Implementation of Seasonal Malaria Chemoprevention: A report of two meetings

Implementing Seasonal Malaria Chemoprevention
Praia Sep 7-8 2012 and Dakar Dec 7-8 2012.

Background

In September 2012, the Universite Cheikh Anta Diop, in collaboration with the London School of Hygiene & Tropical Medicine and the West African Roll Back Malaria Regional Network (WARN), convened a meeting in Praia, Cape Verde, to discuss implementation of Seasonal Malaria Chemoprevention (SMC). Participants included programme managers and staff of national malaria control programmes of WARN member countries, scientists involved in malaria control from research institutions in these countries, and representatives of UNICEF, MSF, Roll Back Malaria, and WHO. The purpose of the meeting was to discuss where, when and how SMC can be implemented in WARN countries, and to share experiences with implementation of SMC in large scale pilot projects. In Dakar in December WHO/BM convened a meeting of malaria control programme managers from the same countries to launch the SMC implementation guide, at which there was further discussion of the same issues. This report is a summary of the discussions and conclusions of these meetings.

Recent progress in malaria control is threatened by emerging resistance of malaria parasites to artemisinins and of mosquitoes to commonly used insecticides. Nevertheless, malaria remains an important public health problem in many parts of Africa and there is unlikely to be a highly effective malaria vaccine for many years. New tools are urgently needed, and there is increasing recognition that effective control will require different strategies tailored to specific areas and populations. SMC is an example of this approach, suited to areas where malaria is highly seasonal and the burden of disease is primarily in young children. In March 2012, WHO recommended that children 3-59 months of age living in areas with highly seasonal malaria should receive a course of treatment with sulfadoxine-pyrimethamine plus amodiaquine each month, for up to four months, during the high

transmission period. Each month, one dose of SP and the first dose of AQ are given on the first day of treatment, and the second and third doses of AQ are given on the next two days. SMC with SP+AQ provides a very high degree of personal protection, with about 90% efficacy for up to 4 weeks after treatment. However, protection decreases rapidly thereafter it is therefore important that children receive treatments at intervals of one month to maximize protection and also to prevent parasite exposure to sub-therapeutic concentrations of drugs. This strict timing requires delivery through community health worker schemes, community case management schemes or mass campaigns which can reach all eligible children over a 2-5 day period each month. The regions most suited to SMC are those where malaria transmission is highly seasonal, and incidence is high. In such areas, the main burden of malaria is in young children and monthly chemoprevention provided to children for about 4 months of the year can prevent a large part of the total malaria burden.

Policy process

By December the process of incorporating SMC into malaria control policy had been initiated in Burkina Faso, Chad, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria and Senegal and most of these countries are expected to adopt the policy in 2012 or 2013. In Senegal, for example, workshops had been held to agree on the areas and age groups to be targeted for SMC, the National Malaria Control Programme has prepared a policy document covering SMC and two other new policies (rectal artesunate and ACT in pregnancy), a national consensus workshop had been held, and formal adoption of the policies by the Ministry of Health is expected early in 2013.

Where and when to implement

Identification of suitable areas for SMC should, ideally, be based on recent data on the incidence of parasitologically confirmed malaria, but this information is not available in most countries; an exception is Senegal, where nationally representative data on the incidence of malaria confirmed by RDT is available for 2008 and 2009 (Fig 1). Most countries have relied on MARA maps and some research data for stratification of the country. Using data on seasonality of clinically diagnosed malaria without parasitological confirmation will give an incorrect impression that malaria incidence is less strongly seasonal than it is. Collation of all available data on seasonality of confirmed malaria and more detailed mapping of areas suitable for SMC would be very useful. The regions currently targetted for SMC in each country are shown in Fig 2. It is not clear if large urban areas within these regions should be included.

All countries have planned for delivery over 4 months of the year, but the timing differs, and varies between countries depending upon local epidemiology; from June to September (Guinea), July to October (Guinea Bissau, Chad, parts of Senegal and Mali), and August to November (Gambia, Burkina Faso, Niger, Burkina Faso, parts of Senegal and Mali). The estimated size of the targeted population in the areas where SMC is planned, and the policy process has started, is 10.9million. In Nigeria and Ghana, the population of children in areas where SMC would be appropriate is 11.2million in Nigeria and 0.5million in Ghana.

Togo, Benin, Central African Republic, Cameroon, South Sudan and Sudan were not represented at the meetings but include regions where SMC may be useful.

SMC for children is intended as a tool to reduce the malaria burden in areas of high transmission; it is not a suitable tool for elimination. In areas where transmission has fallen the age distribution is more uniform across all ages and in these areas other malaria control strategies may be required.

Age groups for SMC

The WHO recommends SMC for children aged 3-59 months, although it also considered the possibility that in some areas older children might also benefit from SMC. Raising the upper age limit to include older children was considered by some countries. The age distribution of parasitologically proven malaria cases admitted to hospital will provide useful information on which to base the age range appropriate for SMC. It is important that these data come from hospitals and health centres whose catchment population is in the area targeted for SMC. It may be misleading to use aggregated national data, or data from referral hospitals whose catchment includes urban areas and areas outside the zone targeted for SMC, if these areas have a lower transmission intensity the age distribution may not reflect the situation in the SMC areas. National reporting forms give aggregated figures only for under 5's and persons 5 and above, and pregnant women (it would be helpful if standard reporting forms could be modified to give a finer breakdown by age). However data on ages of inpatient malaria cases from SMC areas could easily be collected from admissions books for health facilities serving the area targeted for SMC.

The large-scale pilot schemes in Senegal included children up to 9 years of age, SMC with SP+AQ was safe and well tolerated in this age group. Raising the upper age limit from 4 to 9 years approximately doubled the number of children to be treated but there were economies of scale in terms of delivery as health workers could easily include older children during their household visits. For monthly rounds which occurred during term time, visits were planned after school hours and at weekends. The drug dosage for older children was 1 tablet of SP and 1 tablet per day of AQ, for children 5 years of age, and 1.5 tablets of SP and 1.5 tablets per day of AQ, for children 6-9 yrs of age. Increasing the age limit from 4 to 9 years increased the total cost of drugs by approximately 2.5 times when loose tablets were used. The overall cost of delivery was estimated to be $0.50 per child per month. Data from the SMC effectiveness study in Saraya indicates a substantial benefit of SMC in older children.

Pilot schemes

Three countries have implemented SMC in large-scale pilot schemes and benefited from this experience in planning scaling-up of SMC. Senegal has piloted SMC in five districts (Tivaouane from 2007-2010, Mbour, Fatick and Bambey districts from 2008-2010, in central Senegal, and Saraya district in southern Senegal, 2011). MSF conducted pilot schemes in Koutiala district, in southern Mali and in two areas of Moïssala district, in Chad, in 2011. In Senegal, SMC was implemented using two strategies - in central Senegal, through mass campaigns coordinated by the district health team using community health workers paid a daily rate who were managed locally by health posts, and in southern Senegal, through community case management using malaria volunteers and community

health workers resident in the village. In Mali and Chad, mass campaigns were organised each month using community health workers who delivered SMC at fixed points and door to door. In central Senegal, SMC was delivered over three months (September-November), in Southern Senegal over 5 months July-November (analysis showed that 4 months July to October would have been sufficient), and in Mali and Chad over 4 months (July to October).

Management of breakthrough cases

It is preferable that children who have received SMC with SP+AQ who experience a clinical episode of malaria should be treated, with a drug regimen that does not contain AQ or SP, although the WHO policy recommendation does not preclude use of ASAQ for children who have received SMC. Only two countries (Niger and Guinea) currently rely primarily on ASAQ for first line treatment; in Senegal, Gambia, Mali, and Guinea Bissau, AL is the first line, in Chad, Ghana, Nigeria, and Burkina Faso, AL and ASAQ are used. In addition DHA-PQ is used in Ghana and in Chad. Ideally in SMC areas, AL or DHA-PQ should be used for treatment of clinical malaria in children in areas where SMC is introduced.

A child with a febrile illness who has received SMC in the last month is much less likely to have malaria than a child who has not had SMC. If SMC is introduced in areas where use of RDTs for malaria diagnosis is not routine, it would be highly desirable to introduce RDTs at the same time. If antimalarial treatment is given presumptively without requiring parasitological confirmation, children receiving SMC will receive many unnecessary treatments, and confidence in SMC may be undermined.

WHO recommends that treatment for clinical malaria should be given wherever possible only after a positive parasitological diagnosis has been made, most countries have adopted this policy but the extent to which this has been implemented on a national scale is variable. Most countries have planned SMC implementation in a phased manner, initially in small areas as a pilot, rapidly expanding to all the areas where SMC is appropriate. It would be highly desirable to introduce use of RDTs for parasitological diagnosis for malaria in all the areas where SMC will ultimately be delivered, at the start of the SMC pilot implementation. This will provide pre-implementation surveillance data which can serve as a baseline for measuring the impact of SMC.

Supply chain

Existing channels for supplying drugs to districts may be adequate, but careful planning will be needed to ensure timely supply of SMC drugs to districts at the start of each transmission season. To ensure adequate stocks are available at regional level, the number of SP and AQ tablets or treatment packs for infants and older children should be forecast from the estimated number of children under 5 years of age in the target areas. Blister packs of SP and AQ for SMC are being reviewed by WHO for pre-qualification. Distribution from the district health centre to peripheral health facilities and to villages may be done monthly, for areas that become inaccessible during the rainy season adequate supplies for the season can be delivered at the start of the season.

Monitoring and Evaluation

Monitoring and Evaluation (M&E). Plans for M&E are not yet well developed. SMC can be incorporated into existing Health Management Information Systems to monitor process inputs and outcomes and impact indicators. This will need to be supplemented by incorporating coverage of SMC in MIS and DHS surveys. Accurate, complete and durable documentation of dates of doses is essential to permit assessment of coverage, measurement of efficacy using case control studies, and for pharmacovigilance. Partnership with researchers will be necessary to conduct monitoring of SMC efficacy and parasitological monitoring for drug resistance. To sustain support for SMC it will be important to document its impact on health outcomes including incidence of malaria, severe malaria, and child deaths. Financing plans for SMC should allow for M&E but additional research funding will be required to obtain more rigorous evaluation of the public health impact of SMC.

Drug resistance

Currently SP and AQ retain their efficacy in areas where SMC is envisaged. Deployment of SMC with SP+AQ may increase drug pressure on the malaria parasite and lead to increased parasite resistance to SP+AQ and it will, therefore, be necessary to monitor sensitivity of *Plasmodium falciparum* to SP and AQ in areas where SMC is used. Ensuring children receive SMC each month during the transmission period and that they complete the course of treatment each month, and using a different drug regimen for treatment of breakthrough malaria cases will reduce the selection pressure for resistance to SMC drugs. SMC will substantially reduce the need for and use of first line drugs, so using different drugs for prevention and treatment may reduce selection pressure on both drugs.

Rebound effects

Will SMC increase the incidence of malaria in older age groups? This is possible and it will be important to monitor such effects but this will require long term studies. Natural immunity is acquired gradually and SMC may slow this process, and as a result, older children who have received SMC may be at greater risk of malaria than children of the same age who have not received SMC. However, even if a modest increase in the incidence of malaria is seen in the year after treatment is stopped, the balance will still be strongly in favour of SMC because of the many deaths and cases of malaria it is likely to have prevented in the first few years of a child's life. Young children should be protected against malaria because they are especially vulnerable, due to other infections and malnutrition which are more common in this age group.

Pharmacovigilance

Existing national systems are weak, SMC is an opportunity to strengthen these systems by providing guidelines on the recognition and management of adverse drug reactions, making sure forms are designed to capture relevant information and taking steps to ensure reporting forms are used and

are submitted or collected regularly, and the results collated and made available to health staff. Although there are now extensive data demonstrating the safety of SMC with SP+AQ, it will still be important to maintain adequate monitoring for adverse drug reactions in areas where SMC is used.

Conclusions

About 25million children under 5 years of age live in areas of highly seasonal transmission in the Sahel and sub-Sahel, and in many parts of this region malaria remains the leading cause of severe illness and death in children. SMC provides a very high degree of personal protection and, if widely deployed, could prevent a substantial proportion of the deaths and severe illnesses caused by malaria in these children. It is, therefore, vital that steps are taken to ensure SMC is introduced without delay in suitable areas.

Key points from the meeting

1. In order to seek financing for SMC it needs first to be incorporated into national strategic plans for malaria control.
2. SMC is most appropriate where transmission is high and in these areas the burden will be mainly in young children. Some countries have considered extending the age range. Whether this is done s should be based on the age pattern of confirmed cases in the areas targeted for SMC and not from aggregated national data.
3. Febrile illnesses in children who have received SMC are much less likely to be malaria than in children who have not received SMC and it is, therefore, highly desirable to ensure RDTs are used to confirm malaria before treatment is given in areas where SMC is deployed.
4. In countries with both seasonal and year-round transmission, introduction of IPTi may be considered for areas with high year round transmission where SMC is not appropriate. Where transmission is very low, other strategies may be required.
5. Collation of data on seasonality of confirmed malaria, and the age distribution of inpatient cases, in the Sahel subregion should be organised in order to map in more detail areas where SMC may be useful.
6. Monitoring and evaluation should be included in plans for financing SMC. Rigorous evaluation of the public health impact of SMCwill require input from researchers and additional resources.
7. Pharmacovigilance systems need strengthening.

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Table 1: Questions that NMCP representatives were asked in relation to plans for SMC delivery

Current policies and capacity:

Which drugs are used for first line treatment for uncomplicated malaria?

What is the policy with regard to parasitological diagnosis of malaria?

- Are RDTs used at community level?
- What % of malaria treatments are based on parasitological confirmation?

What existing CHW/ASC schemes are in place, how widespread are these?

- Are there malaria community case management schemes?
- How widespread?
- Do these use RDTs?

Is there a national pharmacovigilance system in place for antimalarials; does it need strengthening?

SMC implementation:

What are the plans to include SMC in malaria control?

- Where will SMC be implemented?
- When (which months of the year will it be given)?
- What is the age range of children to be included?

What is the approximate size of the population of children to be covered?

Will SMC be introduced in a phased manner or in all regions at once?

What is the planned delivery approach:

- through mass campaigns,
- through Community Case Management schemes for malaria?
- a mixture of both strategies?

Drug supply chain:

- will SMC drugs be supplied through existing channel for antimalarials?
- will special arrangements be required?

Policy process – has the process started and if so what stage have you reached?

- NMCP policy document drafted?
- Local implementation guide prepared?
- National consensus meetings held?
- When is validation of the policy by the Ministry of Health anticipated?

Have any pilot studies of SMC implementation been done?

Is there information about resistance to SP and AQ that could serve as a baseline for monitoring?

Are there any plans for IPTi implementation in areas not suited to SMC?

What are the plans for monitoring and evaluation of SMC?

Table 2: Country profiles – malaria treatment policy, CCM schemes, and pharmacovigilance systems

Country	First line Treatment	Patients of all ages should receive diagnostic test (date policy adopted)	RDTs used at community level (policy date)	% malaria treatments based on parasitological confirmation (*by policy)	Existing CHW/ASC schemes	National PV system 1 – A strong national system exists; 2 – A national system exists, but needs strengthening; 3 - No national system exists.
Burkina Faso	ASAQ AL	Yes (2009)		20%	National PECADOM scheme	2
Chad	ASAQ	Yes	Yes	20%		3
Gambia	AL	Yes	No	100%*	Existing CCM scheme in most villages	2
Ghana	ASAQ AL DHA-PQ	Yes (2008)	Yes (2009)	100%*	CHPS and HBC CCM in most districts, will be expanded with SMC	2
Guinea	ASAQ	Yes (2009)	No	0%	Low coverage of CHWs	2
Guinea Bissau	AL	Yes (2008)		62%	Trained ASC	2
Mali	AL	Yes (2008)	Yes (2005)	32%	Network of relais communautaire exists	2
Niger	ASAQ AL DHA-PQ	No	Yes (2006)	20%		2
Nigeria	ASAQ AL	Yes (2006)	No	100%*	CCM in all states	1
Senegal	AL	Yes (2007)	Yes (2008)	100%*	PECADOM in communities >5 km from a health facility	2

Table 3: Plans for implementation

	Areas	Age range for SMC	Estimated population eligible for SMC in the targetted area	No of months SMC	Jun	Jul	Aug	Sep	Oct	Nov
Burkina Faso	6/13 regions	3-59mths	1050805	4			X	X	X	X
Chad	19/22 regions	3-59mths	2301431	4		X	X	X	X	
Gambia	CRD,URD	3-59mths	52643	4			X	X	X	X
Ghana	3 Northern Regions	3-59mths	548338	4	X	X	X	X		
Guinea	Siguiri, Dinguiraye, Mali Koundara	3mths to 10 yrs	169459	4	X	X	X	X		
Guinea Bissau	Bafata, Bissau, Biombo, Gabu	3-59mths	160989	4		X	X	X	X	
							X	X	X	X
Mali	9 régions (?)	3-59mths	3228430	4		X	X	X	X	
							X	X	X	X
Niger	7/8 regions	3-59mths	3383774	4			X	X	X	X
Nigeria	11 Northern States	3-59mths	11208504	4			X	X	X	X
Senegal	Tambacounda, Kedougou, Kolda,	3mths to 10 yrs	535329	4		X	X	X	X	
							X	X	X	X

Table 4: SMC policy and implementation plans:

Country	Delivery	Policy	Plan	Supply chain
Burkina Faso	Campaign	Stratégie déjà adoptée dans la politique	Stepped 6 districts in 2013, 20 districts in 2014, all 29 districts in 2015	Non. L'approvisionnement des médicaments sera fait en collaboration avec la DGPML/DAF
Chad	Campaign	Process ongoing, expect to adopt early 2013	Stepped 2013-2015	au travers de l'approvisionnement de routine
Gambia	CCM (VHWs)	Policy process and adoption during 2013	Stepped over 3 years 2013-2015	Through existing supply management system.
Ghana	Community volunteers	Not started	Yet to be developed	Central and Regional Medical Stores, to districts
Guinea	CCM and Campaign	Expect to adopt 2012	Stepped, 2 districts in 2013 and 4 in 2014	Chaine nationale PCG
Guinea Bissau	CCM and Campaign	Expect to adopt 2012	Stepped 2 regions in 2013 and 4 in 2014	Chaine nationale d'approvisionnement
Mali	Campaign		Steped 1 district in 2012, 5 districts in 2013	SDADME
Niger	CCM and Campaign	Process ongoing, expect to adopt end 2012	Stepped 2013-2015	au travers de l'approvisionnement de routine
Nigeria	Village Health Volunteers	Not started	Yet to be developed	Through primary health care facilities
Senegal	CCM+ campaign	Process ongoing, expect to adopt end 2012	Stepped over 2 years 2012 in 1 district (Saraya) & from 2013 in all 4 regions	Through existing district supply from regional pharmacy, distributed to villages via health postes/huts

Table 5: Plans for M&E and plans for IPTi in areas not suited for SMC:

Country	Plans for M&E	Baseline resistance data for SP+AQ	SMC pilot experience	Plan for IPTi in areas of year-round transmission
Burkina Faso	Monitorage journalier durant la campagne; utilisation du SNIS	Yes	No	Planned but not yet implemented
Chad	Surveillance de routine, enquêtes de couverture, études d'efficacité par les instituts de recherches	Yes in 1 district	Yes	Not applicable
Mali	SLIS, SE specifique SMC	Yes	Yes	Not applicable
Gambia	Baseline survey 2013 using routine HMIS tool. Routine HMIS data process. Incorporate in MIS Health facility survey	Yes	No	Not applicable
Ghana	Outcome and impact sureveys	Some data available	No	No plans
Guinea	Monitorage de routine du processus et impacts dans les Services de Santé; Enquêtes de couverture et d'efficacité Résistances aux médicaments.	No	No	Planned
Guinea Bissau	Surveillance dans les services de Santé ; Enauëtes communautaire de couverture, suivi de la mortalité dans la HDSS, Suivi de résistance aux médicaments et recherche opérationnelle	No	No	No plans
Niger	Surveillance de routine, enquêtes de couverture, études d'efficacité par les instituts de recherches	Yes in 1 district	No	Not applicable
Nigeria	Routine IDSR, M&E	National DTET every 2 years for treatment drugs	No	No plans
Senegal	Routine monitoring of process and outcome; coverage surveys (annual DHS from now on); surveillance data in health facilties	Yes in 1 of the 3 regions	Yes	Not applicable

Fig 1. The incidence of malaria in children under 5 years, and in children over 5 years and adults, in Senegal, by health district. Districts are ordered by the incidence among children under 5 years. (Data courtesy of the PNLP, Dakar, Senegal).

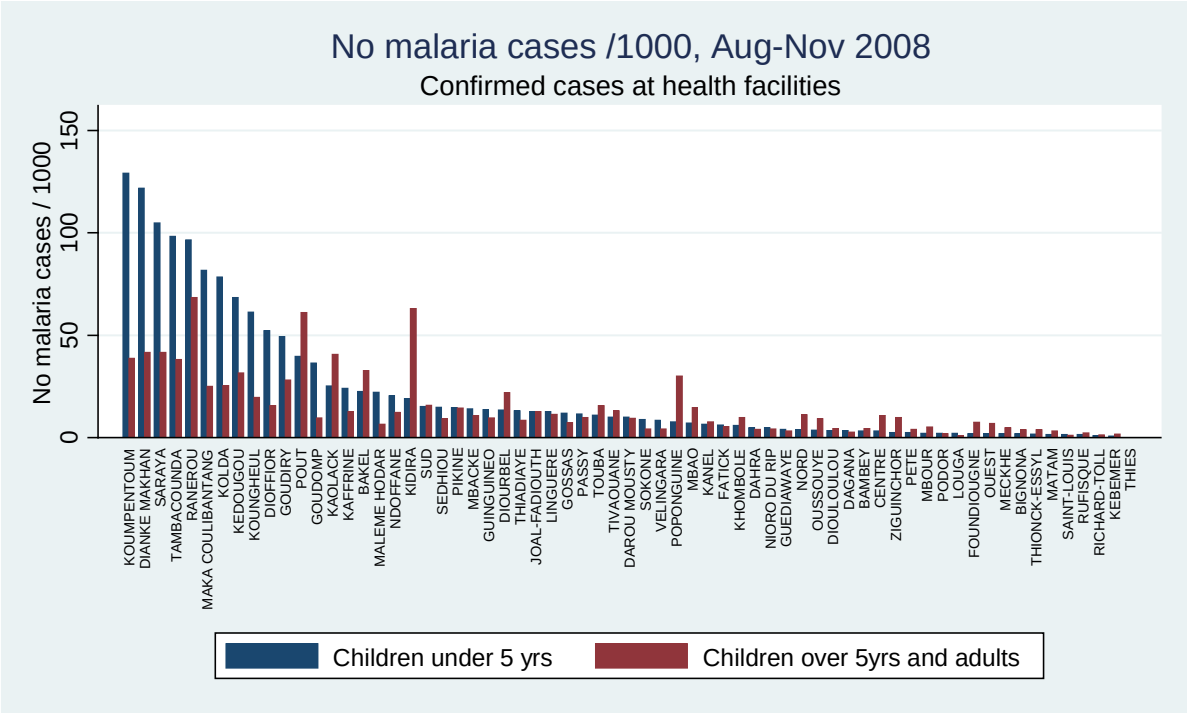

Fig 2. Map showing areas where SMC implementation is planned.

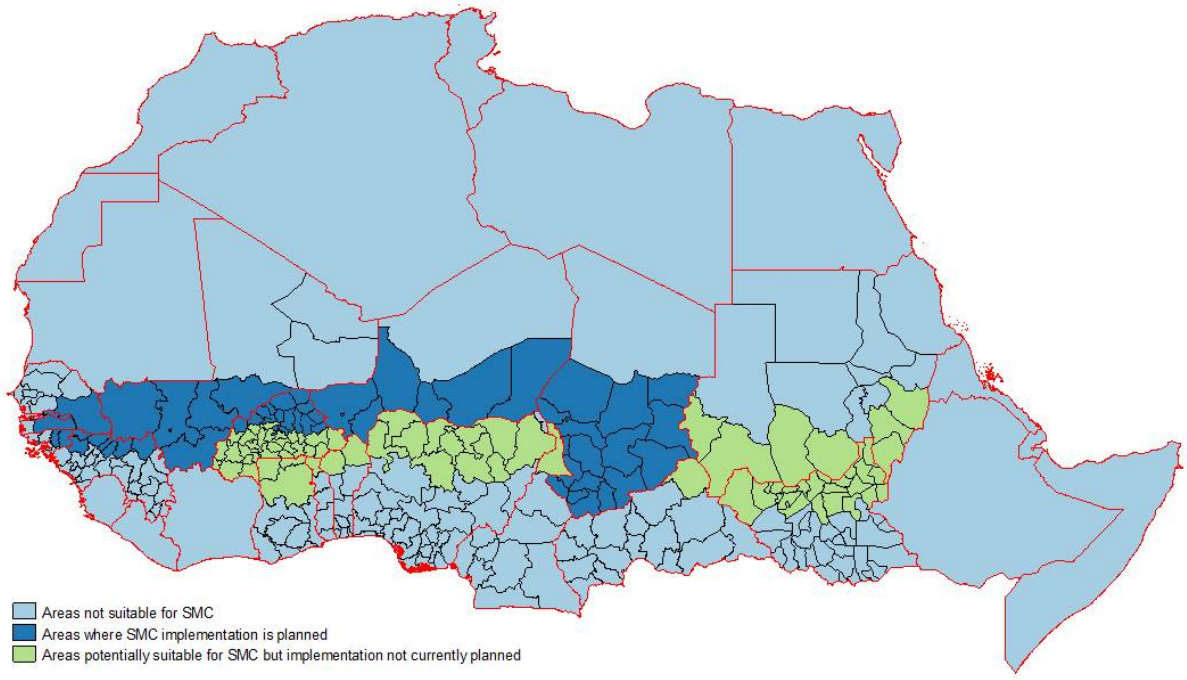

Fig 3: Estimated number of children <5yrs in areas targeted for SMC (<10yrs for Senegal and Guinea) (Total:22.6million).