reduce childhood mortality, Cameroon and her development partners began implementing integrated community case management (iCCM) of pneumonia, diarrhoea, and malaria in 2009 to target communities with difficult access to health services. Community case management (CCM) of malaria can reduce overall mortality and malaria-specific under-five mortality by 40% and 60%, respectively, and severe malaria morbidity by 53%[5, 6]. Yet in 2011, less than 20% of children with fever in sub-Saharan Africa received a finger/heel stick for malaria testing[7]. In some localities of Cameroon, iCCM strategy has been reported to have increased treatment rate for malaria, increased care seeking for fever and reduced burden on healthcare facilities[8, 9]. However, data from a community needs assessment conducted in 2016 in the rural community of Bare-Bakem in the Littoral Region of Cameroon indicated that malaria represented up to 80% of all-cause morbidity across health centres and that iCCM has been facing significant challenges including: passive rather than active case detection; low uptake, underutilisation and attrition of trained community health workers (CHWs); prolonged and frequent stockouts of commodities for malaria diagnosis and treatment; inadequate supervision and motivation of CHWs. School children though typically constituting the group with the highest prevalence of

Plasmodium infection, have been virtually left out of this intervention despite receiving increasing attention recently[10-12]. In response to these challenges that threaten to reverse the initial iCCM gains, Peace Corps Cameroon has been supporting rural communities in Cameroon to effectively fight malaria. In 2018, the Peace Corps community of Bare-Bakem introduced a proactive and reactive case detection approach into the existing iCCM system with the objective to reduce malaria burden by expanding access to prompt malaria case management in the community. Integrating active (proactive and/or reactive) case detection strategy with iCCM has not yet been documented in high transmission settings. We report how in this community-led project, CHW proactively searched for cases of malaria in children under five in schools, health facilities and households; and then using index cases, they reactively detected and treated even more cases in the community by visiting the households of the sick children with confirmed malaria.

Methods

Design: A community-led cross-sectional survey to measure the proportion of *Plasmodium* infection detected under iCCM+ compared with iCCM alone.

Intervention site and priority setting

The intervention was carried out in the rural town of Baré, the headquarters of Baré -Bakem municipality with a population of about 20000 inhabitants occupying a surface area of about $200km^2$. Bare is situated at approximately 10 km from Nkongsamba (the divisional capital) and 120 km from the coastal city of Douala (the regional capital). It has 13 neighbourhoods: Bareko, Ebouth, Axe Lourd, A, A bis, B, B bis, C, D, E, E bis, F and F bis. The locality's low elevation and its warm and wet equatorial climate are conducive for high levels of malaria transmission. The town was host to a Peace Corps Volunteer (PCV) for the period between 2016 and 2018 with the mission to support efforts to fight infant and maternal mortality, malnutrition, malaria and HIV/AIDS. On average, across all the four health facilities in Baré, malaria made up approximately 40% of all sicknesses reported in 2016. Cases of malaria can even represent up to 80% of all sicknesses during the wet season. A Community Needs Assessment (CNA) carried out in December 2016 and January 2017 prior to the intervention indicated that malaria was the number one health priority for the community. Of the 250 people that were interviewed, 84% claimed that malaria was Baré's most important health problem. Malaria has a particularly devastating effect on children under the age of five, over 50% of consultations for children under five years old were confirmed cases of malaria. Despite the recognition that malaria is the community's top health priority – only 34% of participants could correctly explain the mode of transmission of malaria. Similarly, there is very limited access to health facilities and inadequate health-seeking behaviour for malaria treatment. About 80% of the population indicated that they initially seek care from traditional healers or road-side drug vendors. This is why a focus on malaria prevention and education is important but prompt and expanded access to malaria treatment so critical in Baré. The iCCM programme was introduced to respond to these needs but had its shortcomings that led to the implementation of iCCM+.

Intervention description and evaluation: Integrated Community Management Plus (iCCM+)

During 8 weeks of the high transmission period between April and June 2018, Baré's six CHWs locally known in French as "*Agent de Santé Communautaire* (ASC)" conducted an active malaria case detection (ACD) involving the addition of both the proactive case detection (PACD) phase and the reactive case detection (RACD) approaches into their existing iCCM activities. In operational terms**, iCCM+ = iCCM + PACD + RACD**

Before launching, the project trained 25 primary and nursery school teachers on malaria detection and on the promotion of prevention & care seeking behaviour. Each CHW was assigned to a school and a collaborative system between teachers and ASCs working together to detect sick children was developed. Consent forms were distributed to the teachers to pass along to parents of pupils for their approval to test their children. Health care workers from the four health centres were also invited to the training in order to build working relations with CHWs. The CHWs had been trained repeatedly over the past years by the National Malaria Control Programme (NMCP) on community management of malaria, but they were briefed alongside two supervisors on the specificities of this project. One supervisor was in charge of correct data collection, while the other inspected schools and visited households to ensure completeness of field work.

PACD was undertaken in 12 primary & nursery schools, 4 health centres, and 13 community neighbourhoods on a weekly basis. Each week on a Thursday, CHWs visited assigned schools and health centres for a febrile screening. Upon arriving at their schools, the trained teachers will indicate the pupils under five who had a fever in a recent week (axillary temperature of 38°C or more). Health workers similarly helped to identify febrile children admitted in health facilities. Children with fever were identified and tested at no cost for *Plasmodium* infection using rapid diagnostic tests (RDT) approved and supplied by the NMCP. Those tested positive for malaria were named as “index cases” and were further classified as either uncomplicated or severe malaria. Uncomplicated malaria cases were immediately treated with amodiaquine + artesunate, the first-line artemisinin-based combination therapy (ACT) recommended and supplied by the NMCP. Severe cases and RDT-negative cases were referred to health facilities for further investigation and management as per the NMCP guidelines. If a febrile child was absent from school the day the CHW arrived, the teacher would tell the CHW where the child lives. The CHW then visited the household to identify and test the sick child. In the community however, CHW continued to identify febrile children as per the conventional iCCM guidelines.

As malaria cases tend to cluster geographically and temporally[13-16], CHWs who also cluster and work in the neighbourhoods in which they live, then proceeded with the RACD method to visit the home of an index case. In the households, they made a list of all persons resident in the household (contacts of the index case), identified and tested those who had a fever in the past week. Those tested positive for malaria RDT were named as “secondary cases” and were also classified and treated or referred to the nearest health centre in a similar way like the index case as illustrated in Figure 1.

Figure 1. The flow chart of the augmented integrated community case management of malaria (iCCM+)

Data was collected using paper registers and later transcribed into a Microsoft Excel electronic database available as a Supplementary File 1. Data collected from the index case during PACD included: age, sex, place of residence, presence of fever, date of onset of fever, date and location seen by an ASC, results of RDT for malaria, severity of malaria and treatment received. During household visits, the same data were collected from febrile contacts in addition to data pertaining to household size, long-lasting treated bed nets ownership and current usage. Health facility malaria surveillance registers and CHW registers were used as sources to abstract data on malaria cases notified between 2015 and 2018.

Data analyses were performed using Stata version 14.2 (StataCorp. LP, College Station, United States of America) and Microsoft Excel 2016 (Microsoft Corporation, Redmond, USA) was used to plot curves. The data set was checked for logical inconsistencies, invalid codes, omissions and improbable data by tabulating, summarizing, describing and plotting variables, depending on their nature. Missing observations were systematically excluded.

The value of iCCM+ over iCCM alone was measured by the proportion of additional cases detected.

To describe similarities or differences between index and secondary cases, summary statistics were presented as proportions for categorical variables, as means and standard deviations for normally distributed continuous variables and as medians and interquartile ranges (IQRs) for continuous variables with a skewed distribution. Associations between categorical variables were assessed using Pearson's $\chi 2$ test or Fisher's exact test for small samples, as appropriate. For continuous variables, mean differences between index cases and contacts were assessed using Student's t test. Associations between exposure variables and the likelihood of finding a contact were evaluated by a univariate logistic regression model; crude odd ratios, 95% confidence intervals (CIs) were reported. Subsequently, factors associated with the odds of a finding a contact in the univariate analysis at a significance level below 5% were included in a multiple logistic regression model with mixed effects to account for the variability in CHW performance. Backward elimination based on a p-value lower than 0.05 was used to retain variables that were independently associated with contact tracing; the corresponding adjusted odds ratios (aOR) and 95% CIs for the final model were reported.

Patient and public involvement statement

As a community-led project, the public and patients were involved in the project planning, implementation and data collection.

The study was approved by the Cameroon National Ethics Review Committee and Peace Corps Cameroon. Individual and parental consent was sought and all information was anonymised and de-identified prior to analysis. An information letter was sent to parents and local administrations, and was announced in community meeting or worshipping places.

Results

Detection and management of cases

At the end of the three-month pilot study, we screened a total of 501 febrile patients of whom *Plasmodium* infection was confirmed in 425 (overall prevalence of 84.8%) including 176 index cases with a mean age of 3.4 ± 0.1 years who triggered a further screening by RACD of 249 contacts of mean age 19.2 ± 1.2 years (Table 1). On average, index cases were reached within 2.4 ± 0.2 days after onset of fever. Index cases were mostly boys (60.8% vs. 49.8%, p = 0.025) while secondary cases were mostly girls under five years but no gender specificity among older secondary cases. The prevalence of malaria was very high in both the index (83.4%) and the secondary cases (85.9%). Of these 425 confirmed malaria cases, 354 (83.3%) were classified as uncomplicated malaria cases who received ACT immediately from the CHW. The 71 cases who did not receive immediate ACT, were classified as severe malaria cases who were referred to the nearest health centre for further management.

Table 1. Characteristics of index and secondary cases of malaria detected between April and June 2018

Characteristics		**Index cases (n = 176)**	**Secondary cases (n = 249)**	**P-value of the difference between the groups of cases**
Reactive cases found per index case source				
	School	38 (21.6)	50 (20.1)	
	Health facility	36 (20.4)	24 (9.6)	
	Community	102 (58.0)	175 (70.3)	
	Total	176 (100.0)	249 (100.0)	0.004
Sex, n (%)				
	Male	107 (60.8)	124 (49.8)	
	Female	69 (39.2)	125 (50.2)	
	Total	176 (100)	249 (100)	0.025
Age, mean (SD) years		3.4 (0.1)	19.2 (1.2)	<0.0001
Immediate malaria treatment, n (%)				
	ACT	142 (80.7)	212 (85.1)	
	No ACT	34 (19.3)	37 (14.9)	
	Total	176 (100)	249 (100)	0.225
Referrals, n (%)				
	Yes	34 (19.3)	37 (14.9)	
	No	142 (81.7)	212 (85.1)	
	Total	176 (100)	249 (100)	<0.001
Household size, mean (95%CI)		6.4 (6.2 – 6.6)		
Household LLIN ownership, mean (95%CI)		2.4 (2.3 – 2.6)		
LLIN coverage per household member (95%CI)		0.38 (0.36 – 0.40)		
LLIN in use per household member (95%CI)		0.34 (0.32 – 0.36)		

Proactive and Reactive case detection of confirmed malaria

During the RACD triggered by 176 index cases of confirmed malaria in children under five, 132 (75%) of these index cases investigated led to at least one additional case and a total of 249 secondary cases identified from 290 febrile contacts within 176 households visited. There were approximately 6 persons on average per household with a bed net ownership of about 2 LLINs per household leading to a bed net coverage of about 1 LLIN for 3 persons. After a lag phase during the first half of the project, the number of cases detected increased sharply over the second half before returning to the initial stable level (Figure 2).

Figure 2. Trend in the number of cases of confirmed malaria between April and June 2018

Of all the 425 confirmed cases, 38 (8.9%) were index cases identified proactively in schools and led to find 50 (11.8%) more cases; 36 (8.5%) were index cases located in health facilities and led to a further 24 (5.6%) cases; and 102 (24.0%) were index cases identified during routine iCCM activity and led to 175 (41.2%) additional cases showing the value of RACD over iCCM alone (Figure 2). Overall, iCCM+ identified 287 of the 425 cases thus indicating that the ongoing iCCM must have been improved by 67.5% to manage malaria cases in the community (Figure 3).

Figure 3. Flow diagram of cases detected and treated during iCCM and iCCM+

During 12 weeks in April, May, and June in 2017 CHWs detected 238 cases of malaria at a rate of ~20 cases per week. But during our 8-week project across April, May and June in 2018, the CHWs detected 365 cases of malaria at a rate of ~45 cases per week computing to a 125% increase from 2017 during the same transmission season.

The odds of finding a secondary case by RACD increased by 70% if the index case was one year younger (adjusted odd ratio (aOR) = 1.7, 95% CI: 1.5 – 1.9) and by 20% if a household increased by one person (aOR = 1.2, 95% CI: 1.1 – 1.3). Though RACD was likely to find female cases, the evidence to support gender discrimination was rejected in the multiple regression model in Table 2 (aOR = 1.2, 95% CI: 0.7 – 2.1).

Table 2. Multiple logistic regression model of factors associated with secondary case detection (N = 425)

Factor		**Number of confirmed secondary cases, n (%)**	**Crude OR (95%CI)**	**p-value**	**Adjusted OR (95%)**	**p-value**
Sex						
	Male	124 (53.7)	Reference		Reference	
	Female	125 (64.4)	1.6 (1.1 – 2.3)	0.024	1.2 (0.7 – 2.1)	0.477
Additional one year of age			1.7 (1.5 – 1.9)	<0.001	1.7 (1.5 – 1.9)	<0.001
Additional one household member			1.2 (1.1 – 1.3)	<0.001	1.2 (1.1 – 1.3)	0.015

Discussion

In this small-case quality improvement study, we sought to demonstrate in a high transmission area, the feasibility of embedding both the proactive and reactive case detection strategies into integrated community case management in order to maximise malaria case detection and prompt treatment. The study has indicated that by proactively searching for children under five years with malaria as index cases, and by reactively searching for more cases in the households of index cases, iCCM+ must have been increased the proportion of persons diagnosed and treated for *Plasmodium* infection by approximately 67.5%. The study has also confirmed that the burden of malaria lies in the community with only the tip of the iceberg seen in health facilities. While iCCM was introduced to respond to this challenge, it was currently underperforming in this rural setting. This project has suggested that iCCM can be adapted to achieve optimal results. While on one hand it may appear obvious that the malaria component of iCCM can be adapted to or opt for a PACD strategy, implementing RACD in a high transmission setting on the other hand may seem experimental or even controversial to some extent. This is because RACD is a surveillance approach recommended in low transmission or pre-elimination settings to disrupt transmission and is thought to be inefficient and unfeasible in high transmission settings. Conversely, RACD may also waste time and money when cases are few and sporadic[17-20]. Therefore, the choice of RACD as an approach depends on the objective to be attained, the proportion of cases it can detect and the resources needed. Our project was feasible and efficient because our aim was not to eliminate malaria but to detect and treat the maximum possible number of cases during a high transmission season when the proportion of cases is highest using resources already made available for iCCM in a rural setting where access to health services is limited. The extra resource needed is the time to visit schools, health facilities and households. CHWs told us that by conducting only a one-day visit per week to these facilities and only to households of index cases was more productive and made them more useful in their community. This strategy was not much different from what they were doing before, just a more targeted approach: - targeting schools, targeting households of index cases and targeting high transmission season when fever is likely to be caused by a *Plasmodium* infection as confirmed in this study where RDT was positive in 85% of persons screened for fever and with a high probability of 75% that every index case led to at least one secondary case. Beyond CHW job satisfaction, teachers also expressed their satisfaction and were of great support in detecting fever or a history of fever amongst their pupils. Moreover, we found that teachers were far more likely to help CHW finding the households of sick children than healthcare workers. We thus strongly believe that RACD can be both feasible and efficient in a high transmission setting to maximise clinical case management. Consequently, we recommend that PACD and RACD become part of the ongoing iCCM strategy in Cameroon as an approach to optimise case detection. Yet incorporating PACD and RACD into iCCM will entail building a strong collaboration among CWH, HCW and teachers. Such a partnership already exists between the ministries of health and education in Cameroon in their concerted effort to fight neglected tropical diseases specifically soil-transmitted helminthiasis in school children[21]. The recurrent problem of stockouts of commodities will need to be resolved by the NMCP and field monitoring and supervision should become regular by iCCM programme coordination. Resolving these issues of multisector collaboration, delivery of commodities and field coordination were crucial as bottlenecks and explain in part why progress was slow in the first half of the project.

This study has further indicated that, while index cases were likely to be boys, RACD was likely to find girls and women in univariate analysis though such claims were not supported by evidence from multivariate analysis. Boys make up the majority of school children in Cameroon especially in the rural areas and this might be a reflection of this observation[22]. However, it is plausible that gender norms and values that determine the division of labour, leisure patterns, pregnancy, and sex-segregation of sleeping arrangements may lead to different patterns of exposure to mosquitoes for men and women[22-24].

Secondary cases were likely to be older than index cases and to be located in larger households of the index case. Given that we purposely targeted children under five years, it became obvious that we may likely find more of older children and adults as contacts. Clustering of cases has previously been demonstrated in households of the contacts and malaria eradication is thought to be feasible when household size drops below four persons [25, 26]. The average household size in this study was six persons thus explaining while it was very likely to find more cases in the community during RACD.

This study had some limitations so that the results should be interpreted with caution. There was no control arm to clearly distinguish between iCCM+ from iCCM intervention areas. A randomised community trial may be recommended as a solution. The duration and period of the study was limited to only three months and to the first half of the wet season. We could not therefore account for neither seasonality in malaria transmission nor account for sustainability throughout the year. Older children and adults were not included as index cases thus creating an outright difference between index and secondary cases. This must have led to an overestimation of the value of RACD in this field study because in routine practice however, adults would be index cases as well. Targeting school children for malaria treatment must have been a laudable effort but older school children were also left out as index cases though they constitute a group with a higher *Plasmodium* infection prevalence than in the targeted younger age group[10]. However, these children were among those screened in the community. We did not measure the effect of this strategy on the pneumonia and diarrhoea components of iCCM but we believe that being an integral part of the package of interventions, these two components were likely to have been improved as well. We did not attempt to measure effect on malaria transmission as most studies have done.

Conclusion

This study has shown that most symptomatic cases of malaria remain undetected in the community despite the introduction of integrated community management of malaria. Schools are an important portal to locate children with undiagnosed malaria. Active case detection based on a proactive and reactive case detection approaches is feasible in a high transmission setting and has been shown to enhance in a synergistic manner the efficiency of integrated community case management of malaria. We recommend that national malaria control programs adopt and implement this modified form of iCCM in similar settings to reduce the burden of malaria in our communities.

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Footnotes

Ethics approval and consent to participate

The study was approved by the National Ethics Review Board of Cameroon, Peace Corps Cameroon and local administrative and health authorities. Verbal consent was obtained from household members after making public announcements and providing an information leaflets to explain the objectives of the project.

Consent for publication

Not Applicable

Availability of data and material

The datasets used and/or analysed during the current study are available as a supplementary file.

Competing interests

The authors declare that they have no competing interests

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Author Contributions

Conception, design and implementation: TDW, CEB

Data collection, analysis and interpretation: TDW, CEB

Drafting the manuscript: CEB

All authors read and approved the final manuscript

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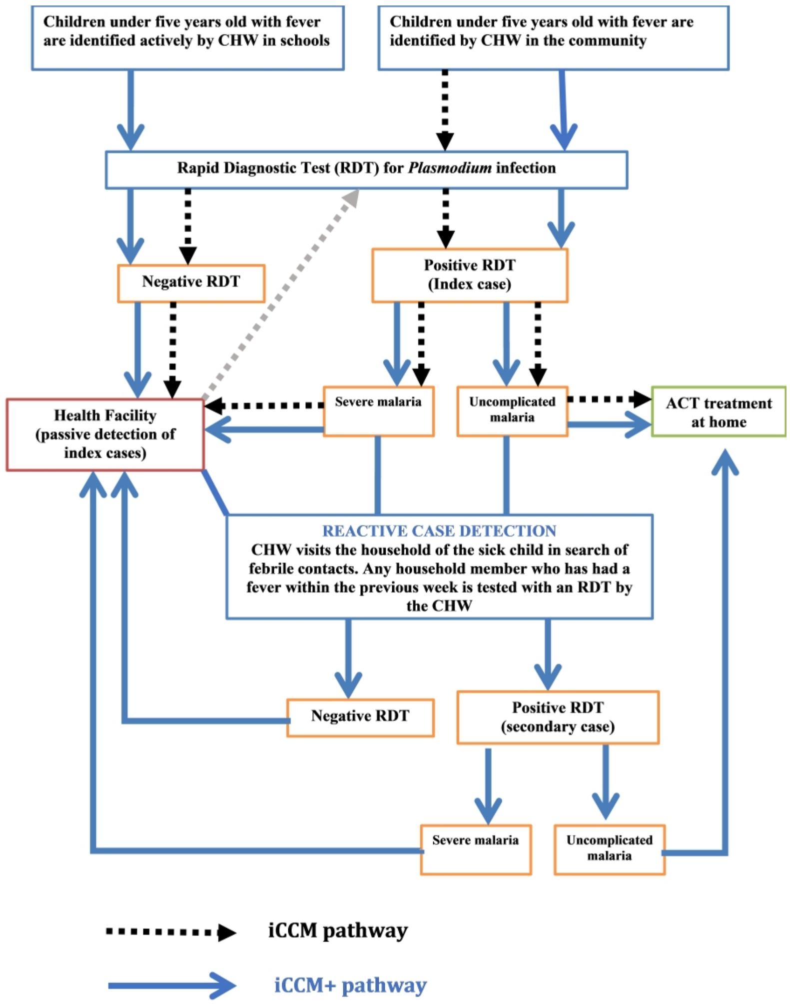


Figure 1. The flow-chart of the augmented integrated community case management of malaria (iCCM+)

522x526mm (300 x 300 DPI)

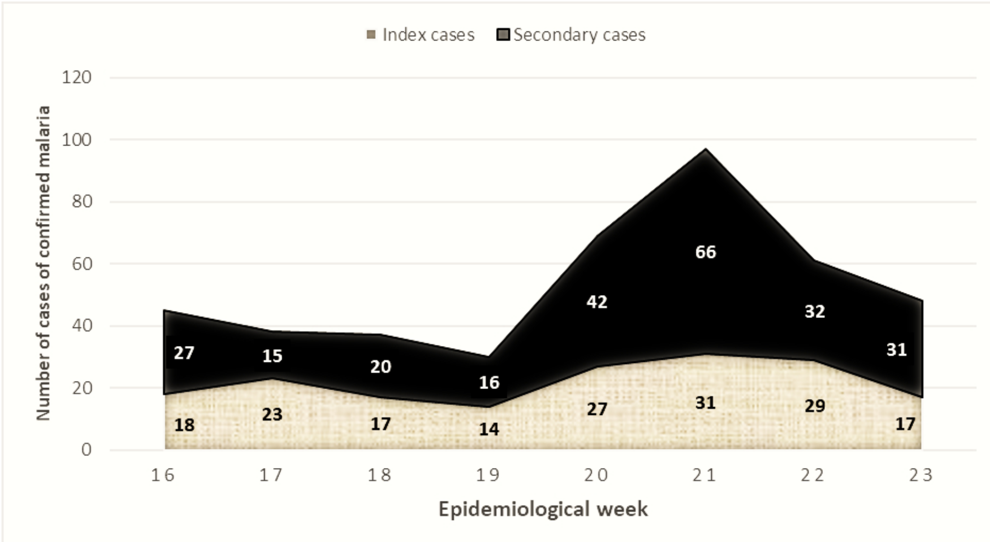
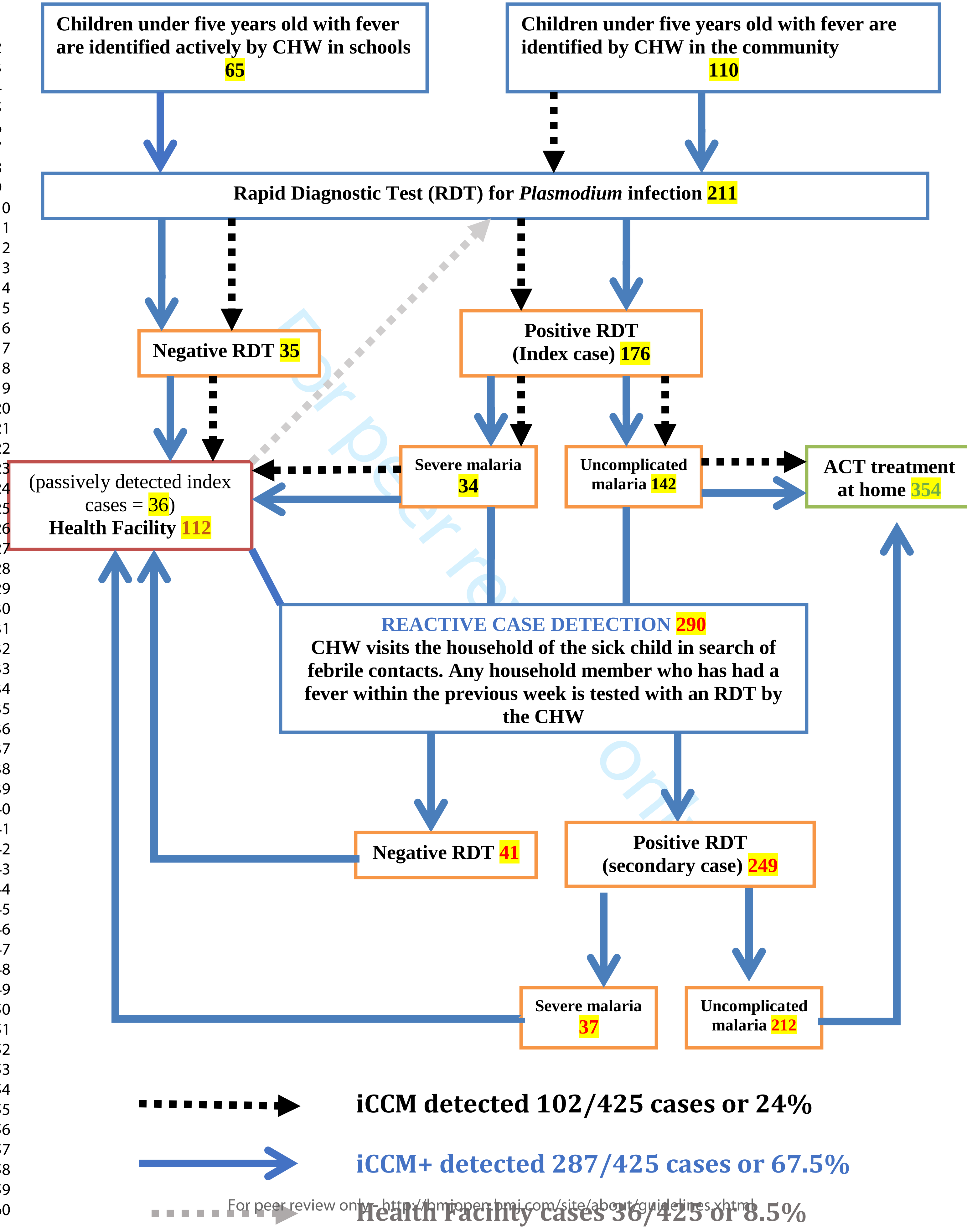


Figure 2. Trend in the number of cases of confirmed malaria

79x43mm (300 x 300 DPI)


Children under five years old with fever are identified actively by CHW in schools 65
Children under five years old with fever are identified by CHW in the community 110
Rapid Diagnostic Test (RDT) for Plasmodium infection 211
Negative RDT 35
Positive RDT (Index case) 176
(passively detected index cases = 36) Health Facility 112
Severe malaria 34
Uncomplicated malaria 142
ACT treatment at home 354
REACTIVE CASE DETECTION 290
CHW visits the household of the sick child in search of febrile contacts. Any household member who has had a fever within the previous week is tested with an RDT by the CHW
Negative RDT 41
Positive RDT (secondary case) 249
Severe malaria 37
Uncomplicated malaria 212
iCCM detected 102/425 cases or 24%
iCCM+ detected 287/425 cases or 67.5%
Health Facility cases 36/425 or 8.5%

Number	Case Number	Case Type Primary: 1 Secondary: 2	Age	Sex Male: 1 Female: 2	Quartier	Fever? No: 0 Yes: 1	RDT Result Negative: 0 Positive: 1	If simple malaria, ACT given? No: 0 Yes: 1 Refused: 2	If complicated malaria or negative RDT, referred? No: 0 Yes: 1	Primary Case Location School: 1 Hospital: 2 Community: 3	Household population	Total LLIN	Total LLIN Attached	ASC	Week	Date of Fever	Date Found by ASC	How long it took? (Days)
1	1	1	4	1	B Bis	1	1	1	0	2	4	3	1	JY	1	16/04/2018	19/04/2018	3
2	1.1	2	10	1	B Bis	0	0	0	0	2				JY	1		19/04/2018	
3	1.2	2	48	2	B Bis	0	0	0	0	2				JY	1		19/04/2018	
4	1.3	2	18	1	B Bis	0	0	0	0	2				JY	1		19/04/2018	
5	2	1	2	2	Bareko	1	1	1	0	2	3	2	2	JY	1	17/04/2018	19/04/2018	2
6	2.1	2	31	2	Bareko	0	0	0	0	2				JY	1		19/04/2018	
7	2.2	2	41	1	Bareko	0	0	0	0	2				JY	1		19/04/2018	
8	3	1	3	1	Ebouh	1	1	1	0	1	9	5	5	ZK	1	14/04/2018	19/04/2018	5
9	3.1	2	14	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
10	3.2	2	11	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
11	4	1	5	1	Ebouh	1	1	1	0	1	9	4	4	ZK	1	16/04/2018	19/04/2018	3
12	4.1	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
13	4.2	2	12	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
14	4.3	2	3	1	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
15	4.4	2	5	2	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
16	4.5	2	8	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
17	5	1	5	2	Ebouh	1	1	1	0	1	15	0	0	ZK	1	16/04/2018	19/04/2018	3
18	5.1	2	8	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
19	5.2	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
20	5.3	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
21	6	1	4	1	Ebouh	1	1	1	0	1	4	2	2	ZK	1	15/04/2018	19/04/2018	4
22	6.1	2	35	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
23	7	1	5	2	Ebouh	1	1	1	0	1	6	6	6	ZK	1	10/04/2018	19/04/2018	9
24	7.1	2	48	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
25	7.2	2	28	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
26	8	1	4	1	Ebouh	1	1	1	0	1	6	3	3	ZK	1	15/04/2018	19/04/2018	4
27	8.1	2	2	1	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
28	9	1	4	2	Ebouh	1	1	1	0	3	8	4	4	ZK	1	13/04/2018	21/04/2018	8
29	10	1	4	2	Ebouh	1	1	1	0	1	6	2	2	ZK	1	15/04/2018	19/04/2018	4
30	11	1	4	1	Ebouh	1	1	1	0	3	7	4	4	ZK	1	13/04/2018	19/04/2018	6
31	12	1	5	2	Ebouh	1	1	1	0	1	3	1	1	ZK	1	16/04/2018	19/04/2018	3
32	13	1	4	2	B Bis	1	0	0	1	1	5	2	2	ZK	1	15/04/2018	19/04/2018	4
33	14	1	5	2	B Bis	1	1	1	0	3	4	2	2	JL	1	19/04/2018	21/04/2018	2
34	14.1	2	27	1	B Bis	1	0	0	1	3				JL	1		21/04/2018	
35	14.2	2	25	2	B Bis	1	0	0	1	3				JL	1		21/04/2018	
36	14.3	2	19	2	B Bis	1	0	0	1	3				JL	1		21/04/2018	
37	15	1	1	1	F	1	1	1	0	3	10	4	4	MN	1	17/04/2018	19/04/2018	2
38	15.1	2	5	2	F	1	1	1	0	3				MN	1		19/04/2018	
39	15.2	2	38	2	F	0	0	0	0	3				MN	1		19/04/2018	
40	15.3	2	18	1	F	0	0	0	0	3				MN	1		19/04/2018	
41	15.4	2	10	2	F	0	0	0	0	3				MN	1		19/04/2018	
42	15.5	2	12	2	F	1	0	0	1	3				MN	1		19/04/2018	
43	15.6	2	21	2	F	0	0	0	0	3				MN	1		19/04/2018	
44	15.7	2	8	1	F	0	0	0	0	3				MN	1		19/04/2018	
45	15.8	2	47	1	F	0	0	0	0	3				MN	1		19/04/2018	
46	16	1	4	2	E	1	0	0	1	3				MN	1	19/04/2018	19/04/2018	0
47	17	1	1	1	E	1	1	1	0	3	8	4	4	BN	1	21/04/2018	21/04/2018	0
48	17.1	2	5	1	E	1	1	1	0	3				BN	1		21/04/2018	
49	17.2	2	11	2	E	1	1	0	1	3				BN	1		21/04/2018	
50	17.3	2	50	1	E	0	0	0	0	3				BN	1		21/04/2018	
51	17.4	2	39	2	E	0	0	0	0	3				BN	1		21/04/2018	
52	18	1	5	1	E	1	1	1	0	3	12	6	4	BN	1	21/04/2018	21/04/2018	0
53	18.1	2	2	1	E	0	0	0	0	3				BN	1		21/04/2018	
54	18.2	2	3	1	E	1	1	1	0	3				BN	1		21/04/2018	
55	18.3	2	4	1	E	1	1	1	0	3				BN	1		21/04/2018	
56	18.4	2	5	2	E	1	1	1	0	3				BN	1		21/04/2018	
57	19	1	4	1	E	1	1	1	0	1	7	3	3	RT	1	18/04/2018	19/04/2018	1
58	19.1	2	68	1	E	1	1	0	1	1				RT	1		19/04/2018	
59	19.2	2	50	2	E	1	1	0	1	1				RT	1		19/04/2018	
60	19.3	2	13	2	E	1	1	0	1	1				RT	1		19/04/2018	
61	19.4	2	11	2	E	1	1	0	1	1				RT	1		19/04/2018	
62	19.5	2	9	1	E	1	1	0	1	1				RT	1		19/04/2018	
63	19.6	2	7	2	E	1	1	0	1	1				RT	1		19/04/2018	
64	20	1	3	1	F	1	1	1	0	1	6	2	1	RT	1	18/04/2018	19/04/2018	1
65	20.1	2	30	1	F	0	0	0	0	1				RT	1		19/04/2018	
66	20.2	2	28	2	F	0	0	0	0	1				RT	1		19/04/2018	
67	20.3	2	18	2	F	0	0	0	0	1				RT	1		19/04/2018	
68	20.4	2	1	2	F	1	1	1	0	1				RT	1		19/04/2018	
69	21	1	3	2	E Bis	1	1	1	0	1	4	2	1	JY	2	25/04/2018	25/04/2018	0
70	21.1	2	45	2	E Bis	0	0	0	0	1				JY	2		25/04/2018	
71	22	1	3	2	F	1	0	0	1	1				JY	2	23/04/2018	26/04/2018	3
72	23	1	2	1	A Bis	1	1	0	0	2	6	3	2	JY	2	22/04/2018	28/04/2018	6
73	23.1	2	30	1	A Bis	0	0	0	0	2				JY	2		28/04/2018	
74	23.2	2	1	1	A Bis	1	1	1	0	2				JY	2		28/04/2018	
75	24	1	5	2	Bareko	1	1	0	0	2	No Visit			JY	2	23/04/2018	28/04/2018	5
76	25	1	1	1	Bareko	1	1	0	0	2	No Visit			JY	2	23/04/2018	28/04/2018	5
77	26	1	2	1	Ebouh	1	1	1	0	3	6	3	3	ZK	2	20/04/2018	24/04/2018	4
78	26.1	2	17	2	Ebouh	1	1	0	1	3				ZK	2		24/04/2018	
79	26.2	2	7	1	Ebouh	1	1	0	1	3				ZK	2		24/04/2018	
80	27	1	4	1	Ebouh	1	1	1	0	1				ZK	2	23/04/2018	26/04/2018	3
81	27.1	2	5	2	Ebouh	1	0	0	1	1				ZK	2		26/04/2018	
82	28	1	5	1	Ebouh	1	1	1	0	1	5	3	3	ZK	2	21/04/2018	26/04/2018	5
83	28.1	2	4	1	Ebouh	1	1	1	0	1				ZK	2		26/04/2018	
84	29	1	5	2	Ebouh	1	1	1	0	1	6	3	3	ZK	2	20/04/2018	26/04/2018	6
85	29.1	2	5	1	Ebouh	1	1	1	0	1				ZK	2		26/04/2018	
86	30	1	5	2	Ebouh	1	0	0	1	1				ZK	2	23/04/2018	26/04/2018	3
87	31	1	3	2	Ebouh	1	1	1	0	1				ZK	2	21/04/2018	26/04/2018	3
88	32	1	4	2	F Bis	1	1	1	0	3	7	3	2	JL	2	21/04/2018	28/04/2018	7
89	32.1	2	33	2	F Bis	1	0	0	1	3				JL	2		28/04/2018	
90	32.2	2	3	2	F Bis	1	1	1	0	3				JL	2		28/04/2018	
91	32.3	2	4	1	F Bis	1	1	1	0	3				JL	2		28/04/2018	
92	33	1	3	1	Axelourd	1	1	0	0	2	7	0	0	MN	2	25/04/2018	26/04/2018	2
93	33.1	2	13	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
94	33.2	2	6	2	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
95	33.3	2	9	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
96	33.4	2	11	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
97	33.5	2	31	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
98	34	1	5	1	B	1	1	0	0	2	3	0	0	MN	2	24/04/2018	26/04/2018	2
99	34.1	2	23	2	B	0	0	0	0	2				MN	2		26/04/2018	
100	35	1	5	1	F	1	1	0	0	2	6	4	4	MN	2	23/04/2018	26/04/2018	3
101	35.1	2	70	1	F	1	0	0	1	2				MN	2		26/04/2018	
102	36	1	4	2	F	1	1	0	0	2	5	2	2	MN	2	26/04/2018	26/04/2018	0
103	36.1	2	9	2	F	1	1	0	1	2				MN	2		26/04/2018	
104	36.2	2	15	2	F	1	0	0	1	2				MN	2		26/04/2018	
105	37	1	2	1	F	1	1	1	0	3	9	4	0	MN	2	23/04/2018	26/04/2018	3
106	37.1	2	30	2	F	1	0	0	1	3				MN	2		26/04/2018	
107	38	1	4	2	E	1	1	1	0	3	4	2	2	BN	2	25/04/2018	29/04/2018	4
108	38.1	2	45	2	E	0	0	0	0	3				BN	2		29/04/2018	
109	39	1	2	2	B	1	1	1	0	3	8	4	4	RT	2	24/04/2018	25/04/2018	1
110	39.1	2	9	1	B	1	1	0	1	3				RT	2		25/04/2018	
111	39.2	2	5	1	B	1	1	1	0	3				RT	2		25/04/2018	
112	39.3	2	29	2	B	0	0	0	0	3				RT	2		25/04/2018	
113	40	1	5	1	D	1	1	1	0	1	3	1	1	RT	2	24/04/2018	25/04/2018	1
114	40.1	2	3	2	D	1	1	1	0	1				RT	2		25/04/2018	
115	40.2	2	51	2	D	0	0	0	0	1				RT	2		25/04/2018	
116	41	1	3	1	B	1	1	1	0	3	3	1	1	RT	2	24/04/2018	26/04/2018	2
117	42	1	2	1	B Bis	1	0	0	1	1				RT	2	25/04/2018	26/04/2018	1
118	43	1	3	2	C	1	1	1	0	3	9	4	4	RT	2	25/04/2018	26/04/2018	1
119	43.1	2	5	2	C	1	0	0	1	3				RT	2		26/04/2018	
120	43.2	2	38	2	C	1	0	0	1	3				RT	2		26/04/2018	
121	43.3	2	3	2	C	1	1	1	0	3				RT	2		26/04/2018	
122	43.4	2	11	2	C	1	1	0	1	3				RT	2		26/04/2018	
123	43.5	2	1	1	C	1	1	1	0	3				RT	2		26/04/2018	
124	43.6	2	26	1	C	0	0	0	0	3				RT	2		26/04/2018	
125	43.7	2	18	2	C	0	0	0	0	3				RT	2		26/04/2018	
126	44	1	5	1	B Bis	1	1	1	0	3	7	4	2	RT	2	17/04/2018	25/04/2018	8
127	45	1	5	2	B Bis	1	1	1	0	1	6	2	2	RT	2	25/04/2018	26/04/2018	1

128	45.1	2	5	2	B Bis	1	1	1	0	1				RT	2		26/04/2018	
129	45.2	2	14	2	B Bis	0	0	0	0	1				RT	2		26/04/2018	
130	46	1	4	2	E Bis	1	1	1	0	1	2	2	2	RT	2	26/04/2018	26/04/2018	0
131	46.1	2	36	2	E Bis	0	0	0	0	1				RT	2		26/04/2018	
132	47	1	1	1	B	1	1	1	0	3	4	2	2	JL	3	02/05/2018	03/05/2018	1
133	47.1	2	45	2	B	1	0	0	1	3				JL	3		03/05/2018	
134	48	1	5	1	B	1	1	1	0	3	4	1	1	JL	3	02/05/2018	03/05/2018	1
135	48.1	2	60	1	B	1	0	0	1	3				JL	3		03/05/2018	
136	49	1	2	1	Bareko	1	1	0	0	2	4	2	2	MN	3	03/05/2018	03/05/2018	0
137	49.1	2	4	1	Bareko	1	1	1	0	2				MN	3		03/05/2018	
138	50	1	5	1	B Bis	1	1	0	0	2	6	2	2	MN	3	27/04/2018	03/05/2018	6
139	50.1	2	9	2	B Bis	1	1	0	1	2				MN	3		03/05/2018	
140	50.2	2	3	2	B Bis	1	1	1	0	2				MN	3		03/05/2018	
141	50.3	2	11	1	B Bis	1	1	0	1	2				MN	3		03/05/2018	
142	51	1	3	1	B	1	1	0	0	2	7	4	0	MN	3	02/05/2018	03/05/2018	1
143	51.1	2	9	1	B	1	1	0	1	2				MN	3		03/05/2018	
144	52	1	2	1	F	1	1	0	0	2	10	3	3	MN	3	02/05/2018	03/05/2018	1
145	52.1	2	4	2	F	1	1	1	0	2				MN	3		03/05/2018	
146	52.2	2	7	2	F	1	1	0	1	2				MN	3		03/05/2018	
147	52.3	2	10	2	F	1	1	0	1	2				MN	3		03/05/2018	
148	53	1	5	2	D	1	1	0	0	2	4	0	0	MN	3	02/05/2018	03/05/2018	1
149	53.1	2	2	2	D	1	1	1	0	2				MN	3		03/05/2018	
150	53.2	2	0.17	1	D	1	1	1	0	2				MN	3		03/05/2018	
151	54	1	0.58	2	Bareko	1	1	0	0	2	8	4	4	MN	3	02/05/2018	03/05/2018	1
152	54.1	2	27	2	Bareko	1	1	0	1	2				MN	3		03/05/2018	
153	55	1	4	1	E	1	1	0	0	2	4	2	2	MN	3	02/05/2018	03/05/2018	1
154	55.1	2	2	1	E	1	1	1	0	2				MN	3		03/05/2018	
155	56	1	5	1	Bareko	1	1	0	0	2	11	6	2	BN	3	01/05/2018	03/05/2018	2
156	56.1	2	5	1	Bareko	1	1	1	0	2				BN	3		03/05/2018	
157	56.2	2	2	1	Bareko	0	0	0	0	2				BN	3		03/05/2018	
158	56.3	2	10	2	Bareko	1	1	0	1	2				BN	3		03/05/2018	
159	56.4	2	18	2	Bareko	0	0	0	0	2				BN	3		03/05/2018	
160	57	1	3	2	Ebouh	1	1	1	0	1	6	2	2	ZK	3	01/05/2018	03/05/2018	2
161	57.1	2	14	1	Ebouh	1	1	0	1	1				ZK	3		03/05/2018	
162	58	1	3	1	Ebouh	1	1	1	0	1	6	0	0	ZK	3	01/05/2018	03/05/2018	2
163	58.1	2	8	2	Ebouh	1	1	0	1	1				ZK	3		03/05/2018	
164	59	1	5	1	B Bis	1	1	1	0	1	4	2	2	ZK	3	01/05/2018	03/05/2018	
165	59.1	2	30	2	B Bis	1	1	0	1	1				ZK	3		03/05/2018	
166	60	1	5	1	Ebouh	1	1	1	0	1	6	3	3	ZK	3	01/05/2018	03/05/2018	2
167	60.1	2	35	2	Ebouh	1	0	0	1	1				ZK	3		03/05/2018	
168	61	1	5	1	Ebouh	1	0	0	1	1				ZK	3	01/05/2018	03/05/2018	2
169	62	1	3	1	Ebouh	1	0	0	1	1	4	2	1	ZK	3	02/05/2018	03/05/2018	1
170	63	1	3	2	D	1	1	1	0	3	5	2	2	RT	3	02/05/2018	02/05/2018	0
171	63.1	2	5	2	D	1	1	1	0	3				RT	3		02/05/2018	
172	63.2	2	2	1	D	1	0	0	1	3				RT	3		02/05/2018	
173	64	1	4	1	F Bis	1	1	1	0	1	5	2	2	RT	3	27/04/2018	03/05/2018	6
174	64.1	2	3	1	F Bis	1	0	0	1	1				RT	3		03/05/2018	
175	65	1	2	2	B	1	0	0	1	3	8	3	3	RT	3	01/05/2018	03/05/2018	2
176	66	1	2	2	B	1	0	0	1	3	6	3	3	RT	3	03/05/2018	03/05/2018	0
177	67	1	5	1	B Bis	1	0	0	1	1				RT	3	03/05/2018	03/05/2018	0
178	68	1	5	1	D	1	0	0	1	1				RT	3	02/05/2018	03/05/2018	1
179	69	1	4	1	A	1	0	0	1	1				RT	3	02/05/2018	03/05/2018	1
180	70	1	3	1	E	1	1	0	0	2	10	0	0	JY	3	28/04/2018	03/05/2018	5
181	70.1	2	9	2	E	1	1	0	1	2				JY	3		03/05/2018	
182	70.2	2	3	1	E	1	1	1	0	2				JY	3		03/05/2018	
183	71	1	5	2	B	1	1	1	0	3	5	3	3	MN	4	06/05/2018	10/05/2018	4
184	71.1	2	8	1	B	1	1	0	1	3				MN	4		10/05/2018	
185	72	1	4	1	F	1	1	1	0	3	5	2	2	MN	4	08/05/2018	10/05/2018	2
186	72.1	2	3	1	F	1	1	1	0	3				MN	4		10/05/2018	
187	72.2	2	5	2	F	1	1	1	0	3				MN	4		10/05/2018	
188	72.3	2	2	1	F	1	1	1	0	3				MN	4		10/05/2018	
189	73	1	1	1	F	1	0	0	1	3				MN	4	05/05/2018	10/05/2018	5
190	74	1	3	2	F	1	0	0	1	3				MN	4	05/05/2018	10/05/2018	5
191	75	1	4	2	Bareko	1	1	1	0	3	6	0	0	MN	4	07/05/2018	10/05/2018	3
192	75.1	2	5	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
193	75.2	2	3	2	Bareko	1	1	1	0	3				MN	4		10/05/2018	
194	75.3	2	5	2	Bareko	1	1	1	0	3				MN	4		10/05/2018	
195	76	1	5	2	Bareko	1	1	1	0	3	9	5	5	MN	4	07/05/2018	10/05/2018	3
196	76.1	2	0.5	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
197	76.2	2	3	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
198	76.3	2	2	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
199	76.4	2	4	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
200	77	1	2	2	E	1	1	1	0	3				BN	4	10/05/2018	10/05/2018	0
201	77.1	2	5	2	E	1	1	1	0	3				BN	4		10/05/2018	
202	78	1	2	2	A	1	1	1	0	3				BN	4	08/05/2018	11/05/2018	3
203	78.1	2	3	2	A	1	1	1	0	3				BN	4		11/05/2018	
204	79	1	3	1	E Bis	1	1	1	0	1	2	1	1	RT	4	02/05/2018	03/05/2018	1
205	79.1	2	22	2	E Bis	1	0	0	1	1				RT	4		03/05/2018	
206	80	1	4	2	D	1	1	1	0	1	6	4	4	RT	4	01/05/2018	03/05/2018	2
207	81	1	2	2	A	1	1	1	0	3	5	4	4	JY	4	09/05/2018	10/05/2018	1
208	81.1	2	1	1	A	1	1	1	0	3				JY	4		10/05/2018	
209	82	1	5	2	A	1	1	1	0	3	5	3	2	JY	4	10/05/2018	11/05/2018	1
210	83	1	4	1	Ebouh	1	1	1	0	1	10	0	0	ZK	4	07/05/2018	10/05/2018	3
211	83.1	2	6	1	Ebouh	1	1	0	1	1				ZK	4		10/05/2018	
212	83.2	2	3	1	Ebouh	1	0	0	1	1				ZK	4		10/05/2018	
213	84	1	1	1	B Bis	1	1	1	0	3	5	3	3	ZK	4	08/05/2018	10/05/2018	2
214	84.1	2	27	2	B Bis	1	0	0	1	3				ZK	4		10/05/2018	
215	85	1	5	1	Ebouh	1	0	0	1	1				ZK	4	09/05/2018	10/05/2018	1
216	86	1	5	1	Ebouh	1	1	1	0	1	5	3	3	ZK	4	08/05/2018	10/05/2018	2
217	86.1	2	35	2	Ebouh	1	1	0	1	1				ZK	4		10/05/2018	
218	87	1	5	1	Ebouh	1	0	0	1	1				ZK	4	07/05/2018	10/05/2018	3
219	88	1	4	1	Ebouh	1	0	0	1	1				ZK	4	08/05/2018	10/05/2018	2
220	89	1	4	2	F	1	1	1	0	3	5	2	2	JL	4	06/05/2018	07/05/2018	1
221	89.1	2	45	1	F	1	0	0	1	3				JL	4		07/05/2018	
222	89.2	2	15	1	F	1	0	0	1	3				JL	4		07/05/2018	
223	90	1	3	2	Ebouh	1	1	1	0	3	6	3	3	ZK	5	14/05/2018	15/05/2018	1
224	90.1	2	6	2	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
225	90.2	2	61	1	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
226	90.3	2	6	1	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
227	91	1	2	1	Ebouh	1	1	1	0	1	6	3	3	ZK	5	15/05/2018	17/05/2018	2
228	91.1	2	7	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
229	91.2	2	56	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
230	92	1	3	1	Ebouh	1	1	1	0	1	8	3	3	ZK	5	15/05/2018	17/05/2018	2
231	92.1	2	60	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
232	92.2	2	10	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
233	92.3	2	16	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
234	93	1	3	1	Ebouh	1	1	1	0	1	6	3	3	ZK	5	14/05/2018	17/05/2018	3
235	93.1	2	8	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
236	93.2	2	58	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
237	94	1	4	1	E	1	0	0	1	1				ZK	5	13/05/2018	17/05/2018	4
238	95	1	3	2	Ebouh	1	0	0	1	1				ZK	5	15/05/2018	17/05/2018	2
239	96	1	3	1	Ebouh	1	0	0	1	1				ZK	5	14/05/2018	17/05/2018	3
240	97	1	3	2	Ebouh	1	0	0	1	1				ZK	5	15/05/2018	17/05/2018	2
241	98	1	5	1	C	1	1	1	0	3	4	2	2	MN	5	14/05/2018	17/05/2018	3
242	98.1	2	14	2	C	1	1	1	0	3				MN	5		17/05/2018	
243	98.2	2	61	2	C	1	1	1	0	3				MN	5		17/05/2018	
244	98.3	2	12	1	C	1	1	1	0	3				MN	5		17/05/2018	
245	99	1	4	2	F	1	1	1	0	3	7	3	3	MN	5	14/05/2018	17/05/2018	3
246	99.1	2	10	1	F	1	1	1	0	3				MN	5		17/05/2018	
247	99.2	2	48	1	F	1	1	1	0	3				MN	5		17/05/2018	
248	99.3	2	9	1	F	1	1	1	0	3				MN	5		17/05/2018	
249	100	1	3	1	B	1	1	1	0	3	4	2	2	MN	5	14/05/2018	17/05/2018	3
250	100.1	2	20	1	B	1	1	1	0	3				MN	5		17/05/2018	
251	100.2	2	60	1	B	1	1	1	0	3				MN	5		17/05/2018	
252	101	1	2	2	F Bis	1	1	1	0	3	4	0	0	MN	5	15/05/2018	17/05/2018	2
253	101.1	2	34	2	F Bis	1	1	1	0	3				MN	5		17/05/2018	
254	101.2	2	37	1	F Bis	1	1	1	0	3				MN	5		17/05/2018	
255	101.3	2	12	2	F Bis	1	1	1	0	3				MN	5		17/05/2018	
256	102	1	2	2	F	1	1	1	0	3	7	3	3	MN	5	11/05/2018	17/05/2018	6
257	102.1	2	6	2	F	1	1	1	0	3				MN	5		17/05/2018	
258	102.2	2	14	2	F	1	1	1	0	3				MN	5		17/05/2018	
259	103	1	0.75	1	F Bis	1	1	1	0	3	9	4	4	MN	5	10/05/2018	17/05/2018	7
260	103.1	2	0.17	1	F Bis	1	0	0	1	3				MN	5		17/05/2018	
261	103.2	2	65	1	F Bis	1	1	1	0	3				MN	5		17/05/2018	
262	104	1	3	2	D	1	1	0	0	2	5	3	0	MN	5	16/05/2018	17/05/2018	1

263	104.1	2	25	2	D	1	1	1	0	2				MN	5		17/05/2018	
264	104.2	2	49	2	D	1	1	1	0	2				MN	5		17/05/2018	
265	105	1	2	2	A Bis	1	1	1	0	3	8	2	2	MN	5	16/05/2018	17/05/2018	1
266	105.1	2	8	2	A Bis	1	1	1	0	3				MN	5		17/05/2018	
267	106	1	1	1	D	1	1	1	0	3	8	4	4	MN	5	14/05/2018	17/05/2018	3
268	106.1	2	47	2	D	1	1	1	0	3				MN	5		17/05/2018	
269	106.2	2	12	2	D	1	1	1	0	3				MN	5		17/05/2018	
270	106.3	2	19	1	D	1	1	1	0	3				MN	5		17/05/2018	
271	106.4	2	11	2	D	1	1	1	0	3				MN	5		17/05/2018	
272	107	1	0.67	2	A Bis	1	1	0	0	2	4	1	1	MN	5	16/05/2018	17/05/2018	1
273	107.1	2	2	2	A Bis	1	0	0	1	2				MN	5		17/05/2018	
274	107.2	2	25	2	A Bis	1	1	1	0	2				MN	5		17/05/2018	
275	108	1	5	1	B Bis	1	1	1	0	1	6	2	1	RT	5	14/05/2018	16/05/2018	2
276	108.1	2	3	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
277	108.2	2	7	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
278	109	1	3	2	B Bis	1	0	0	1	1				RT	5	16/05/2018	16/05/2018	0
279	110	1	5	1	C	1	1	1	0	1	9	1	1	RT	5	16/05/2018	17/05/2018	1
280	110.1	2	2	2	C	1	1	1	0	1				RT	5		17/05/2018	
281	111	1	4	2	F	1	1	1	0	1	6	2	2	RT	5	16/05/2018	17/05/2018	1
282	112	1	5	1	B Bis	1	1	1	0	1	4	1	1	RT	5	16/05/2018	16/05/2018	0
283	112.1	2	1	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
284	113	1	4	2	B	1	0	0	1	1				RT	5	16/05/2018	17/05/2018	1
285	114	1	2	1	A	1	1	1	0	3	4	2	2	JY	5	16/05/2018	16/05/2018	0
286	114.1	2	62	1	A	1	1	1	0	3				JY	5		16/05/2018	
287	115	1	2	1	F Bis	1	1	1	0	3	4	2	2	JY	5	15/05/2018	16/05/2018	1
288	115.1	2	65	1	F Bis	1	1	1	0	3				JY	5		16/05/2018	
289	116	1	3	2	E Bis	1	1	1	0	3	5	3	3	JY	5	14/05/2018	14/05/2018	0
290	116.1	2	35	2	E Bis	1	1	1	0	3				JY	5		14/05/2018	
291	117	1	2	1	F	1	1	0	0	2	4	2	2	JL	5	08/05/2018	10/05/2018	2
292	117.1	2	45	1	F	1	0	0	1	2				JL	5		10/05/2018	
293	118	1	2	1	F	1	1	0	0	2	3	1	1	JL	5	02/05/2018	10/05/2018	8
294	118.1	2	18	2	F	1	0	0	1	2				JL	5		10/05/2018	
295	119	1	0.75	1	E	1	1	0	0	2	7	3	3	JL	5	02/05/2018	10/05/2018	8
296	119.1	2	38	1	E	1	0	0	1	2				JL	5		10/05/2018	
297	120	1	4	1	A Bis	1	1	1	0	3	6	0	0	JL	5	11/05/2018	17/05/2018	6
298	120.1	2	55	2	A Bis	1	0	0	1	3				JL	5		17/05/2018	
299	121	1	4	2	F	1	1	1	0	3	6	2	2	JL	5	16/05/2018	17/05/2018	1
300	121.1	2	58	2	F	1	1	1	0	3				JL	5		17/05/2018	
301	122	1	3	1	Axelourd	1	1	1	0	3	7	5	3	JL	5	16/05/2018	17/05/2018	1
302	122.1	2	20	2	Axelourd	1	1	1	0	3				JL	5		17/05/2018	
303	122.2	2	55	2	Axelourd	1	1	1	0	3				JL	5		17/05/2018	
304	123	1	3	1	Ebouh	1	1	1	0	3	7	4	4	ZK	6	23/05/2018	26/05/2018	3
305	123.1	2	6	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
306	123.2	2	30	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
307	123.3	2	10	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
308	124	1	5	1	Ebouh	1	1	1	0	1	4	0	0	ZK	6	22/05/2018	24/05/2018	2
309	124.1	2	57	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
310	124.2	2	30	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
311	124.3	2	4	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
312	125	1	3	2	Ebouh	1	0	0	1	1				ZK	6	21/05/2018	24/05/2018	3
313	126	1	4	1	Ebouh	1	0	0	1	1				ZK	6	20/05/2018	24/05/2018	4
314	127	1	3	1	E Bis	1	1	1	0	3	6	3	3	BN	6	23/05/2018	25/05/2018	2
315	127.1	2	5	1	E Bis	1	1	1	0	3				BN	6		25/05/2018	
316	127.2	2	31	2	E Bis	1	1	1	0	3				BN	6		25/05/2018	
317	128	1	3	2	Bareko	1	1	1	0	1	6	3	2	BN	6	22/05/2018	24/05/2018	2
318	128.1	2	45	2	Bareko	1	1	1	0	1				BN	6		24/05/2018	
319	128.2	2	39	1	Bareko	1	1	1	0	1				BN	6		24/05/2018	
320	129	1	4	1	A	1	1	1	0	1	7	4	4	BN	6	21/05/2018	24/05/2018	3
321	129.1	2	12	1	A	1	1	1	0	1				BN	6		24/05/2018	
322	130	1	4	1	Bareko	1	1	1	0	1	5	3	2	BN	6	23/05/2018	25/05/2018	2
323	130.1	2	5	2	Bareko	1	1	1	0	1				BN	6		25/05/2018	
324	130.2	2	7	2	Bareko	1	1	1	0	1				BN	6		25/05/2018	
325	130.3	2	60	1	Bareko	1	1	1	0	1				BN	6		25/05/2018	
326	131	1	4	1	A Bis	1	1	1	0	3	4	2	2	BN	6	21/05/2018	23/05/2018	2
327	131.1	2	8	2	A Bis	1	1	1	0	3				BN	6		23/05/2018	
328	131.2	2	6	2	A Bis	1	1	1	0	3				BN	6		23/05/2018	
329	131.3	2	50	1	A Bis	1	1	1	0	3				BN	6		23/05/2018	
330	132	1	2	1	F Bis	1	1	0	0	2	7	4	4	JY	6	15/05/2018	15/05/2018	0
331	133	1	3	2	F	1	1	0	0	2	5	2	2	JY	6	04/05/2018	07/05/2018	3
332	133.1	2	35	2	A	1	1	1	0	2				JY	6		07/05/2018	1
333	134	1	3	1	B Bis	1	1	1	0	3	5	3	3	JY	6	24/05/2018	24/05/2018	0
334	134.1	2	40	1	B Bis	1	1	1	0	3				JY	6		24/05/2018	1
335	135	1	4	2	Bareko	1	0	0	1	1	4	1	1	JY	6	24/05/2018	24/05/2018	0
336	136	1	4	1	A	1	1	1	0	3	6	3	3	MN	6	23/05/2018	26/05/2018	3
337	136.1	2	62	2	A	1	1	1	0	3				MN	6		26/05/2018	
338	136.2	2	17	1	A	1	1	1	0	3				MN	6		26/05/2018	
339	136.3	2	68	1	A	1	1	1	0	3				MN	6		26/05/2018	
340	137	1	3	1	Bareko	1	1	1	0	3	7	4	4	MN	6	21/05/2018	23/05/2018	2
341	137.1	2	7	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
342	137.2	2	8	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
343	137.3	2	16	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
344	137.4	2	59	2	Bareko	1	1	1	0	3				MN	6		23/05/2018	
345	137.5	2	12	2	Bareko	1	1	1	0	3				MN	6		23/05/2018	
346	138	1	5	1	B Bis	1	1	1	0	3	8	3	2	MN	6	20/05/2018	24/05/2018	4
347	138.1	2	30	2	B Bis	1	1	1	0	3				MN	6		24/05/2018	
348	138.2	2	2	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
349	138.3	2	42	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
350	139	1	1	2	B	1	1	1	0	3	6	2	2	MN	6	20/05/2018	24/05/2018	4
351	139.1	2	9	2	B	1	1	1	0	3				MN	6		24/05/2018	
352	139.2	2	7	1	B	1	1	1	0	3				MN	6		24/05/2018	
353	139.3	2	4	1	B	1	1	1	0	3				MN	6		24/05/2018	
354	139.4	2	22	2	B	1	1	1	0	3				MN	6		24/05/2018	
355	139.5	2	34	1	B	1	1	1	0	3				MN	6		24/05/2018	
356	140	1	5	1	F	1	1	1	0	3	7	5	5	MN	6	20/05/2018	24/05/2018	4
357	140.1	2	6	1	F	1	1	1	0	3				MN	6		24/05/2018	
358	141	1	3	2	B Bis	1	1	1	0	3	6	2	2	MN	6	20/05/2018	24/05/2018	4
359	141.1	2	12	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
360	141.2	2	5	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
361	141.3	2	40	2	B Bis	1	1	1	0	3				MN	6		24/05/2018	
362	142	1	3	1	F	1	1	1	0	3	7	4	1	MN	6	21/05/2018	23/05/2018	2
363	142.1	2	11	1	F	1	1	1	0	3				MN	6		23/05/2018	
364	142.2	2	9	1	F	1	1	1	0	3				MN	6		23/05/2018	
365	142.3	2	11	2	F	1	1	1	0	3				MN	6		23/05/2018	
366	142.4	2	15	2	F	1	1	1	0	3				MN	6		23/05/2018	
367	143	1	5	2	B	1	1	1	0	3	9	3	2	MN	6	21/05/2018	21/05/2018	0
368	143.1	2	43	2	B	1	1	1	0	3				MN	6		21/05/2018	
369	143.2	2	11	1	B	1	1	1	0	3				MN	6		21/05/2018	
370	144	1	5	2	D	1	1	1	0	3	8	4	4	MN	6	20/05/2018	21/05/2018	1
371	144.1	2	36	2	D	1	1	1	0	3				MN	6		21/05/2018	
372	144.2	2	12	1	D	1	1	1	0	3				MN	6		21/05/2018	
373	144.3	2	10	2	D	1	1	1	0	3				MN	6		21/05/2018	
374	144.4	2	15	1	D	1	1	1	0	3				MN	6		21/05/2018	
375	145	1	2	1	D	1	1	1	0	3	4	2	2	MN	6	22/05/2018	22/05/2018	0
376	145.1	2	10	1	D	1	1	1	0	3				MN	6		22/05/2018	
377	145.2	2	36	2	D	1	1	1	0	3				MN	6		22/05/2018	
378	145.3	2	7	1	D	1	1	1	0	3				MN	6		22/05/2018	
379	146	1	4	1	D	1	1	0	0	2	9	0	0	MN	6	22/05/2018	24/05/2018	2
380	146.1	2	2	1	D	1	1	1	0	2				MN	6		24/05/2018	
381	147	1	1	1	F Bis	1	1	1	0	3	4	1	1	MN	6	20/05/2018	20/05/2018	0
382	147.1	2	1	2	F Bis	1	1	1	0	3				MN	6		20/05/2018	
383	148	1	3	1	B	1	1	1	0	3	4	1	1	RT	6	22/05/2018	23/05/2018	1
384	149	1	0.5	1	A	1	0	0	1	3	6	2	2	RT	6	23/05/2018	23/05/2018	0
385	150	1	4	2	C	1	1	1	0	3	4	0	0	RT	6	22/05/2018	23/05/2018	1
386	150.1	2	6	2	C	1	1	1	0	3				RT	6		23/05/2018	
387	151	1	4	1	B	1	1	1	0	3	7	3	3	RT	6	25/05/2018	25/05/2018	0
388	151.1	2	34	1	B	1	1	1	0	3				RT	6		25/05/2018	
389	151.2	2	7	1	B	1	0	0	1	3				RT	6		25/05/2018	
390	151.3	2	4	1	B	1	1	1	0	3				RT	6		25/05/2018	
391	152	1	1	2	F Bis	1	1	1	0	3	5	1	1	JL	6	23/05/2018	24/05/2018	1
392	152.1	2	8	2	F Bis	1	1	1	0	3				JL	6		24/05/2018	
393	152.2	2	5	1	F Bis	1	1	1	0	3				JL	6		24/05/2018	
394	153	1	4	1	B Bis	1	1	1	0	3	6	2	2	JL	6	19/05/2018	21/05/2018	2
395	153.1	2	54	2	B Bis	1	1	1	0	3				JL	6		21/05/2018	
396	153.2	2	31	1	B Bis	1	1	1	0	3				JL	6		21/05/2018	
397	153.3	2	18	1	B Bis	1	1	1	0	3				JL	6		21/05/2018	

398	154	1	5	1	B	1	1	1	0	3	9	0	0	JL	6	19/05/2018	21/05/2018	2
399	154.1	2	25	2	B	1	0	0	1	3				JL	6		21/05/2018	
400	155	1	3	1	F	1	1	1	0	3	4	1	1	JL	6	21/05/2018	23/05/2018	2
401	155.1	2	23	2	F	1	1	1	0	3				JL	6		23/05/2018	
402	156	1	0.6	2	F Bis	1	1	1	0	3	12	0	0	JL	6	23/05/2018	24/05/2018	1
403	156.1	2	10	2	F Bis	1	1	1	0	3				JL	6		24/05/2019	
404	156.2	2	11	1	F Bis	1	1	1	0	3				JL	6		24/05/2020	
405	156.3	2	7	2	F Bis	1	1	1	0	3				JL	6		24/05/2021	
406	157	1	2	1	F Bis	1	1	1	0	3	5	2	2	JL	6	23/05/2018	24/05/2018	1
407	157.1	2	39	2	F Bis	1	0	0	1	3				JL	6		24/05/2018	
408	158	1	5	1	C	1	1	1	0	3	9	3	3	RT	7	02/06/2018	02/06/2018	0
409	158.1	2	17	1	C	1	1	1	0	3				RT	7		02/06/2018	
410	158.2	2	18	2	C	1	1	1	0	3				RT	7		02/06/2018	
411	158.3	2	15	1	C	1	1	1	0	3				RT	7		02/06/2018	
412	158.4	2	9	1	C	1	1	1	0	3				RT	7		02/06/2018	
413	158.5	2	12	2	C	1	1	1	0	3				RT	7		02/06/2018	
414	159	1	5	2	B	1	0	0	1	3				RT	7	29/05/2018	31/05/2018	2
415	160	1	2	2	E Bis	1	1	1	0	3	6	3	3	RT	7	03/06/2018	03/06/2018	0
416	160.1	2	9	1	E Bis	1	1	1	0	3				RT	7		03/06/2018	
417	161	1	5	2	D	1	1	1	0	3	8	3	3	RT	7	29/05/2018	31/05/2018	2
418	161.1	2	4	1	D	1	1	1	0	3				RT	7		31/05/2018	
419	161.2	2	11	2	D	1	1	1	0	3				RT	7		31/05/2018	
420	162	1	6	1	Ebouh	1	1	1	0	3	10	5	5	ZK	7	24/05/2018	28/05/2018	4
421	163	1	3	1	Ebouh	1	1	1	0	3	6	3	3	ZK	7	27/05/2018	29/05/2018	2
422	163.1	2	30	1	Ebouh	1	1	1	0	3				ZK	7		29/05/2018	
423	163.2	2	18	1	Ebouh	1	1	1	0	3				ZK	7		29/05/2018	
424	164	1	3	1	Ebouh	1	1	1	0	3	8	4	4	ZK	7	24/05/2018	28/05/2018	4
425	165	1	3	1	Ebouh	1	0	0	1	1				ZK	7	24/05/2018	29/05/2018	5
426	166	1	3	1	Ebouh	1	0	0	1	1				ZK	7	25/05/2018	29/05/2018	4
427	167	1	3	1	Ebouh	1	0	0	1	1				ZK	7	26/05/2018	29/05/2018	3
428	168	1	3	1	Ebouh	1	0	0	1	1				ZK	7	26/05/2018	29/05/2018	3
429	169	1	2	1	B	1	0	0	1	1				ZK	7	25/05/2018	29/05/2018	4
430	170	1	3	1	B	1	0	0	1	1				ZK	7	24/05/2018	29/05/2018	5
431	171	1	5	1	Bareko	1	1	1	0	3	8	1	1	JL	7	29/05/2018	30/05/2018	1
432	171.1	2	33	1	Bareko	1	0	0	1	3				JL	7		30/05/2018	
433	171.2	2	11	2	Bareko	1	1	1	0	3				JL	7		30/05/2018	
434	171.3	2	11	1	Bareko	1	1	1	0	3				JL	7		30/05/2018	
435	172	1	5	2	F Bis	1	1	1	0	3	8	2	1	JL	7	28/05/2018	31/05/2018	3
436	172.1	2	9	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
437	172.2	2	9	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
438	172.3	2	62	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
439	172.4	2	38	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
440	173	1	3	1	F Bis	1	1	1	0	3	3	1	1	JL	7	27/05/2018	30/05/2018	3
441	173.1	2	28	2	F Bis	1	0	0	1	3				JL	7		30/05/2018	
442	174	1	5	1	A Bis	1	1	1	0	3	9	2	2	MN	7	28/05/2018	31/05/2018	3
443	174.1	2	17	1	A Bis	1	1	1	0	3				MN	7		31/05/2018	
444	174.2	2	7	2	A Bis	1	0	0	1	3				MN	7		31/05/2018	
445	174.3	2	15	1	A Bis	1	0	0	1	3				MN	7		31/05/2018	
446	174.4	2	44	1	A Bis	1	1	1	0	3				MN	7		31/05/2018	
447	175	1	2	1	B	1	1	0	0	2	No Visit			MN	7	16/05/2018	31/05/2018	
448	176	1	2	2	F	1	1	1	0	3	15	0	0	MN	7	26/05/2018	31/05/2018	5
449	176.1	2	49	1	F	1	1	1	0	3				MN	7		31/05/2018	
450	176.2	2	14	1	F	1	1	1	0	3				MN	7		31/05/2018	
451	177	1	2	2	F	1	1	1	0	3	7	4	3	MN	7	30/05/2018	31/05/2018	1
452	177.1	2	8	1	F	1	1	1	0	3				MN	7		31/05/2018	
453	177.2	2	6	1	F	1	1	1	0	3				MN	7		31/05/2018	
454	177.3	2	6	2	F	1	1	1	0	3				MN	7		31/05/2018	
455	177.4	2	13	2	F	1	1	1	0	3				MN	7		31/05/2018	
456	177.5	2	37	2	F	1	1	1	0	3				MN	7		31/05/2018	
457	177.6	2	51	1	F	1	0	0	1	3				MN	7		31/05/2018	
458	178	1	5	1	D	1	1	1	0	3	2	1	0	MN	7	30/05/2018	30/05/2018	0
459	178.1	2	59	1	D	1	1	1	0	3				MN	7		30/05/2018	
460	179	1	3	2	F	1	1	1	0	3	6	3	3	MN	7	04/06/2018	04/06/2018	0
461	179.1	2	52	2	F	1	1	1	0	3				MN	7		04/06/2018	
462	180	1	4	2	E	1	1	0	0	2	No Visit			MN	7	14/06/2018	31/05/2018	
463	181	1	4	1	D	1	1	0	0	2	No Visit			MN	7	26/05/2018	31/05/2018	
464	182	1	3	1	D	1	1	0	0	2	No Visit			MN	7	30/05/2018	31/05/2018	
465	183	1	4	2	E	1	1	0	0	2	4	2	2	MN	7	29/05/2018	31/05/2018	2
466	183.1	2	55	2	E	1	1	1	0	2				MN	7		31/05/2018	
467	184	1	5	2	F	1	1	1	0	3	6	1	1	MN	7	29/05/2018	02/06/2018	4
468	184.1	2	74	2	F	1	1	1	0	3				MN	7		02/06/2018	
469	185	1	3	1	A Bis	1	1	0	0	2	No Visit			MN	7	16/05/2018	31/05/2018	
470	186	1	3	2	Bareko	1	1	0	0	2	No Visit			JY	7	19/05/2018	19/05/2018	
471	187	1	2	1	Bareko	1	1	0	0	2	No Visit			JY	7	15/05/2018	15/05/2018	
472	188	1	3	2	B Bis	1	1	1	0	3	4	2	2	JY	7	17/05/2018	18/05/2018	1
473	188.1	2	61	1	B Bis	1	1	1	0	3				JY	7		18/05/2018	
474	189	1	1	2	Ebouh	1	1	0	0	2	No Visit			JY	7	16/05/2018	24/05/2018	
475	190	1	2	1	Ebouh	1	1	0	0	2	No Visit			JY	7	17/05/2018	17/05/2018	
476	191	1	3	1	A Bis	1	1	1	0	3	8	3	3	JY	7	30/05/2018	31/05/2018	1
477	192	1	3	2	B Bis	1	1	1	0	3	6	2	2	JY	7	31/05/2018	31/05/2018	0
478	193	1	3	2	B	1	1	1	0	3	8	4	4	BN	7	28/05/2018	28/05/2018	0
479	193.1	2	2	1	B	1	1	1	0	3				BN	7		28/05/2018	
480	193.2	2	2	1	B	1	1	1	0	3				BN	7		28/05/2018	
481	194	1	3	2	B	1	1	1	0	3	6	3	1	RT	8	05/06/2018	07/06/2018	2
482	194.1	2	7	2	B	1	1	1	0	3				RT	8		07/06/2018	
483	195	1	2	2	C	1	1	1	0	3	7	2	2	RT	8	30/05/2018	08/06/2018	9
484	195.1	2	8	2	C	1	1	1	0	3				RT	8		08/06/2018	
485	195.2	2	41	2	C	1	1	1	0	3				RT	8		08/06/2018	
486	196	1	4	1	A	1	1	1	0	3	6	0	0	RT	8	09/06/2018	10/06/2018	1
487	196.1	2	5	2	A	1	1	1	0	3				RT	8		10/06/2018	
488	197	1	1	2	F	1	1	1	0	3	5	2	2	MN	8	06/06/2018	06/06/2018	0
489	197.1	2	1	2	F	1	1	1	0	3				MN	8		06/06/2018	
490	197.2	2	28	1	F	1	1	1	0	3				MN	8		06/06/2018	
491	198	1	4	1	C	1	1	1	0	3	10	0	0	MN	8	04/06/2018	05/06/2018	1
492	198.1	2	10	2	C	1	1	1	0	3				MN	8		05/06/2018	
493	198.2	2	4	1	C	1	0	0	1	3				MN	8		05/06/2018	
494	198.3	2	13	2	C	1	1	1	0	3				MN	8		05/06/2018	
495	198.4	2	16	1	C	1	1	1	0	3				MN	8		05/06/2018	
496	199	1	3	2	F Bis	1	0	0	1	3				MN	8	06/06/2018	07/06/2018	1
497	200	1	5	1	F Bis	1	1	1	0	3	8	4	4	MN	8	07/06/2018	08/06/2018	1
498	200.1	2	42	2	F Bis	1	1	1	0	3				MN	8		08/06/2018	
499	200.2	2	2	1	F Bis	1	1	1	0	3				MN	8		08/06/2018	
500	201	1	3	1	Bareko	1	1	1	0	3	4	1	1	MN	8	30/05/2018	04/06/2018	5
501	201.1	2	1	2	Bareko	1	1	1	0	3				MN	8		04/06/2018	
502	201.2	2	58	2	Bareko	1	1	1	0	3				MN	8		04/06/2018	
503	202	1	5	1	Ebouh	1	1	1	0	3	5	3	3	ZK	8	04/06/2018	05/06/2018	1
504	202.1	2	50	2	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
505	202.2	2	61	1	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
506	202.3	2	8	1	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
507	203	1	3	1	Ebouh	1	1	1	0	3	7	4	4	ZK	8	03/06/2018	07/06/2018	4
508	203.1	2	45	1	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
509	203.2	2	7	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
510	203.3	2	12	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
511	204	1	3	1	Ebouh	1	1	1	0	3	6	3	3	ZK	8	06/06/2018	07/06/2018	1
512	204.1	2	12	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
513	204.2	2	11	1	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
514	205	1	4	1	Ebouh	1	1	1	0	3	4	0	0	ZK	8	05/06/2018	08/06/2018	3
515	205.1	2	10	1	Ebouh	1	1	1	0	3				ZK	8		08/06/2018	
516	205.2	2	9	2	Ebouh	1	1	1	0	3				ZK	8		08/06/2018	
517	206	1	5	1	Ebouh	1	1	1	0	3	9	5	5	ZK	8	07/06/2018	09/06/2018	2
518	206.1	2	6	2	Ebouh	1	1	1	0	3				ZK	8		09/06/2018	
519	206.2	2	13	2	Ebouh	1	1	1	0	3				ZK	8		09/06/2018	
520	207	1	2	2	B	1	1	1	0	3	2	0	0	JY	8	04/06/2018	05/06/2018	1
521	207.1	2	17	1	B	1	1	1	0	3				JY	8		05/06/2018	
522	208	1	3	1	A	1	1	1	0	3	4	2	2	JY	8	07/06/2018	08/06/2018	1
523	208.1	2	29	2	A	1	1	1	0	3				JY	8		08/06/2018	
524	209	1	2	2	A	1	1	1	0	3	5	2	2	JY	8	07/06/2018	07/06/2018	0
525	209.1	2	39	2	A	1	1	1	0	3				JY	8		07/06/2018	
526	209.2	2	16	1	A	1	1	1	0	3				JY	8		07/06/2018	
527	210	1	4	1	A	1	1	1	0	3	6	4	3	JY	8	08/06/2018	08/06/2018	0
528	210.1	2	49	1	A	1	1	1	0	3				JY	8		08/06/2018	
529	211	1	2	1	F	1	1	1	0	3	4	2	2	JL	8	10/06/2018	10/06/2018	0
530	211.1	2	55	1	F	1	1	1	0	3				JL	8		10/06/2018	
																		467

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract **Page 2**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found **Page 2**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported **Page 3**
Objectives	3	State specific objectives, including any prespecified hypotheses **Page 4**
Methods		
Study design	4	Present key elements of study design early in the paper **Page 4**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection **Page 4-7**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants **Page 5-6**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable **Page 6-7**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group **Page 6-7**
Bias	9	Describe any efforts to address potential sources of bias **Page 6**
Study size	10	Explain how the study size was arrived at **Not calculated**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why **Page 7**
Statistical methods **Page 7**	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed **Page 7-8**
		(b) Give reasons for non-participation at each stage **Figure 1**
		(c) Consider use of a flow diagram **Figure 1**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders **Table 1**
		(b) Indicate number of participants with missing data for each variable of interest **Table 1**
Outcome data	15*	Report numbers of outcome events or summary measures **Tables 1 and 2**
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included **Page 9 and Table 2**
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a

		meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses **Page 9**
Discussion		
Key results	18	Summarise key results with reference to study objectives **Page 10**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias **Page 11**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence **Page 11**
Generalisability	21	Discuss the generalisability (external validity) of the study results **Page 11-12**
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **Page 15**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Adding proactive and reactive case detection into the integrated community case management system (iCCM+) to optimise diagnosis and treatment of malaria in a high transmission setting of Cameroon: an observational quality improvement study

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Adding proactive and reactive case detection into the integrated community case management system (iCCM+) to optimise diagnosis and treatment of malaria in a high transmission setting of Cameroon: an observational quality improvement study

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Key words
Malaria, integrated community case management, active case detection, Cameroon

Abstract

Objective: Integrated community case management (iCCM) of childhood illness is a powerful intervention to reduce mortality. Yet, only 29% and 59% of children with fever in sub-Saharan Africa had access to malaria testing and treatment between 2015 and 2017. We report how iCCM+ based on incorporating active case detection of malaria into iCCM could help improve testing and treatment.

Design: A community-led observational quality improvement study

Setting: The rural community of Bare-Bakem in Cameroon

Participants: Children and adults with fever between April and June 2018

Intervention: A modified iCCM programme (iCCM+) comprised of a proactive screening of febrile children under five years old for malaria using rapid diagnostic testing to identify index cases and a reactive screening triggered by these index cases to detect secondary cases in the community

Primary and secondary outcome measures: The proportion of additional malaria cases detected by iCCM+ over iCCM.

Results: We screened 501 febrile patients of whom *Plasmodium* infection was confirmed in 425 (84.8%) cases. Of these cases, 102 (24.0%) were index cases identified in the community during routine iCCM activity and 36 (8.5%) cases detected passively in health facilities; 38 (8.9%) were index cases identified proactively in schools; and 249 (58.6%) were additional cases detected by reactive case detection (RACD) – computing to a total of 287 (67.5%) additional cases found by iCCM+ over iCCM. The likelihood of finding additional cases increased with increasing family size [adjusted odd ratio (aOR) = 1.2, 95% CI: 54 1.1 – 1.3] and with increasing age [(aOR) = 1.7, 95% CI: 1.5 – 1.9].

Conclusion: Most symptomatic cases of malaria remain undetected in the community despite the introduction of community case management of malaria. iCCM+ can be adopted to diagnose and treat more of these undiagnosed cases especially when targeted to schools, older children and larger households.

Article Summary

Strengths and Limitations of this study

- The first study to show the public health significance of a reactive case detection strategy in a high malaria transmission area
- The study used existing community resources but in a more targeted manner to maximise access to malaria treatment in a poor and rural community
- A small-scale study with no control arm carried out during a relatively short period and during the high transmission season thus inclined towards over-estimating the value of the intervention

Introduction

In Cameroon, malaria-related morbidity has reduced from 40.6% in 2008 to 24.3% in 2017 while malaria proportionate mortality has reduced from 17.6% in 2000 to 12.8% in 2017[1-4]. Despite this remarkable effort, malaria remains a major public health problem in Cameroon where the entire population of more than 25 million inhabitants is at risk, with 71% living in high transmission areas[5]. In 2016, approximately 1.7 million malaria cases and 2637 deaths from malaria were recorded in health facilities in Cameroon. Children under five years of age were the most affected group in whom malaria was responsible for 41% of all-cause morbidity, 55% of hospital admissions and 69.7% of all malaria-attributed deaths in 2015[2]. To reduce childhood mortality, Cameroon and her development partners began implementing integrated community case management (iCCM) of pneumonia, diarrhoea, and malaria in 2009 to target communities with difficult access to health services. Community case management (CCM) of malaria can reduce overall mortality and malaria-specific under-five mortality by 40% and 60%, respectively, and severe malaria morbidity by 53%[6 7]. Yet between 2015and 2017, only 59% of children with fever in sub-Saharan Africa received a malaria diagnostic test and only 29% had received any antimalarial drug [8 9]. In some localities of Cameroon, iCCM strategy has been reported to have increased treatment rate for malaria, increased care seeking for fever and reduced burden on healthcare facilities[10 11]. However, data from a community needs assessment conducted in 2016 in the rural community of Bare-Bakem in the Littoral Region of Cameroon indicated that malaria represented up to 80% of all-cause morbidity across health centres and that iCCM has been facing significant challenges including: low uptake inherent to its passive nature, underutilisation and attrition of trained community health workers (CHWs); prolonged and frequent stockouts of commodities for malaria diagnosis and treatment; inadequate supervision and motivation of CHWs. School children though typically constituting the group with the highest prevalence of *Plasmodium* infection, have been virtually left out of this intervention despite receiving increasing attention recently[12-14]. In response to these challenges that threaten to reverse the initial iCCM gains, Peace Corps Cameroon has been supporting rural communities in Cameroon to effectively fight malaria. In 2018, the Peace Corps community of Bare-Bakem introduced a proactive and reactive case detection approach into the existing iCCM system with the objective to reduce malaria burden by expanding access to prompt malaria case management in the community. Integrating active (proactive and/or reactive) case detection strategy with iCCM has not yet been documented in high transmission settings. We report how in this community-led project, CHW proactively searched for cases of malaria in children under five in schools, health facilities and households; and then using index cases, they reactively detected and treated even more cases in the community by visiting the households of the sick children with confirmed malaria.

Methods

Design: A community-led quality improvement study to measure the proportion of additional *Plasmodium* infection detected under iCCM+ compared with iCCM alone.

Intervention site and priority setting

The intervention was carried out in the rural town of Baré, the headquarters of Baré -Bakem municipality with a population of about 20000 inhabitants occupying a surface area of about 200km². Bare is situated at approximately 10 km from Nkongsamba (the divisional capital) and 120 km from the coastal city of Douala (the regional capital). It has 13 neighbourhoods: Bareko, Ebouth, Axe Lourd, A, A bis, B, B bis, C, D, E, E bis, F and F bis. The locality's low elevation and its warm and wet equatorial climate are conducive for high levels of malaria transmission. The town was host to a Peace Corps Volunteer (PCV) for the period between 2016 and 2018 with the mission to support efforts to fight infant and maternal mortality, malnutrition, malaria and HIV/AIDS. On average, across all the four health facilities in Baré, malaria made up approximately 40% of all sicknesses reported in 2016. Cases of malaria can even represent up to 80% of all sicknesses during the wet season. From a Community Needs Assessment (CNA) carried out in December 2016 and January 2017 prior to the intervention, 84% reported malaria as the most important health problem, but only 34% of respondents knew how malaria was transmitted. 80% of individuals reported first seeking care from traditional healers. The iCCM programme was introduced to respond to these needs but had its shortcomings that led to the conception and implementation of iCCM+ as a modified iCCM intervention.

Intervention description and evaluation

Integrated Community Management (iCCM)

In 2016, as part of the ongoing nation-wide iCCM programme, CHW were trained, supplied and supervised to diagnose and treat children for malaria, pneumonia and diarrhoea, using artemisinin-based combination therapies, oral antibiotics, oral rehydration salts and zinc. Through home visits, patients of all ages in the community are screened for the 3 diseases and treatment is administered based on the results of the examination and diagnostic testing that includes malaria RDTs, disease history and respiratory rate. CHW also deliver health education and promotion talks during these home visits. There are no visits to schools and there is neither the proactive nor the reactive case detection effort. In this study, only the malaria component of iCCM was considered (Figure 1).

Integrated Community Management Plus (iCCM+)

During 8 weeks of the high transmission period between April and June 2018, Baré's six CHWs locally known in French as "*Agent de Santé Communautaire* (ASC)" conducted an active malaria case detection (ACD) involving the addition of both the proactive case detection (PACD) phase and the reactive case detection (RACD) approaches into their existing iCCM activities. In operational terms**, iCCM+ = iCCM + PACD + RACD**

Before launching, the project trained 25 primary and nursery school teachers on malaria detection and on the promotion of prevention & care seeking behaviour. Each CHW was assigned to a school and a collaborative system between teachers and CHWs working together to detect sick children was developed. Consent forms were distributed to the teachers to pass along to parents of pupils for their approval to test their children. Health care workers from the four health centres were also invited to the training in order to build working relations with CHWs. The CHWs had been trained repeatedly over the past years by the National Malaria Control Programme (NMCP) on community management of malaria, but they were briefed alongside two supervisors on the specificities of this project. One supervisor was in charge of correct data collection, while the other inspected schools and visited households to ensure completeness of field work.

PACD was undertaken in 12 primary & nursery schools, 4 health centres, and 13 community neighbourhoods on a weekly basis. Each week on a Thursday, CHWs visited assigned schools and health centres to locate febrile children. Upon arriving at their schools, the trained teachers indicated the pupils under five who had a fever in a recent week. Health workers similarly helped to identify febrile children admitted in health facilities. Children with fever were identified and tested at no cost for *Plasmodium* infection using rapid diagnostic tests (RDT) approved and supplied by the NMCP. Those tested positive for malaria were named as "index cases" and were further classified as either uncomplicated or severe malaria. Uncomplicated malaria cases were immediately treated with amodiaquine + artesunate, the first-line artemisinin-based combination therapy (ACT) recommended and supplied by the NMCP. Severe cases and RDT-negative cases were referred to health facilities for further investigation and management as per the NMCP guidelines. If a febrile child was absent from school the day the CHW arrived, the teacher would tell the CHW where the child lives. The CHW then visited the household to identify and test the sick child. In the community however, CHW continued to identify febrile children as per the conventional iCCM guidelines.

As malaria cases tend to cluster geographically and temporally[15-18], CHWs who also cluster and work in the neighbourhoods in which they live, then proceeded with the RACD method to visit the home of an index case. In the households, they made a list of all persons resident in the household (contacts of the index case), identified and tested those who had a fever in the past week. Those tested positive for malaria RDT were named as "secondary cases" and were also classified and treated or referred to the nearest health centre in a similar way like the index case as illustrated in Figure 1.

Figure 1. The flow chart of the augmented integrated community case management of malaria (iCCM+)

Data was collected using paper registers and later transcribed into a Microsoft Excel electronic database available as a Supplementary File 1. Data collected from the index case during PACD included: age, sex, place of residence, presence of fever, date of onset of fever, date and location seen by a CHW, results of RDT for malaria, severity of malaria and treatment received. During household visits, the same data were collected from febrile contacts in addition to data pertaining to household size, long-lasting treated bed nets ownership and current usage. Health facility malaria surveillance registers and CHW registers were used as sources to abstract data on malaria cases notified between 2015 and 2018.

Data analyses were performed using Stata version 14.2 (StataCorp. LP, College Station, United States of America) and Microsoft Excel 2016 (Microsoft Corporation, Redmond, USA) was used to plot curves. The data set was checked for logical inconsistencies, invalid codes, omissions and improbable data by tabulating, summarizing, describing and plotting variables, depending on their nature. Missing observations were systematically excluded.

The value of iCCM+ over iCCM alone was measured by the proportion of additional cases detected.

To describe similarities or differences between index and secondary cases, summary statistics were presented as proportions for categorical variables, as means and standard deviations for normally distributed continuous variables and as medians and interquartile ranges (IQRs) for continuous variables with a skewed distribution. Associations between categorical variables were assessed using Pearson's $\chi 2$ test or Fisher's exact test for small samples, as appropriate. For continuous variables, mean differences between index cases and contacts were assessed using Student's t test. Associations between exposure variables and the likelihood of finding a contact were evaluated by a univariate logistic regression model; crude odd ratios, 95% confidence intervals (CIs) were reported. Subsequently, factors associated with the odds of a finding a contact in the univariate analysis at a significance level below 5% were included in a multiple logistic regression model with mixed effects to account for the variability in CHW performance. Backward elimination based on a p-value lower than 0.05 was used to retain variables that were independently associated with contact tracing; the corresponding adjusted odds ratios (aOR) and 95% CIs for the final model were reported.

Patient and public involvement statement

As a community-led project, the public and patients were involved in the project planning, implementation and data collection.

The study was approved by the Cameroon National Ethics Review Committee and Peace Corps Cameroon. Individual and parental consent was sought and all information was anonymised and de-identified prior to analysis. An information letter was sent to parents and local administrations, and was announced in community meeting or worshipping places.

Results

Detection and management of cases

At the end of the three-month pilot study, we screened a total of 501 febrile patients of whom *Plasmodium* infection was confirmed in 425 (overall test-positivity of 84.8%) including 176 index cases with a mean age of 3.4 ± 0.1 years who triggered a further screening by RACD of 249 contacts of mean age 19.2 ± 1.2 years (Table 1). On average, index cases were reached within 2.4 ± 0.2 days after onset of fever. Index cases were mostly boys (60.8% vs. 49.8%, p = 0.025) while secondary cases were mostly girls under five years but no gender specificity among older secondary cases. The RDT positivity for malaria was very high in both the index (83.4%) and the secondary cases (85.9%). Of these 425 confirmed malaria cases, 354 (83.3%) were classified as uncomplicated malaria cases who received ACT immediately from the CHW. The 71 cases who did not receive immediate ACT, were classified as severe malaria cases who were referred to the nearest health centre for further management.

Table 1. Characteristics of index and secondary cases of malaria detected between April and June 2018

Characteristics		**Index cases (n = 176)**	**Secondary cases (n = 249)**	**P-value of the difference between the groups of cases**
Reactive cases found per index case source				
	School	38 (21.6)	50 (20.1)	
	Health facility	36 (20.4)	24 (9.6)	
	Community	102 (58.0)	175 (70.3)	
	Total	176 (100.0)	249 (100.0)	0.004
Sex, n (%)				
	Male	107 (60.8)	124 (49.8)	
	Female	69 (39.2)	125 (50.2)	
	Total	176 (100)	249 (100)	0.025
Age, mean (SD) years		3.4 (0.1)	19.2 (1.2)	<0.0001
Immediate malaria treatment, n (%)				
	ACT	142 (80.7)	212 (85.1)	
	No ACT	34 (19.3)	37 (14.9)	
	Total	176 (100)	249 (100)	0.225
Referred to health facility, n (%)				
	Yes	34 (19.3)	37 (14.9)	
	No	142 (81.7)	212 (85.1)	

	Total	176 (100)	249 (100)	<0.001
Household size, mean (95%CI)		6.4 (6.2 – 6.6)		
Household LLIN ownership, mean (95%CI)		2.4 (2.3 – 2.6)		
LLIN coverage per household member (95%CI)		0.38 (0.36 – 0.40)		
LLIN in use per household member (95%CI)		0.34 (0.32 – 0.36)		

Proactive and Reactive case detection of confirmed malaria

During the RACD triggered by 176 index cases of confirmed malaria in children under five, 132 (75%) of these index cases investigated led to at least one additional case and a total of 249 secondary cases identified from 290 febrile contacts within 176 households visited. There were approximately 6 persons on average per household with a bed net ownership of about 2 LLINs per household leading to a bed net coverage of about 1 LLIN for 3 persons. After a lag phase during the first half of the project, the number of cases detected increased sharply over the second half before returning to the initial stable level (Figure 2).

Figure 2. Trend in the number of cases of confirmed malaria between April and June 2018

Of all the 425 confirmed cases, 38 (8.9%) were index cases identified proactively in schools and led to find 50 (11.8%) more cases; 36 (8.5%) were index cases located in health facilities and led to a further 24 (5.6%) cases; and 102 (24.0%) were index cases identified during routine iCCM activity and led to 175 (41.2%) additional cases showing the value of RACD over iCCM alone (Figure 2). Overall, iCCM+ identified 287 of the 425 cases thus indicating that the ongoing iCCM must have been improved by 67.5% to detect malaria cases in the community (Figure 3).

Figure 3. Flow diagram of cases detected and treated during iCCM and iCCM+

During 12 weeks in April, May, and June in 2017 CHWs detected 238 cases of malaria at a rate of ~20 cases per week. But during our 8-week project across April, May and June in 2018, the CHWs detected 365 cases of malaria at a rate of ~45 cases per week computing to a 125% increase from 2017 during the same transmission season.

The odds of finding a secondary case by RACD increased by 70% if the index case was one year younger (adjusted odd ratio (aOR) = 1.7, 95% CI: 1.5 – 1.9) and by 20% if a household size increased by one person (aOR = 1.2, 95% CI: 1.1 – 1.3). Though RACD was likely to find female cases, the evidence to support gender discrimination was rejected in the multiple regression model in Table 2 (aOR = 1.2, 95% CI: 0.7 – 2.1).

Table 2. Multiple logistic regression model of factors associated with secondary case detection (N = 425)

Factor		Number of confirmed secondary cases, n (%)	Crude OR (95%CI)	p-value	Adjusted OR (95%)	p-value
Sex						
	Male	124 (53.7)	Reference		Reference	
	Female	125 (64.4)	1.6 (1.1 – 2.3)	0.024	1.2 (0.7 – 2.1)	0.477
Additional one year of age			1.7 (1.5 – 1.9)	<0.001	1.7 (1.5 – 1.9)	<0.001
Additional one household member			1.2 (1.1 – 1.3)	<0.001	1.2 (1.1 – 1.3)	0.015

Discussion

In this small-scale quality improvement study, we sought to demonstrate in a high transmission area, the feasibility of embedding both the proactive and reactive case detection strategies into integrated community case management in order to maximise malaria case detection and prompt treatment. The study has indicated iCCM+ increased the proportion of persons diagnosed and treated for *Plasmodium* infection by approximately 67.5%. The study has also confirmed that the burden of malaria lies in the community with only the tip of the iceberg seen in health facilities. While iCCM was introduced to respond to this challenge, it was currently underperforming in this rural setting. This project has suggested that iCCM can be adapted to achieve optimal results. While on one hand it may appear obvious that the malaria component of iCCM can be adapted to or opt for a PACD strategy, implementing RACD in a high transmission setting on the other hand may seem experimental or even controversial to some extent. This is because RACD is a surveillance approach recommended in low transmission or pre-elimination settings to disrupt transmission and is thought to be inefficient and infeasible in high transmission settings. Conversely, RACD may also waste time and money when cases are few and sporadic[19-22]. Therefore, the choice of RACD as an approach depends on the objective to be attained, the proportion of cases it can detect and the resources needed. Our project was feasible and efficient because our aim was not to eliminate malaria but to detect and treat the maximum possible number of cases during a high transmission season when the proportion of cases is highest using resources already made available for iCCM in a rural setting where access to health services is limited. The extra resource needed is the time to visit schools, health facilities and households. CHWs told us that by conducting only a one-day visit per week to these facilities and only to households of index cases was more productive and made them more useful in their community. This strategy was not much different from what they were doing before, just a more targeted approach: - targeting schools, targeting households of index cases and targeting high transmission season when fever is likely to be caused by a *Plasmodium* infection as confirmed in this study where RDT was positive in 85% of persons screened for fever and with a high probability of 75% that every index case led to at least one secondary case. Beyond CHW job satisfaction, teachers also expressed their satisfaction and were of great support in detecting fever or a history of fever amongst their pupils. Moreover, we found that teachers were far more likely to help CHW finding the households of sick children than healthcare workers. We thus strongly believe that RACD can be both feasible and efficient in a high transmission setting to maximise clinical case management. Consequently, we recommend that PACD and RACD become part of the ongoing iCCM strategy in Cameroon as an approach to optimise case detection. Yet incorporating PACD and RACD into iCCM will entail building a strong collaboration among CWH, HCW and teachers. Such a partnership already exists between the ministries of health and education in Cameroon in their concerted effort to fight neglected tropical diseases specifically soil-transmitted helminthiasis in school children[23]. The recurrent problem of stockouts of commodities will need to be resolved by the NMCP and field monitoring and supervision should become regular by iCCM programme coordination. Resolving these issues of multisector collaboration, delivery of commodities and field coordination were crucial as bottlenecks and explain in part why progress was slow in the first half of the project. In response to the breakdown in the delivery of commodities, the regional office for the NMCP is now distributing these commodities to health facilities and thus offsetting the transportation hurdles faced by the latter to purchase and pick them up from their regional head offices of NMCP. Moreover, under the ongoing performance-based financing (PBF) system, health facilities are becoming more and more autonomous and can get their commodities from local authorised outlets.

This study has further indicated that, while index cases were likely to be boys, RACD was likely to find girls and women in univariate analysis though such claims were not supported by evidence from multivariate analysis. Boys make up the majority of school children in Cameroon especially in the rural areas and this might be a reflection of this observation[24]. However, it is plausible that gender norms and values that determine the division of labour, leisure patterns, pregnancy, and sex-segregation of sleeping arrangements may lead to different patterns of exposure to mosquitoes for men and women[24-26].

Secondary cases were likely to be older than index cases and to be located in larger households of the index case. Given that we purposely targeted children under five years, it became obvious that we may likely find more of older children and adults as contacts. Clustering of cases has previously been demonstrated in households of the contacts and malaria eradication is thought to be feasible when household size drops below four persons [27 28]. The average household size in this study was six persons thus explaining while it was very likely to find more cases in the community during RACD.

This study had some limitations so that the results should be interpreted with caution. There was no control arm to clearly distinguish between iCCM+ from iCCM intervention areas. A randomised community trial may be recommended as a solution. The duration and period of the study was limited to only three months and to the first half of the wet season. We could not therefore account for neither seasonality in malaria transmission nor account for sustainability throughout the year. Older children and adults were not included as index cases thus creating an outright difference between index and secondary cases. This must have led to an overestimation of the value of RACD in this field study because in routine practice however, adults would be index cases as well. Targeting school children for malaria treatment must have been a laudable effort but older school children were also left out as index cases though they constitute a group with a higher *Plasmodium* infection prevalence than in the targeted younger age group[12]. However, these children were among those screened in the community. We did not measure the effect of this strategy on the pneumonia and diarrhoea components of iCCM but we believe that being an integral part of the package of interventions, these two components were likely to have been improved as well. We did not attempt to measure effect on malaria transmission as most studies have done.

Conclusion

This study has shown that most symptomatic cases of malaria remain undetected in the community despite the introduction of integrated community management of malaria. Schools are an important portal to locate children with undiagnosed malaria. Active case detection based on a proactive and reactive case detection approaches is feasible in a high transmission setting and has been shown to enhance in a synergistic manner the efficiency of integrated community case management of malaria. We recommend that national malaria control programs adopt and implement this modified form of iCCM in similar settings to diagnose and treat more malaria cases in our communities.

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Footnotes

Ethics approval and consent to participate

The study was approved by the National Ethics Review Board of Cameroon, Peace Corps Cameroon and local administrative and health authorities. Verbal consent was obtained from household members after making public announcements and providing an information leaflets to explain the objectives of the project.

Consent for publication

Not Applicable

Availability of data and material

The datasets used and/or analysed during the current study are available as a supplementary file.

Competing interests

The authors declare that they have no competing interests

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Author Contributions

Conception, design and implementation: TDW, CEB

Data collection, analysis and interpretation: TDW, CEB

Drafting the manuscript: CEB

All authors read and approved the final manuscript

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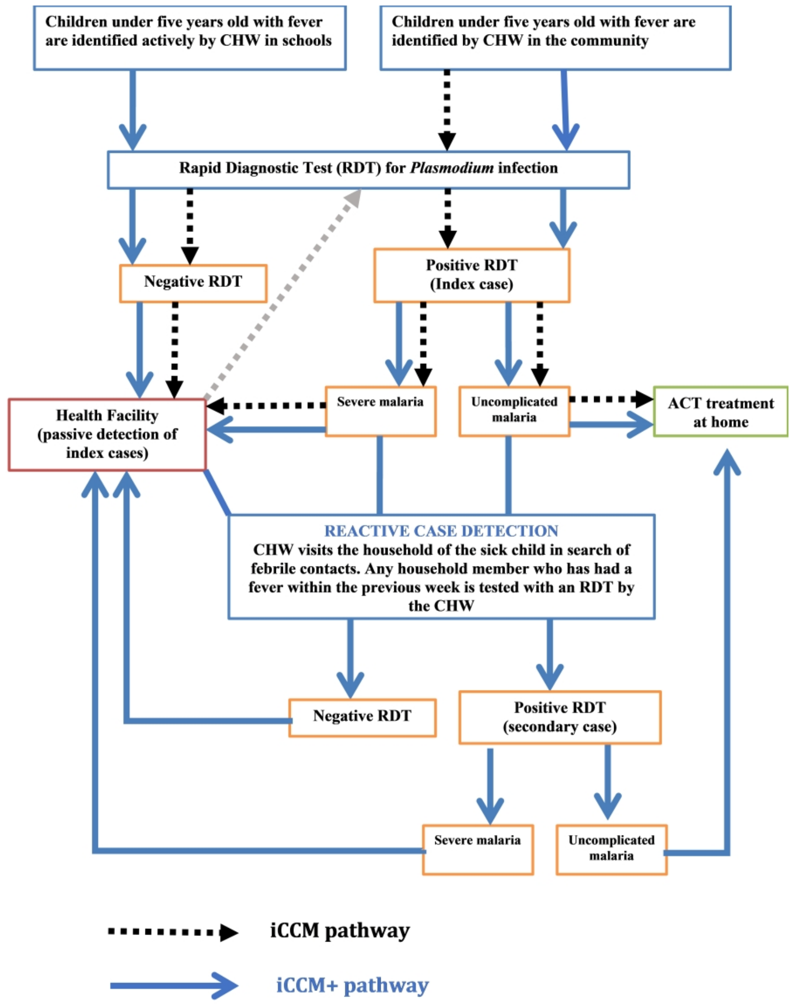


Figure 1. The flow-chart of the augmented integrated community case management of malaria (iCCM+)

522x526mm (300 x 300 DPI)

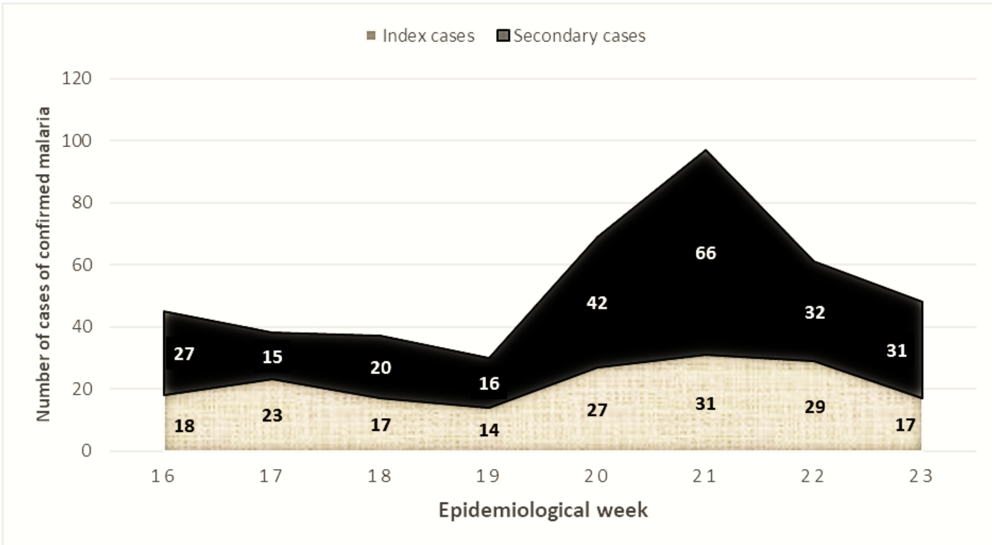
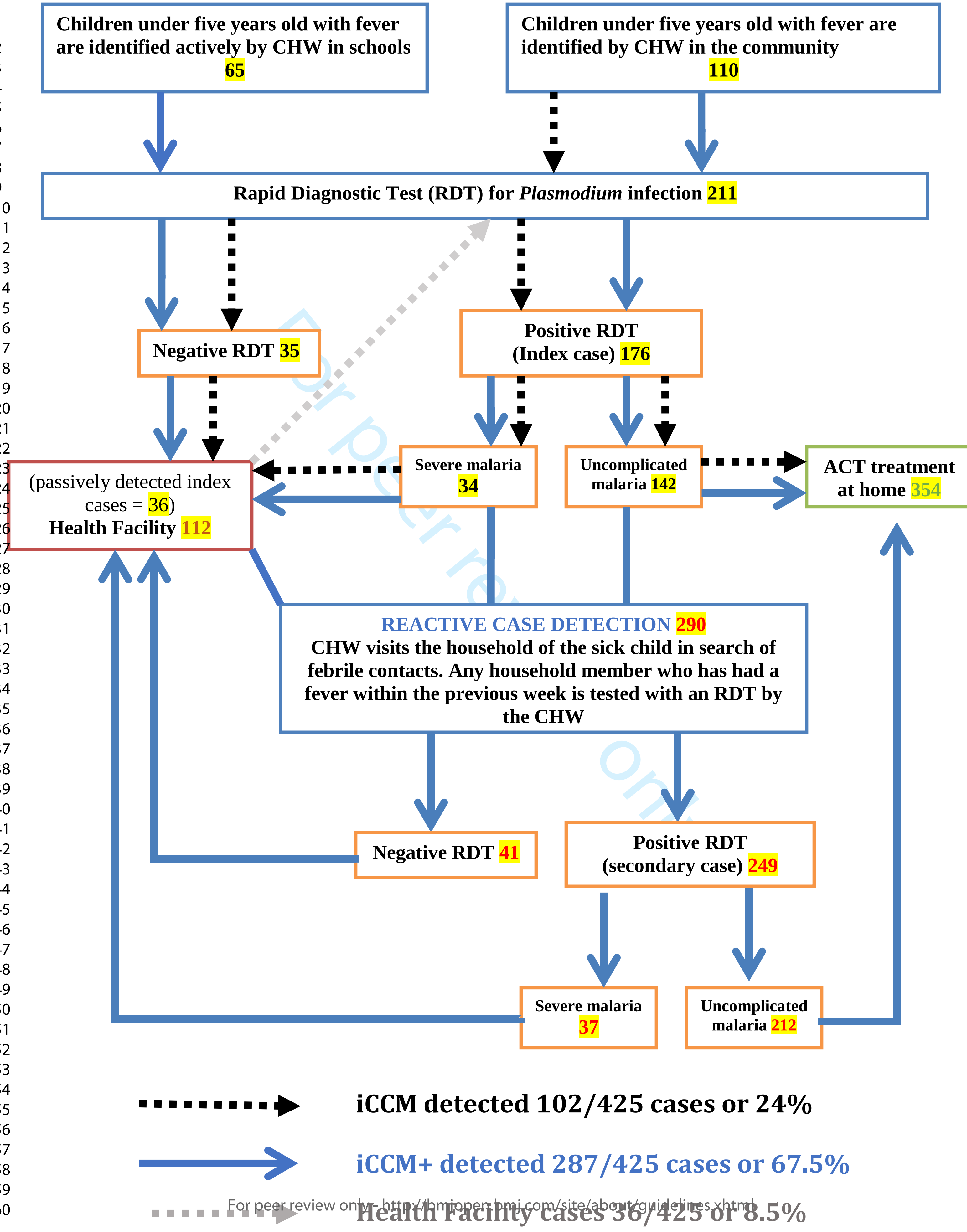


Figure 2. Trend in the number of cases of confirmed malaria

79x43mm (300 x 300 DPI)


Children under five years old with fever are identified actively by CHW in schools 65
Children under five years old with fever are identified by CHW in the community 110
Rapid Diagnostic Test (RDT) for *Plasmodium* infection 211
Negative RDT 35
Positive RDT (Index case) 176
Severe malaria 34
Uncomplicated malaria 142
ACT treatment at home 354
(passively detected index cases = 36)
Health Facility 112
REACTIVE CASE DETECTION 290
CHW visits the household of the sick child in search of febrile contacts. Any household member who has had a fever within the previous week is tested with an RDT by the CHW
Negative RDT 41
Positive RDT (secondary case) 249
Severe malaria 37
Uncomplicated malaria 212
iCCM detected 102/425 cases or 24%
iCCM+ detected 287/425 cases or 67.5%
Health Facility cases 36/425 or 8.5%

Number	Case Number	Case Type Primary: 1 Secondary: 2	Age	Sex Male: 1 Female: 2	Quartier	Fever? No: 0 Yes: 1	RDT Result Negative: 0 Positive: 1	If simple malaria, ACT given? No: 0 Yes: 1 Refused: 2	If complicated malaria or negative RDT, referred? No: 0 Yes: 1	Primary Case Location School: 1 Hospital: 2 Community: 3	Household population	Total LLIN	Total LLIN Attached	ASC	Week	Date of Fever	Date Found by ASC	How long it took? (Days)
1	1	1	4	1	B Bis	1	1	1	0	2	4	3	1	JY	1	16/04/2018	19/04/2018	3
2	1.1	2	10	1	B Bis	0	0	0	0	2				JY	1		19/04/2018	
3	1.2	2	48	2	B Bis	0	0	0	0	2				JY	1		19/04/2018	
4	1.3	2	18	1	B Bis	0	0	0	0	2				JY	1		19/04/2018	
5	2	1	2	2	Bareko	1	1	1	0	2	3	2	2	JY	1	17/04/2018	19/04/2018	2
6	2.1	2	31	2	Bareko	0	0	0	0	2				JY	1		19/04/2018	
7	2.2	2	41	1	Bareko	0	0	0	0	2				JY	1		19/04/2018	
8	3	1	3	1	Ebouh	1	1	1	0	1	9	5	5	ZK	1	14/04/2018	19/04/2018	5
9	3.1	2	14	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
10	3.2	2	11	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
11	4	1	5	1	Ebouh	1	1	1	0	1	9	4	4	ZK	1	16/04/2018	19/04/2018	3
12	4.1	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
13	4.2	2	12	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
14	4.3	2	3	1	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
15	4.4	2	5	2	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
16	4.5	2	8	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
17	5	1	5	2	Ebouh	1	1	1	0	1	15	0	0	ZK	1	16/04/2018	19/04/2018	3
18	5.1	2	8	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
19	5.2	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
20	5.3	2	10	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
21	6	1	4	1	Ebouh	1	1	1	0	1	4	2	2	ZK	1	15/04/2018	19/04/2018	4
22	6.1	2	35	1	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
23	7	1	5	2	Ebouh	1	1	1	0	1	6	6	6	ZK	1	10/04/2018	19/04/2018	9
24	7.1	2	48	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
25	7.2	2	28	2	Ebouh	1	1	0	1	1				ZK	1		19/04/2018	
26	8	1	4	1	Ebouh	1	1	1	0	1	6	3	3	ZK	1	15/04/2018	19/04/2018	4
27	8.1	2	2	1	Ebouh	1	1	1	0	1				ZK	1		19/04/2018	
28	9	1	4	2	Ebouh	1	1	1	0	3	8	4	4	ZK	1	13/04/2018	21/04/2018	8
29	10	1	4	2	Ebouh	1	1	1	0	1	6	2	2	ZK	1	15/04/2018	19/04/2018	4
30	11	1	4	1	Ebouh	1	1	1	0	3	7	4	4	ZK	1	13/04/2018	19/04/2018	6
31	12	1	5	2	Ebouh	1	1	1	0	1	3	1	1	ZK	1	16/04/2018	19/04/2018	3
32	13	1	4	2	B Bis	1	0	0	1	1	5	2	2	ZK	1	15/04/2018	19/04/2018	4
33	14	1	5	2	B Bis	1	1	1	0	3	4	2	2	JL	1	19/04/2018	21/04/2018	2
34	14.1	2	27	1	B Bis	1	0	0	1	3				JL	1		21/04/2018	
35	14.2	2	25	2	B Bis	1	0	0	1	3				JL	1		21/04/2018	
36	14.3	2	19	2	B Bis	1	0	0	1	3				JL	1		21/04/2018	
37	15	1	1	1	F	1	1	1	0	3	10	4	4	MN	1	17/04/2018	19/04/2018	2
38	15.1	2	5	2	F	1	1	1	0	3				MN	1		19/04/2018	
39	15.2	2	38	2	F	0	0	0	0	3				MN	1		19/04/2018	
40	15.3	2	18	1	F	0	0	0	0	3				MN	1		19/04/2018	
41	15.4	2	10	2	F	0	0	0	0	3				MN	1		19/04/2018	
42	15.5	2	12	2	F	1	0	0	1	3				MN	1		19/04/2018	
43	15.6	2	21	2	F	0	0	0	0	3				MN	1		19/04/2018	
44	15.7	2	8	1	F	0	0	0	0	3				MN	1		19/04/2018	
45	15.8	2	47	1	F	0	0	0	0	3				MN	1		19/04/2018	
46	16	1	4	2	E	1	0	0	1	3				MN	1	19/04/2018	19/04/2018	0
47	17	1	1	1	E	1	1	1	0	3	8	4	4	BN	1	21/04/2018	21/04/2018	0
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49	17.2	2	11	2	E	1	1	0	1	3				BN	1		21/04/2018	
50	17.3	2	50	1	E	0	0	0	0	3				BN	1		21/04/2018	
51	17.4	2	39	2	E	0	0	0	0	3				BN	1		21/04/2018	
52	18	1	5	1	E	1	1	1	0	3	12	6	4	BN	1	21/04/2018	21/04/2018	0
53	18.1	2	2	1	E	0	0	0	0	3				BN	1		21/04/2018	
54	18.2	2	3	1	E	1	1	1	0	3				BN	1		21/04/2018	
55	18.3	2	4	1	E	1	1	1	0	3				BN	1		21/04/2018	
56	18.4	2	5	2	E	1	1	1	0	3				BN	1		21/04/2018	
57	19	1	4	1	E	1	1	1	0	1	7	3	3	RT	1	18/04/2018	19/04/2018	1
58	19.1	2	68	1	E	1	1	0	1	1				RT	1		19/04/2018	
59	19.2	2	50	2	E	1	1	0	1	1				RT	1		19/04/2018	
60	19.3	2	13	2	E	1	1	0	1	1				RT	1		19/04/2018	
61	19.4	2	11	2	E	1	1	0	1	1				RT	1		19/04/2018	
62	19.5	2	9	1	E	1	1	0	1	1				RT	1		19/04/2018	
63	19.6	2	7	2	E	1	1	0	1	1				RT	1		19/04/2018	
64	20	1	3	1	F	1	1	1	0	1	6	2	1	RT	1	18/04/2018	19/04/2018	1
65	20.1	2	30	1	F	0	0	0	0	1				RT	1		19/04/2018	
66	20.2	2	28	2	F	0	0	0	0	1				RT	1		19/04/2018	
67	20.3	2	18	2	F	0	0	0	0	1				RT	1		19/04/2018	
68	20.4	2	1	2	F	1	1	1	0	1				RT	1		19/04/2018	
69	21	1	3	2	E Bis	1	1	1	0	1	4	2	1	JY	2	25/04/2018	25/04/2018	0
70	21.1	2	45	2	E Bis	0	0	0	0	1				JY	2		25/04/2018	
71	22	1	3	2	F	1	0	0	1	1				JY	2	23/04/2018	26/04/2018	3
72	23	1	2	1	A Bis	1	1	0	0	2	6	3	2	JY	2	22/04/2018	28/04/2018	6
73	23.1	2	30	1	A Bis	0	0	0	0	2				JY	2		28/04/2018	
74	23.2	2	1	1	A Bis	1	1	1	0	2				JY	2		28/04/2018	
75	24	1	5	2	Bareko	1	1	0	0	2	No Visit			JY	2	23/04/2018	28/04/2018	5
76	25	1	1	1	Bareko	1	1	0	0	2	No Visit			JY	2	23/04/2018	28/04/2018	5
77	26	1	2	1	Ebouh	1	1	1	0	3	6	3	3	ZK	2	20/04/2018	24/04/2018	4
78	26.1	2	17	2	Ebouh	1	1	0	1	3				ZK	2		24/04/2018	
79	26.2	2	7	1	Ebouh	1	1	0	1	3				ZK	2		24/04/2018	
80	27	1	4	1	Ebouh	1	1	1	0	1				ZK	2	23/04/2018	26/04/2018	3
81	27.1	2	5	2	Ebouh	1	0	0	1	1				ZK	2		26/04/2018	
82	28	1	5	1	Ebouh	1	1	1	0	1	5	3	3	ZK	2	21/04/2018	26/04/2018	5
83	28.1	2	4	1	Ebouh	1	1	1	0	1				ZK	2		26/04/2018	
84	29	1	5	2	Ebouh	1	1	1	0	1	6	3	3	ZK	2	20/04/2018	26/04/2018	6
85	29.1	2	5	1	Ebouh	1	1	1	0	1				ZK	2		26/04/2018	
86	30	1	5	2	Ebouh	1	0	0	1	1				ZK	2	23/04/2018	26/04/2018	3
87	31	1	3	2	Ebouh	1	1	1	0	1				ZK	2	21/04/2018	26/04/2018	3
88	32	1	4	2	F Bis	1	1	1	0	3	7	3	2	JL	2	21/04/2018	28/04/2018	7
89	32.1	2	33	2	F Bis	1	0	0	1	3				JL	2		28/04/2018	
90	32.2	2	3	2	F Bis	1	1	1	0	3				JL	2		28/04/2018	
91	32.3	2	4	1	F Bis	1	1	1	0	3				JL	2		28/04/2018	
92	33	1	3	1	Axelourd	1	1	0	0	2	7	0	0	MN	2	25/04/2018	26/04/2018	2
93	33.1	2	13	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
94	33.2	2	6	2	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
95	33.3	2	9	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
96	33.4	2	11	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
97	33.5	2	31	1	Axelourd	1	0	0	1	2				MN	2		26/04/2018	
98	34	1	5	1	B	1	1	0	0	2	3	0	0	MN	2	24/04/2018	26/04/2018	2
99	34.1	2	23	2	B	0	0	0	0	2				MN	2		26/04/2018	
100	35	1	5	1	F	1	1	0	0	2	6	4	4	MN	2	23/04/2018	26/04/2018	3
101	35.1	2	70	1	F	1	0	0	1	2				MN	2		26/04/2018	
102	36	1	4	2	F	1	1	0	0	2	5	2	2	MN	2	26/04/2018	26/04/2018	0
103	36.1	2	9	2	F	1	1	0	1	2				MN	2		26/04/2018	
104	36.2	2	15	2	F	1	0	0	1	2				MN	2		26/04/2018	
105	37	1	2	1	F	1	1	1	0	3	9	4	0	MN	2	23/04/2018	26/04/2018	3
106	37.1	2	30	2	F	1	0	0	1	3				MN	2		26/04/2018	
107	38	1	4	2	E	1	1	1	0	3	4	2	2	BN	2	25/04/2018	29/04/2018	4
108	38.1	2	45	2	E	0	0	0	0	3				BN	2		29/04/2018	
109	39	1	2	2	B	1	1	1	0	3	8	4	4	RT	2	24/04/2018	25/04/2018	1
110	39.1	2	9	1	B	1	1	0	1	3				RT	2		25/04/2018	
111	39.2	2	5	1	B	1	1	1	0	3				RT	2		25/04/2018	
112	39.3	2	29	2	B	0	0	0	0	3				RT	2		25/04/2018	
113	40	1	5	1	D	1	1	1	0	1	3	1	1	RT	2	24/04/2018	25/04/2018	1
114	40.1	2	3	2	D	1	1	1	0	1				RT	2		25/04/2018	
115	40.2	2	51	2	D	0	0	0	0	1				RT	2		25/04/2018	
116	41	1	3	1	B	1	1	1	0	3	3	1	1	RT	2	24/04/2018	26/04/2018	2
117	42	1	2	1	B Bis	1	0	0	1	1				RT	2	25/04/2018	26/04/2018	1
118	43	1	3	2	C	1	1	1	0	3	9	4	4	RT	2	25/04/2018	26/04/2018	1
119	43.1	2	5	2	C	1	0	0	1	3				RT	2		26/04/2018	
120	43.2	2	38	2	C	1	0	0	1	3				RT	2		26/04/2018	
121	43.3	2	3	2	C	1	1	1	0	3				RT	2		26/04/2018	
122	43.4	2	11	2	C	1	1	0	1	3				RT	2		26/04/2018	
123	43.5	2	1	1	C	1	1	1	0	3				RT	2		26/04/2018	
124	43.6	2	26	1	C	0	0	0	0	3				RT	2		26/04/2018	
125	43.7	2	18	2	C	0	0	0	0	3				RT	2		26/04/2018	
126	44	1	5	1	B Bis	1	1	1	0	3	7	4	2	RT	2	17/04/2018	25/04/2018	8
127	45	1	5	2	B Bis	1	1	1	0	1	6	2	2	RT	2	25/04/2018	26/04/2018	1

128	45.1	2	5	2	B Bis	1	1	1	0	1				RT	2		26/04/2018	
129	45.2	2	14	2	B Bis	0	0	0	0	1				RT	2		26/04/2018	
130	46	1	4	2	E Bis	1	1	1	0	1	2	2	2	RT	2	26/04/2018	26/04/2018	0
131	46.1	2	36	2	E Bis	0	0	0	0	1				RT	2		26/04/2018	
132	47	1	1	1	B	1	1	1	0	3	4	2	2	JL	3	02/05/2018	03/05/2018	1
133	47.1	2	45	2	B	1	0	0	1	3				JL	3		03/05/2018	
134	48	1	5	1	B	1	1	1	0	3	4	1	1	JL	3	02/05/2018	03/05/2018	1
135	48.1	2	60	1	B	1	0	0	1	3				JL	3		03/05/2018	
136	49	1	2	1	Bareko	1	1	0	0	2	4	2	2	MN	3	03/05/2018	03/05/2018	0
137	49.1	2	4	1	Bareko	1	1	1	0	2				MN	3		03/05/2018	
138	50	1	5	1	B Bis	1	1	0	0	2	6	2	2	MN	3	27/04/2018	03/05/2018	6
139	50.1	2	9	2	B Bis	1	1	0	1	2				MN	3		03/05/2018	
140	50.2	2	3	2	B Bis	1	1	1	0	2				MN	3		03/05/2018	
141	50.3	2	11	1	B Bis	1	1	0	1	2				MN	3		03/05/2018	
142	51	1	3	1	B	1	1	0	0	2	7	4	0	MN	3	02/05/2018	03/05/2018	1
143	51.1	2	9	1	B	1	1	0	1	2				MN	3		03/05/2018	
144	52	1	2	1	F	1	1	0	0	2	10	3	3	MN	3	02/05/2018	03/05/2018	1
145	52.1	2	4	2	F	1	1	1	0	2				MN	3		03/05/2018	
146	52.2	2	7	2	F	1	1	0	1	2				MN	3		03/05/2018	
147	52.3	2	10	2	F	1	1	0	1	2				MN	3		03/05/2018	
148	53	1	5	2	D	1	1	0	0	2	4	0	0	MN	3	02/05/2018	03/05/2018	1
149	53.1	2	2	2	D	1	1	1	0	2				MN	3		03/05/2018	
150	53.2	2	0.17	1	D	1	1	1	0	2				MN	3		03/05/2018	
151	54	1	0.58	2	Bareko	1	1	0	0	2	8	4	4	MN	3	02/05/2018	03/05/2018	1
152	54.1	2	27	2	Bareko	1	1	0	1	2				MN	3		03/05/2018	
153	55	1	4	1	E	1	1	0	0	2	4	2	2	MN	3	02/05/2018	03/05/2018	1
154	55.1	2	2	1	E	1	1	1	0	2				MN	3		03/05/2018	
155	56	1	5	1	Bareko	1	1	0	0	2	11	6	2	BN	3	01/05/2018	03/05/2018	2
156	56.1	2	5	1	Bareko	1	1	1	0	2				BN	3		03/05/2018	
157	56.2	2	2	1	Bareko	0	0	0	0	2				BN	3		03/05/2018	
158	56.3	2	10	2	Bareko	1	1	0	1	2				BN	3		03/05/2018	
159	56.4	2	18	2	Bareko	0	0	0	0	2				BN	3		03/05/2018	
160	57	1	3	2	Ebouh	1	1	1	0	1	6	2	2	ZK	3	01/05/2018	03/05/2018	2
161	57.1	2	14	1	Ebouh	1	1	0	1	1				ZK	3		03/05/2018	
162	58	1	3	1	Ebouh	1	1	1	0	1	6	0	0	ZK	3	01/05/2018	03/05/2018	2
163	58.1	2	8	2	Ebouh	1	1	0	1	1				ZK	3		03/05/2018	
164	59	1	5	1	B Bis	1	1	1	0	1	4	2	2	ZK	3	01/05/2018	03/05/2018	
165	59.1	2	30	2	B Bis	1	1	0	1	1				ZK	3		03/05/2018	
166	60	1	5	1	Ebouh	1	1	1	0	1	6	3	3	ZK	3	01/05/2018	03/05/2018	2
167	60.1	2	35	2	Ebouh	1	0	0	1	1				ZK	3		03/05/2018	
168	61	1	5	1	Ebouh	1	0	0	1	1				ZK	3	01/05/2018	03/05/2018	2
169	62	1	3	1	Ebouh	1	0	0	1	1	4	2	1	ZK	3	02/05/2018	03/05/2018	1
170	63	1	3	2	D	1	1	1	0	3	5	2	2	RT	3	02/05/2018	02/05/2018	0
171	63.1	2	5	2	D	1	1	1	0	3				RT	3		02/05/2018	
172	63.2	2	2	1	D	1	0	0	1	3				RT	3		02/05/2018	
173	64	1	4	1	F Bis	1	1	1	0	1	5	2	2	RT	3	27/04/2018	03/05/2018	6
174	64.1	2	3	1	F Bis	1	0	0	1	1				RT	3		03/05/2018	
175	65	1	2	2	B	1	0	0	1	3	8	3	3	RT	3	01/05/2018	03/05/2018	2
176	66	1	2	2	B	1	0	0	1	3	6	3	3	RT	3	03/05/2018	03/05/2018	0
177	67	1	5	1	B Bis	1	0	0	1	1				RT	3	03/05/2018	03/05/2018	0
178	68	1	5	1	D	1	0	0	1	1				RT	3	02/05/2018	03/05/2018	1
179	69	1	4	1	A	1	0	0	1	1				RT	3	02/05/2018	03/05/2018	1
180	70	1	3	1	E	1	1	0	0	2	10	0	0	JY	3	28/04/2018	03/05/2018	5
181	70.1	2	9	2	E	1	1	0	1	2				JY	3		03/05/2018	
182	70.2	2	3	1	E	1	1	1	0	2				JY	3		03/05/2018	
183	71	1	5	2	B	1	1	1	0	3	5	3	3	MN	4	06/05/2018	10/05/2018	4
184	71.1	2	8	1	B	1	1	0	1	3				MN	4		10/05/2018	
185	72	1	4	1	F	1	1	1	0	3	5	2	2	MN	4	08/05/2018	10/05/2018	2
186	72.1	2	3	1	F	1	1	1	0	3				MN	4		10/05/2018	
187	72.2	2	5	2	F	1	1	1	0	3				MN	4		10/05/2018	
188	72.3	2	2	1	F	1	1	1	0	3				MN	4		10/05/2018	
189	73	1	1	1	F	1	0	0	1	3				MN	4	05/05/2018	10/05/2018	5
190	74	1	3	2	F	1	0	0	1	3				MN	4	05/05/2018	10/05/2018	5
191	75	1	4	2	Bareko	1	1	1	0	3	6	0	0	MN	4	07/05/2018	10/05/2018	3
192	75.1	2	5	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
193	75.2	2	3	2	Bareko	1	1	1	0	3				MN	4		10/05/2018	
194	75.3	2	5	2	Bareko	1	1	1	0	3				MN	4		10/05/2018	
195	76	1	5	2	Bareko	1	1	1	0	3	9	5	5	MN	4	07/05/2018	10/05/2018	3
196	76.1	2	0.5	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
197	76.2	2	3	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
198	76.3	2	2	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
199	76.4	2	4	1	Bareko	1	1	1	0	3				MN	4		10/05/2018	
200	77	1	2	2	E	1	1	1	0	3				BN	4	10/05/2018	10/05/2018	0
201	77.1	2	5	2	E	1	1	1	0	3				BN	4		10/05/2018	
202	78	1	2	2	A	1	1	1	0	3				BN	4	08/05/2018	11/05/2018	3
203	78.1	2	3	2	A	1	1	1	0	3				BN	4		11/05/2018	
204	79	1	3	1	E Bis	1	1	1	0	1	2	1	1	RT	4	02/05/2018	03/05/2018	1
205	79.1	2	22	2	E Bis	1	0	0	1	1				RT	4		03/05/2018	
206	80	1	4	2	D	1	1	1	0	1	6	4	4	RT	4	01/05/2018	03/05/2018	2
207	81	1	2	2	A	1	1	1	0	3	5	4	4	JY	4	09/05/2018	10/05/2018	1
208	81.1	2	1	1	A	1	1	1	0	3				JY	4		10/05/2018	
209	82	1	5	2	A	1	1	1	0	3	5	3	2	JY	4	10/05/2018	11/05/2018	1
210	83	1	4	1	Ebouh	1	1	1	0	1	10	0	0	ZK	4	07/05/2018	10/05/2018	3
211	83.1	2	6	1	Ebouh	1	1	0	1	1				ZK	4		10/05/2018	
212	83.2	2	3	1	Ebouh	1	0	0	1	1				ZK	4		10/05/2018	
213	84	1	1	1	B Bis	1	1	1	0	3	5	3	3	ZK	4	08/05/2018	10/05/2018	2
214	84.1	2	27	2	B Bis	1	0	0	1	3				ZK	4		10/05/2018	
215	85	1	5	1	Ebouh	1	0	0	1	1				ZK	4	09/05/2018	10/05/2018	1
216	86	1	5	1	Ebouh	1	1	1	0	1	5	3	3	ZK	4	08/05/2018	10/05/2018	2
217	86.1	2	35	2	Ebouh	1	1	0	1	1				ZK	4		10/05/2018	
218	87	1	5	1	Ebouh	1	0	0	1	1				ZK	4	07/05/2018	10/05/2018	3
219	88	1	4	1	Ebouh	1	0	0	1	1				ZK	4	08/05/2018	10/05/2018	2
220	89	1	4	2	F	1	1	1	0	3	5	2	2	JL	4	06/05/2018	07/05/2018	1
221	89.1	2	45	1	F	1	0	0	1	3				JL	4		07/05/2018	
222	89.2	2	15	1	F	1	0	0	1	3				JL	4		07/05/2018	
223	90	1	3	2	Ebouh	1	1	1	0	3	6	3	3	ZK	5	14/05/2018	15/05/2018	1
224	90.1	2	6	2	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
225	90.2	2	61	1	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
226	90.3	2	6	1	Ebouh	1	1	1	0	3				ZK	5		15/05/2018	
227	91	1	2	1	Ebouh	1	1	1	0	1	6	3	3	ZK	5	15/05/2018	17/05/2018	2
228	91.1	2	7	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
229	91.2	2	56	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
230	92	1	3	1	Ebouh	1	1	1	0	1	8	3	3	ZK	5	15/05/2018	17/05/2018	2
231	92.1	2	60	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
232	92.2	2	10	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
233	92.3	2	16	1	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
234	93	1	3	1	Ebouh	1	1	1	0	1	6	3	3	ZK	5	14/05/2018	17/05/2018	3
235	93.1	2	8	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
236	93.2	2	58	2	Ebouh	1	1	1	0	1				ZK	5		17/05/2018	
237	94	1	4	1	E	1	0	0	1	1				ZK	5	13/05/2018	17/05/2018	4
238	95	1	3	2	Ebouh	1	0	0	1	1				ZK	5	15/05/2018	17/05/2018	2
239	96	1	3	1	Ebouh	1	0	0	1	1				ZK	5	14/05/2018	17/05/2018	3
240	97	1	3	2	Ebouh	1	0	0	1	1				ZK	5	15/05/2018	17/05/2018	2
241	98	1	5	1	C	1	1	1	0	3	4	2	2	MN	5	14/05/2018	17/05/2018	3
242	98.1	2	14	2	C	1	1	1	0	3				MN	5		17/05/2018	
243	98.2	2	61	2	C	1	1	1	0	3				MN	5		17/05/2018	
244	98.3	2	12	1	C	1	1	1	0	3				MN	5		17/05/2018	
245	99	1	4	2	F	1	1	1	0	3	7	3	3	MN	5	14/05/2018	17/05/2018	3
246	99.1	2	10	1	F	1	1	1	0	3				MN	5		17/05/2018	
247	99.2	2	48	1	F	1	1	1	0	3				MN	5		17/05/2018	
248	99.3	2	9	1	F	1	1	1	0	3				MN	5		17/05/2018	
249	100	1	3	1	B	1	1	1	0	3	4	2	2	MN	5	14/05/2018	17/05/2018	3
250	100.1	2	20	1	B	1	1	1	0	3				MN	5		17/05/2018	
251	100.2	2	60	1	B	1	1	1	0	3				MN	5		17/05/2018	
252	101	1	2	2	F Bis	1	1	1	0	3	4	0	0	MN	5	15/05/2018	17/05/2018	2
253	101.1	2	34	2	F Bis	1	1	1	0	3				MN	5		17/05/2018	
254	101.2	2	37	1	F Bis	1	1	1	0	3				MN	5		17/05/2018	
255	101.3	2	12	2	F Bis	1	1	1	0	3				MN	5		17/05/2018	
256	102	1	2	2	F	1	1	1	0	3	7	3	3	MN	5	11/05/2018	17/05/2018	6
257	102.1	2	6	2	F	1	1	1	0	3				MN	5		17/05/2018	
258	102.2	2	14	2	F	1	1	1	0	3				MN	5		17/05/2018	
259	103	1	0.75	1	F Bis	1	1	1	0	3	9	4	4	MN	5	10/05/2018	17/05/2018	7
260	103.1	2	0.17	1	F Bis	1	0	0	1	3				MN	5		17/05/2018	
261	103.2	2	65	1	F Bis	1	1	1	0	3				MN	5		17/05/2018	
262	104	1	3	2	D	1	1	0	0	2	5	3	0	MN	5	16/05/2018	17/05/2018	1

263	104.1	2	25	2	D	1	1	1	0	2				MN	5		17/05/2018	
264	104.2	2	49	2	D	1	1	1	0	2				MN	5		17/05/2018	
265	105	1	2	2	A Bis	1	1	1	0	3	8	2	2	MN	5	16/05/2018	17/05/2018	1
266	105.1	2	8	2	A Bis	1	1	1	0	3				MN	5		17/05/2018	
267	106	1	1	1	D	1	1	1	0	3	8	4	4	MN	5	14/05/2018	17/05/2018	3
268	106.1	2	47	2	D	1	1	1	0	3				MN	5		17/05/2018	
269	106.2	2	12	2	D	1	1	1	0	3				MN	5		17/05/2018	
270	106.3	2	19	1	D	1	1	1	0	3				MN	5		17/05/2018	
271	106.4	2	11	2	D	1	1	1	0	3				MN	5		17/05/2018	
272	107	1	0.67	2	A Bis	1	1	0	0	2	4	1	1	MN	5	16/05/2018	17/05/2018	1
273	107.1	2	2	2	A Bis	1	0	0	1	2				MN	5		17/05/2018	
274	107.2	2	25	2	A Bis	1	1	1	0	2				MN	5		17/05/2018	
275	108	1	5	1	B Bis	1	1	1	0	1	6	2	1	RT	5	14/05/2018	16/05/2018	2
276	108.1	2	3	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
277	108.2	2	7	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
278	109	1	3	2	B Bis	1	0	0	1	1				RT	5	16/05/2018	16/05/2018	0
279	110	1	5	1	C	1	1	1	0	1	9	1	1	RT	5	16/05/2018	17/05/2018	1
280	110.1	2	2	2	C	1	1	1	0	1				RT	5		17/05/2018	
281	111	1	4	2	F	1	1	1	0	1	6	2	2	RT	5	16/05/2018	17/05/2018	1
282	112	1	5	1	B Bis	1	1	1	0	1	4	1	1	RT	5	16/05/2018	16/05/2018	0
283	112.1	2	1	1	B Bis	1	1	1	0	1				RT	5		16/05/2018	
284	113	1	4	2	B	1	0	0	1	1				RT	5	16/05/2018	17/05/2018	1
285	114	1	2	1	A	1	1	1	0	3	4	2	2	JY	5	16/05/2018	16/05/2018	0
286	114.1	2	62	1	A	1	1	1	0	3				JY	5		16/05/2018	
287	115	1	2	1	F Bis	1	1	1	0	3	4	2	2	JY	5	15/05/2018	16/05/2018	1
288	115.1	2	65	1	F Bis	1	1	1	0	3				JY	5		16/05/2018	
289	116	1	3	2	E Bis	1	1	1	0	3	5	3	3	JY	5	14/05/2018	14/05/2018	0
290	116.1	2	35	2	E Bis	1	1	1	0	3				JY	5		14/05/2018	
291	117	1	2	1	F	1	1	0	0	2	4	2	2	JL	5	08/05/2018	10/05/2018	2
292	117.1	2	45	1	F	1	0	0	1	2				JL	5		10/05/2018	
293	118	1	2	1	F	1	1	0	0	2	3	1	1	JL	5	02/05/2018	10/05/2018	8
294	118.1	2	18	2	F	1	0	0	1	2				JL	5		10/05/2018	
295	119	1	0.75	1	E	1	1	0	0	2	7	3	3	JL	5	02/05/2018	10/05/2018	8
296	119.1	2	38	1	E	1	0	0	1	2				JL	5		10/05/2018	
297	120	1	4	1	A Bis	1	1	1	0	3	6	0	0	JL	5	11/05/2018	17/05/2018	6
298	120.1	2	55	2	A Bis	1	0	0	1	3				JL	5		17/05/2018	
299	121	1	4	2	F	1	1	1	0	3	6	2	2	JL	5	16/05/2018	17/05/2018	1
300	121.1	2	58	2	F	1	1	1	0	3				JL	5		17/05/2018	
301	122	1	3	1	Axelourd	1	1	1	0	3	7	5	3	JL	5	16/05/2018	17/05/2018	1
302	122.1	2	20	2	Axelourd	1	1	1	0	3				JL	5		17/05/2018	
303	122.2	2	55	2	Axelourd	1	1	1	0	3				JL	5		17/05/2018	
304	123	1	3	1	Ebouh	1	1	1	0	3	7	4	4	ZK	6	23/05/2018	26/05/2018	3
305	123.1	2	6	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
306	123.2	2	30	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
307	123.3	2	10	2	Ebouh	1	1	1	0	3				ZK	6		26/05/2018	
308	124	1	5	1	Ebouh	1	1	1	0	1	4	0	0	ZK	6	22/05/2018	24/05/2018	2
309	124.1	2	57	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
310	124.2	2	30	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
311	124.3	2	4	2	Ebouh	1	1	1	0	1				ZK	6		24/05/2018	
312	125	1	3	2	Ebouh	1	0	0	1	1				ZK	6	21/05/2018	24/05/2018	3
313	126	1	4	1	Ebouh	1	0	0	1	1				ZK	6	20/05/2018	24/05/2018	4
314	127	1	3	1	E Bis	1	1	1	0	3	6	3	3	BN	6	23/05/2018	25/05/2018	2
315	127.1	2	5	1	E Bis	1	1	1	0	3				BN	6		25/05/2018	
316	127.2	2	31	2	E Bis	1	1	1	0	3				BN	6		25/05/2018	
317	128	1	3	2	Bareko	1	1	1	0	1	6	3	2	BN	6	22/05/2018	24/05/2018	2
318	128.1	2	45	2	Bareko	1	1	1	0	1				BN	6		24/05/2018	
319	128.2	2	39	1	Bareko	1	1	1	0	1				BN	6		24/05/2018	
320	129	1	4	1	A	1	1	1	0	1	7	4	4	BN	6	21/05/2018	24/05/2018	3
321	129.1	2	12	1	A	1	1	1	0	1				BN	6		24/05/2018	
322	130	1	4	1	Bareko	1	1	1	0	1	5	3	2	BN	6	23/05/2018	25/05/2018	2
323	130.1	2	5	2	Bareko	1	1	1	0	1				BN	6		25/05/2018	
324	130.2	2	7	2	Bareko	1	1	1	0	1				BN	6		25/05/2018	
325	130.3	2	60	1	Bareko	1	1	1	0	1				BN	6		25/05/2018	
326	131	1	4	1	A Bis	1	1	1	0	3	4	2	2	BN	6	21/05/2018	23/05/2018	2
327	131.1	2	8	2	A Bis	1	1	1	0	3				BN	6		23/05/2018	
328	131.2	2	6	2	A Bis	1	1	1	0	3				BN	6		23/05/2018	
329	131.3	2	50	1	A Bis	1	1	1	0	3				BN	6		23/05/2018	
330	132	1	2	1	F Bis	1	1	0	0	2	7	4	4	JY	6	15/05/2018	15/05/2018	0
331	133	1	3	2	F	1	1	0	0	2	5	2	2	JY	6	04/05/2018	07/05/2018	3
332	133.1	2	35	2	A	1	1	1	0	2				JY	6		07/05/2018	1
333	134	1	3	1	B Bis	1	1	1	0	3	5	3	3	JY	6	24/05/2018	24/05/2018	0
334	134.1	2	40	1	B Bis	1	1	1	0	3				JY	6		24/05/2018	1
335	135	1	4	2	Bareko	1	0	0	1	1	4	1	1	JY	6	24/05/2018	24/05/2018	0
336	136	1	4	1	A	1	1	1	0	3	6	3	3	MN	6	23/05/2018	26/05/2018	3
337	136.1	2	62	2	A	1	1	1	0	3				MN	6		26/05/2018	
338	136.2	2	17	1	A	1	1	1	0	3				MN	6		26/05/2018	
339	136.3	2	68	1	A	1	1	1	0	3				MN	6		26/05/2018	
340	137	1	3	1	Bareko	1	1	1	0	3	7	4	4	MN	6	21/05/2018	23/05/2018	2
341	137.1	2	7	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
342	137.2	2	8	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
343	137.3	2	16	1	Bareko	1	1	1	0	3				MN	6		23/05/2018	
344	137.4	2	59	2	Bareko	1	1	1	0	3				MN	6		23/05/2018	
345	137.5	2	12	2	Bareko	1	1	1	0	3				MN	6		23/05/2018	
346	138	1	5	1	B Bis	1	1	1	0	3	8	3	2	MN	6	20/05/2018	24/05/2018	4
347	138.1	2	30	2	B Bis	1	1	1	0	3				MN	6		24/05/2018	
348	138.2	2	2	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
349	138.3	2	42	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
350	139	1	1	2	B	1	1	1	0	3	6	2	2	MN	6	20/05/2018	24/05/2018	4
351	139.1	2	9	2	B	1	1	1	0	3				MN	6		24/05/2018	
352	139.2	2	7	1	B	1	1	1	0	3				MN	6		24/05/2018	
353	139.3	2	4	1	B	1	1	1	0	3				MN	6		24/05/2018	
354	139.4	2	22	2	B	1	1	1	0	3				MN	6		24/05/2018	
355	139.5	2	34	1	B	1	1	1	0	3				MN	6		24/05/2018	
356	140	1	5	1	F	1	1	1	0	3	7	5	5	MN	6	20/05/2018	24/05/2018	4
357	140.1	2	6	1	F	1	1	1	0	3				MN	6		24/05/2018	
358	141	1	3	2	B Bis	1	1	1	0	3	6	2	2	MN	6	20/05/2018	24/05/2018	4
359	141.1	2	12	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
360	141.2	2	5	1	B Bis	1	1	1	0	3				MN	6		24/05/2018	
361	141.3	2	40	2	B Bis	1	1	1	0	3				MN	6		24/05/2018	
362	142	1	3	1	F	1	1	1	0	3	7	4	1	MN	6	21/05/2018	23/05/2018	2
363	142.1	2	11	1	F	1	1	1	0	3				MN	6		23/05/2018	
364	142.2	2	9	1	F	1	1	1	0	3				MN	6		23/05/2018	
365	142.3	2	11	2	F	1	1	1	0	3				MN	6		23/05/2018	
366	142.4	2	15	2	F	1	1	1	0	3				MN	6		23/05/2018	
367	143	1	5	2	B	1	1	1	0	3	9	3	2	MN	6	21/05/2018	21/05/2018	0
368	143.1	2	43	2	B	1	1	1	0	3				MN	6		21/05/2018	
369	143.2	2	11	1	B	1	1	1	0	3				MN	6		21/05/2018	
370	144	1	5	2	D	1	1	1	0	3	8	4	4	MN	6	20/05/2018	21/05/2018	1
371	144.1	2	36	2	D	1	1	1	0	3				MN	6		21/05/2018	
372	144.2	2	12	1	D	1	1	1	0	3				MN	6		21/05/2018	
373	144.3	2	10	2	D	1	1	1	0	3				MN	6		21/05/2018	
374	144.4	2	15	1	D	1	1	1	0	3				MN	6		21/05/2018	
375	145	1	2	1	D	1	1	1	0	3	4	2	2	MN	6	22/05/2018	22/05/2018	0
376	145.1	2	10	1	D	1	1	1	0	3				MN	6		22/05/2018	
377	145.2	2	36	2	D	1	1	1	0	3				MN	6		22/05/2018	
378	145.3	2	7	1	D	1	1	1	0	3				MN	6		22/05/2018	
379	146	1	4	1	D	1	1	0	0	2	9	0	0	MN	6	22/05/2018	24/05/2018	2
380	146.1	2	2	1	D	1	1	1	0	2				MN	6		24/05/2018	
381	147	1	1	1	F Bis	1	1	1	0	3	4	1	1	MN	6	20/05/2018	20/05/2018	0
382	147.1	2	1	2	F Bis	1	1	1	0	3				MN	6		20/05/2018	
383	148	1	3	1	B	1	1	1	0	3	4	1	1	RT	6	22/05/2018	23/05/2018	1
384	149	1	0.5	1	A	1	0	0	1	3	6	2	2	RT	6	23/05/2018	23/05/2018	0
385	150	1	4	2	C	1	1	1	0	3	4	0	0	RT	6	22/05/2018	23/05/2018	1
386	150.1	2	6	2	C	1	1	1	0	3				RT	6		23/05/2018	
387	151	1	4	1	B	1	1	1	0	3	7	3	3	RT	6	25/05/2018	25/05/2018	0
388	151.1	2	34	1	B	1	1	1	0	3				RT	6		25/05/2018	
389	151.2	2	7	1	B	1	0	0	1	3				RT	6		25/05/2018	
390	151.3	2	4	1	B	1	1	1	0	3				RT	6		25/05/2018	
391	152	1	1	2	F Bis	1	1	1	0	3	5	1	1	JL	6	23/05/2018	24/05/2018	1
392	152.1	2	8	2	F Bis	1	1	1	0	3				JL	6		24/05/2018	
393	152.2	2	5	1	F Bis	1	1	1	0	3				JL	6		24/05/2018	
394	153	1	4	1	B Bis	1	1	1	0	3	6	2	2	JL	6	19/05/2018	21/05/2018	2
395	153.1	2	54	2	B Bis	1	1	1	0	3				JL	6		21/05/2018	
396	153.2	2	31	1	B Bis	1	1	1	0	3				JL	6		21/05/2018	
397	153.3	2	18	1	B Bis	1	1	1	0	3				JL	6		21/05/2018	

398	154	1	5	1	B	1	1	1	0	3	9	0	0	JL	6	19/05/2018	21/05/2018	2
399	154.1	2	25	2	B	1	0	0	1	3				JL	6		21/05/2018	
400	155	1	3	1	F	1	1	1	0	3	4	1	1	JL	6	21/05/2018	23/05/2018	2
401	155.1	2	23	2	F	1	1	1	0	3				JL	6		23/05/2018	
402	156	1	0.6	2	F Bis	1	1	1	0	3	12	0	0	JL	6	23/05/2018	24/05/2018	1
403	156.1	2	10	2	F Bis	1	1	1	0	3				JL	6		24/05/2019	
404	156.2	2	11	1	F Bis	1	1	1	0	3				JL	6		24/05/2020	
405	156.3	2	7	2	F Bis	1	1	1	0	3				JL	6		24/05/2021	
406	157	1	2	1	F Bis	1	1	1	0	3	5	2	2	JL	6	23/05/2018	24/05/2018	1
407	157.1	2	39	2	F Bis	1	0	0	1	3				JL	6		24/05/2018	
408	158	1	5	1	C	1	1	1	0	3	9	3	3	RT	7	02/06/2018	02/06/2018	0
409	158.1	2	17	1	C	1	1	1	0	3				RT	7		02/06/2018	
410	158.2	2	18	2	C	1	1	1	0	3				RT	7		02/06/2018	
411	158.3	2	15	1	C	1	1	1	0	3				RT	7		02/06/2018	
412	158.4	2	9	1	C	1	1	1	0	3				RT	7		02/06/2018	
413	158.5	2	12	2	C	1	1	1	0	3				RT	7		02/06/2018	
414	159	1	5	2	B	1	0	0	1	3				RT	7	29/05/2018	31/05/2018	2
415	160	1	2	2	E Bis	1	1	1	0	3	6	3	3	RT	7	03/06/2018	03/06/2018	0
416	160.1	2	9	1	E Bis	1	1	1	0	3				RT	7		03/06/2018	
417	161	1	5	2	D	1	1	1	0	3	8	3	3	RT	7	29/05/2018	31/05/2018	2
418	161.1	2	4	1	D	1	1	1	0	3				RT	7		31/05/2018	
419	161.2	2	11	2	D	1	1	1	0	3				RT	7		31/05/2018	
420	162	1	6	1	Ebouh	1	1	1	0	3	10	5	5	ZK	7	24/05/2018	28/05/2018	4
421	163	1	3	1	Ebouh	1	1	1	0	3	6	3	3	ZK	7	27/05/2018	29/05/2018	2
422	163.1	2	30	1	Ebouh	1	1	1	0	3				ZK	7		29/05/2018	
423	163.2	2	18	1	Ebouh	1	1	1	0	3				ZK	7		29/05/2018	
424	164	1	3	1	Ebouh	1	1	1	0	3	8	4	4	ZK	7	24/05/2018	28/05/2018	4
425	165	1	3	1	Ebouh	1	0	0	1	1				ZK	7	24/05/2018	29/05/2018	5
426	166	1	3	1	Ebouh	1	0	0	1	1				ZK	7	25/05/2018	29/05/2018	4
427	167	1	3	1	Ebouh	1	0	0	1	1				ZK	7	26/05/2018	29/05/2018	3
428	168	1	3	1	Ebouh	1	0	0	1	1				ZK	7	26/05/2018	29/05/2018	3
429	169	1	2	1	B	1	0	0	1	1				ZK	7	25/05/2018	29/05/2018	4
430	170	1	3	1	B	1	0	0	1	1				ZK	7	24/05/2018	29/05/2018	5
431	171	1	5	1	Bareko	1	1	1	0	3	8	1	1	JL	7	29/05/2018	30/05/2018	1
432	171.1	2	33	1	Bareko	1	0	0	1	3				JL	7		30/05/2018	
433	171.2	2	11	2	Bareko	1	1	1	0	3				JL	7		30/05/2018	
434	171.3	2	11	1	Bareko	1	1	1	0	3				JL	7		30/05/2018	
435	172	1	5	2	F Bis	1	1	1	0	3	8	2	1	JL	7	28/05/2018	31/05/2018	3
436	172.1	2	9	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
437	172.2	2	9	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
438	172.3	2	62	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
439	172.4	2	38	2	F Bis	1	1	1	0	3				JL	7		31/05/2018	
440	173	1	3	1	F Bis	1	1	1	0	3	3	1	1	JL	7	27/05/2018	30/05/2018	3
441	173.1	2	28	2	F Bis	1	0	0	1	3				JL	7		30/05/2018	
442	174	1	5	1	A Bis	1	1	1	0	3	9	2	2	MN	7	28/05/2018	31/05/2018	3
443	174.1	2	17	1	A Bis	1	1	1	0	3				MN	7		31/05/2018	
444	174.2	2	7	2	A Bis	1	0	0	1	3				MN	7		31/05/2018	
445	174.3	2	15	1	A Bis	1	0	0	1	3				MN	7		31/05/2018	
446	174.4	2	44	1	A Bis	1	1	1	0	3				MN	7		31/05/2018	
447	175	1	2	1	B	1	1	0	0	2	No Visit			MN	7	16/05/2018	31/05/2018	
448	176	1	2	2	F	1	1	1	0	3	15	0	0	MN	7	26/05/2018	31/05/2018	5
449	176.1	2	49	1	F	1	1	1	0	3				MN	7		31/05/2018	
450	176.2	2	14	1	F	1	1	1	0	3				MN	7		31/05/2018	
451	177	1	2	2	F	1	1	1	0	3	7	4	3	MN	7	30/05/2018	31/05/2018	1
452	177.1	2	8	1	F	1	1	1	0	3				MN	7		31/05/2018	
453	177.2	2	6	1	F	1	1	1	0	3				MN	7		31/05/2018	
454	177.3	2	6	2	F	1	1	1	0	3				MN	7		31/05/2018	
455	177.4	2	13	2	F	1	1	1	0	3				MN	7		31/05/2018	
456	177.5	2	37	2	F	1	1	1	0	3				MN	7		31/05/2018	
457	177.6	2	51	1	F	1	0	0	1	3				MN	7		31/05/2018	
458	178	1	5	1	D	1	1	1	0	3	2	1	0	MN	7	30/05/2018	30/05/2018	0
459	178.1	2	59	1	D	1	1	1	0	3				MN	7		30/05/2018	
460	179	1	3	2	F	1	1	1	0	3	6	3	3	MN	7	04/06/2018	04/06/2018	0
461	179.1	2	52	2	F	1	1	1	0	3				MN	7		04/06/2018	
462	180	1	4	2	E	1	1	0	0	2	No Visit			MN	7	14/06/2018	31/05/2018	
463	181	1	4	1	D	1	1	0	0	2	No Visit			MN	7	26/05/2018	31/05/2018	
464	182	1	3	1	D	1	1	0	0	2	No Visit			MN	7	30/05/2018	31/05/2018	
465	183	1	4	2	E	1	1	0	0	2	4	2	2	MN	7	29/05/2018	31/05/2018	2
466	183.1	2	55	2	E	1	1	1	0	2				MN	7		31/05/2018	
467	184	1	5	2	F	1	1	1	0	3	6	1	1	MN	7	29/05/2018	02/06/2018	4
468	184.1	2	74	2	F	1	1	1	0	3				MN	7		02/06/2018	
469	185	1	3	1	A Bis	1	1	0	0	2	No Visit			MN	7	16/05/2018	31/05/2018	
470	186	1	3	2	Bareko	1	1	0	0	2	No Visit			JY	7	19/05/2018	19/05/2018	
471	187	1	2	1	Bareko	1	1	0	0	2	No Visit			JY	7	15/05/2018	15/05/2018	
472	188	1	3	2	B Bis	1	1	1	0	3	4	2	2	JY	7	17/05/2018	18/05/2018	1
473	188.1	2	61	1	B Bis	1	1	1	0	3				JY	7		18/05/2018	
474	189	1	1	2	Ebouh	1	1	0	0	2	No Visit			JY	7	16/05/2018	24/05/2018	
475	190	1	2	1	Ebouh	1	1	0	0	2	No Visit			JY	7	17/05/2018	17/05/2018	
476	191	1	3	1	A Bis	1	1	1	0	3	8	3	3	JY	7	30/05/2018	31/05/2018	1
477	192	1	3	2	B Bis	1	1	1	0	3	6	2	2	JY	7	31/05/2018	31/05/2018	0
478	193	1	3	2	B	1	1	1	0	3	8	4	4	BN	7	28/05/2018	28/05/2018	0
479	193.1	2	2	1	B	1	1	1	0	3				BN	7		28/05/2018	
480	193.2	2	2	1	B	1	1	1	0	3				BN	7		28/05/2018	
481	194	1	3	2	B	1	1	1	0	3	6	3	1	RT	8	05/06/2018	07/06/2018	2
482	194.1	2	7	2	B	1	1	1	0	3				RT	8		07/06/2018	
483	195	1	2	2	C	1	1	1	0	3	7	2	2	RT	8	30/05/2018	08/06/2018	9
484	195.1	2	8	2	C	1	1	1	0	3				RT	8		08/06/2018	
485	195.2	2	41	2	C	1	1	1	0	3				RT	8		08/06/2018	
486	196	1	4	1	A	1	1	1	0	3	6	0	0	RT	8	09/06/2018	10/06/2018	1
487	196.1	2	5	2	A	1	1	1	0	3				RT	8		10/06/2018	
488	197	1	1	2	F	1	1	1	0	3	5	2	2	MN	8	06/06/2018	06/06/2018	0
489	197.1	2	1	2	F	1	1	1	0	3				MN	8		06/06/2018	
490	197.2	2	28	1	F	1	1	1	0	3				MN	8		06/06/2018	
491	198	1	4	1	C	1	1	1	0	3	10	0	0	MN	8	04/06/2018	05/06/2018	1
492	198.1	2	10	2	C	1	1	1	0	3				MN	8		05/06/2018	
493	198.2	2	4	1	C	1	0	0	1	3				MN	8		05/06/2018	
494	198.3	2	13	2	C	1	1	1	0	3				MN	8		05/06/2018	
495	198.4	2	16	1	C	1	1	1	0	3				MN	8		05/06/2018	
496	199	1	3	2	F Bis	1	0	0	1	3				MN	8	06/06/2018	07/06/2018	1
497	200	1	5	1	F Bis	1	1	1	0	3	8	4	4	MN	8	07/06/2018	08/06/2018	1
498	200.1	2	42	2	F Bis	1	1	1	0	3				MN	8		08/06/2018	
499	200.2	2	2	1	F Bis	1	1	1	0	3				MN	8		08/06/2018	
500	201	1	3	1	Bareko	1	1	1	0	3	4	1	1	MN	8	30/05/2018	04/06/2018	5
501	201.1	2	1	2	Bareko	1	1	1	0	3				MN	8		04/06/2018	
502	201.2	2	58	2	Bareko	1	1	1	0	3				MN	8		04/06/2018	
503	202	1	5	1	Ebouh	1	1	1	0	3	5	3	3	ZK	8	04/06/2018	05/06/2018	1
504	202.1	2	50	2	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
505	202.2	2	61	1	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
506	202.3	2	8	1	Ebouh	1	1	1	0	3				ZK	8		05/06/2018	
507	203	1	3	1	Ebouh	1	1	1	0	3	7	4	4	ZK	8	03/06/2018	07/06/2018	4
508	203.1	2	45	1	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
509	203.2	2	7	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
510	203.3	2	12	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
511	204	1	3	1	Ebouh	1	1	1	0	3	6	3	3	ZK	8	06/06/2018	07/06/2018	1
512	204.1	2	12	2	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
513	204.2	2	11	1	Ebouh	1	1	1	0	3				ZK	8		07/06/2018	
514	205	1	4	1	Ebouh	1	1	1	0	3	4	0	0	ZK	8	05/06/2018	08/06/2018	3
515	205.1	2	10	1	Ebouh	1	1	1	0	3				ZK	8		08/06/2018	
516	205.2	2	9	2	Ebouh	1	1	1	0	3				ZK	8		08/06/2018	
517	206	1	5	1	Ebouh	1	1	1	0	3	9	5	5	ZK	8	07/06/2018	09/06/2018	2
518	206.1	2	6	2	Ebouh	1	1	1	0	3				ZK	8		09/06/2018	
519	206.2	2	13	2	Ebouh	1	1	1	0	3				ZK	8		09/06/2018	
520	207	1	2	2	B	1	1	1	0	3	2	0	0	JY	8	04/06/2018	05/06/2018	1
521	207.1	2	17	1	B	1	1	1	0	3				JY	8		05/06/2018	
522	208	1	3	1	A	1	1	1	0	3	4	2	2	JY	8	07/06/2018	08/06/2018	1
523	208.1	2	29	2	A	1	1	1	0	3				JY	8		08/06/2018	
524	209	1	2	2	A	1	1	1	0	3	5	2	2	JY	8	07/06/2018	07/06/2018	0
525	209.1	2	39	2	A	1	1	1	0	3				JY	8		07/06/2018	
526	209.2	2	16	1	A	1	1	1	0	3				JY	8		07/06/2018	
527	210	1	4	1	A	1	1	1	0	3	6	4	3	JY	8	08/06/2018	08/06/2018	0
528	210.1	2	49	1	A	1	1	1	0	3				JY	8		08/06/2018	
529	211	1	2	1	F	1	1	1	0	3	4	2	2	JL	8	10/06/2018	10/06/2018	0
530	211.1	2	55	1	F	1	1	1	0	3				JL	8		10/06/2018	
																		467

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract **Page 2**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found **Page 2**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported **Page 3**
Objectives	3	State specific objectives, including any prespecified hypotheses **Page 4**
Methods		
Study design	4	Present key elements of study design early in the paper **Page 4**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection **Page 4-7**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants **Page 5-6**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable **Page 6-7**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group **Page 6-7**
Bias	9	Describe any efforts to address potential sources of bias **Page 6**
Study size	10	Explain how the study size was arrived at **Not calculated**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why **Page 7**
Statistical methods **Page 7**	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed **Page 7-8**
		(b) Give reasons for non-participation at each stage **Figure 1**
		(c) Consider use of a flow diagram **Figure 1**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders **Table 1**
		(b) Indicate number of participants with missing data for each variable of interest **Table 1**
Outcome data	15*	Report numbers of outcome events or summary measures **Tables 1 and 2**
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included **Page 9 and Table 2**
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a

		meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses **Page 9**
Discussion		
Key results	18	Summarise key results with reference to study objectives **Page 10**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias **Page 11**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence **Page 11**
Generalisability	21	Discuss the generalisability (external validity) of the study results **Page 11-12**
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **Page 15**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.