UNICEF

Operational Research
on
Intermittent Preventive Treatment of malaria in infants
(IPTi)

ACCEPTABILITY REPORT

New York, September 2009
Acknowledgements

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<tbody>
<tr>
<td>ACT</td>
<td>Artemisinin-based combination therapy</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal care</td>
</tr>
<tr>
<td>CHWs</td>
<td>Community health workers</td>
</tr>
<tr>
<td>EPI</td>
<td>Expanded Programme of Immunization</td>
</tr>
<tr>
<td>FGD</td>
<td>Focus group discussion</td>
</tr>
<tr>
<td>DTP2</td>
<td>Second dose of vaccine against diphtheria, pertussis and tetanus</td>
</tr>
<tr>
<td>DTP3</td>
<td>Third dose of vaccine against diphtheria, pertussis and tetanus</td>
</tr>
<tr>
<td>IDD</td>
<td>In-depth discussion</td>
</tr>
<tr>
<td>IDI</td>
<td>In-depth interview</td>
</tr>
<tr>
<td>IPTi</td>
<td>Intermittent preventive treatment of malaria in infants</td>
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<tr>
<td>IPTp</td>
<td>Intermittent preventive treatment of malaria in pregnant women</td>
</tr>
<tr>
<td>ITN</td>
<td>Insecticide-treated mosquito net</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>SP</td>
<td>Sulphadoxine-pyrimethamine</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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SUMMARY

Introduction

Intermittent Preventive Treatment in infants (IPTi) with Sulphadoxine-Pyrimethamine (SP) is a new malaria control strategy with potential for implementation scale up. UNICEF launched an operational research study to analyze the acceptability of this new intervention by the target communities and the health staff in charge of administering it in natural conditions during one year of treatment deployment.

Methodology

The study consisted of qualitative surveys, with data collected through direct observation, in-depth interviews (IDIs) and focus group discussions (FGDs) in IPTi pilot implementing districts in Benin, Madagascar and Senegal. Data collection took place between 6 and 12 months of implementation in villages stratified by their immunization coverage levels. Data was collected on a tape recorder and later transcribed, merged and analyzed using NVivo 7 qualitative data analysis computer software.

Results

Communities’ knowledge of malaria etiology and diagnosis was generally very good, although treatment-seeking behavior only ultimately included the health center. Perceptions of SP-IPTi were very positive both among communities and health workers. No cases of refusal were identified in any of the 3 countries. One of the factors contributing to IPTi's high acceptability was the belief by caregivers and some health staff that SP is an anti-pyretic that can prevent or decrease post-vaccinal fever. Additionally, IPTi did not have a negative influence on other malaria control strategies, and no negative rumors related to its coupling with EPI were identified. Child health care decisions normatively made by the head of household (father) are progressively shifting to financially independent mothers.

Conclusions

IPTi is a well-accepted strategy among health workers and community members, and its coupling with EPI showed a synergic acceptability between both interventions. However, a misconception of the role of SP in IPTi may have contributed to the high acceptability results and needs to be addressed when scaling up implementation programmes.
I. INTRODUCTION

1. Intermittent preventive treatment of malaria in infants

Intermittent preventive treatment of malaria in infants (IPTi) is a new malaria control strategy based on the intermittent administration of a treatment dose of an anti-malarial medication during the first year of life coupled with the Expanded Programme of Immunization (EPI). The anti-malarial drug is administered during the routine immunizations visits to infants, irrespective of their malarial infection status, along with DTP2, DTP3 and Measles vaccinations at 2, 3 and 9 months of age, respectively. IPTi has shown to decrease the incidence of malaria by 30% during the 1st year of life [1].

The association of IPTi with a successful programme such as the routine immunizations of the EPI offers a great number of advantages: a potential high coverage, logistic advantages, and low cost. However, also possible is the risk of IPTi having a negative impact on the routine immunization programme due to low acceptability of this new intervention by health workers and/or communities. Communities’ acceptability of IPTi was previously evaluated in a clinical trial setting in Mozambique [2] where community resistance to the intervention was identified but attributed to the clinical trial setting in the study rather than to IPTi per se. In particular, interviews revealed that participants in the study reacted most negatively to procedures used to draw blood from infants and to measure their height. The authors postulated that such reactions were due to underlying mistrust of medical research rather than concerns about immunization or about this specific intervention.

UNICEF identified the need for an operational research study to analyze acceptability of this new intervention by communities and health staff under field conditions, and free of the bias created by experimental settings (clinical trial or effectiveness studies), before engaging in a widespread implementation. The anthropological studies were conducted within the context of the pilot implementation conducted by each country’s Ministry of Health (MOH) with support from UNICEF in Benin, Madagascar and Senegal. The principal objective of the anthropological study was to identify impediments and facilitate factors regarding community and health workers’ reception of this new IPTi programme and its long-term acceptability. Identifying such factors could lead to an improved implementation programme design including appropriate communication messages in which the target population (beneficiaries and providers) accepts and supports the programme.

2. Importance of acceptability studies

Anthropology offers to public health an understanding of perceptions about diseases or implementing programmes and how they translate into effective action. Motivations behind treatment-seeking behavior or adherence to health recommendations affect the success of a public health programme and cannot be tested using clinical trials or survey designs because they require an in-depth understanding of the cultural context. The appropriate method in these instances is often qualitative methods that combine observation, focus group discussions (FGDs) and in-depth interviews (IDIs) with quantitative surveys. Acceptability studies are an example of anthropological considerations being applied in a community health context. Taking acceptability of the target population into account before starting a new health intervention is not only ethically important but ensures the long-term effectiveness of a programme.

In gauging acceptance, certain sectors of the community are particularly important to consider. Acceptance by local health care providers is essential, as they are often either directly involved in carrying out the programme or consulted by community members. The level of acceptability among caregivers who make treatment-seeking decisions on behalf of the family is
also of crucial importance, and should be taken into account to best target the communication campaigns promoting the launching of an intervention.

Additionally, a health intervention is perceived to be important if the negative health outcome it addresses is recognized as a problem in the community. If the disease outcome causes morbidity and mortality to the point that it has become a priority issue, then the community is more likely to be receptive to new interventions seeking to ameliorate the situation.

Interventions are more likely to succeed when they introduce an improved strategy to solve a well-recognized problem in the target population rather than imposing a new set of priorities for problems to be addressed. To gauge the extent to which community stakeholders’ objectives match those of the proposed intervention, qualitative exploratory research may be conducted before the pilot intervention.

3. Acceptability of IPTi

Acceptability is a condition resulting from an adjudication process by which individuals (i) compare the perceived reality with its known alternatives, and (ii) decide whether the gain is greater or sufficiently similar to the alternative condition [3]. Comparing different alternatives is the basis of the decision of acceptability [4, 5]. Individuals build expectations on the conditions they encounter partly based on knowledge and experience, and then compare them to the actual conditions. The criteria to assess and compare the alternatives are based on three factors: its desirability, its equity and its feasibility. However, often communities adopt behaviors without necessarily measuring their advantages and drawbacks, but instead base their judgement on other perceptions that are socially in accordance with the proposed measure.

In determining community acceptability of IPTi it was important to identify inherent obstacles that could potentially limit the success of the programme implementation. There were major concerns regarding parental and community acceptance. For example, if communities understand IPTi as full immunization against malaria, they may replace the need to take other measures to prevent malaria behaviorally. Furthermore, the pairing of IPTi with EPI already underway in the community has the potential to negatively influence people’s attitudes toward routine immunizations, leading to a decrease in adherence to routine vaccination recommendations and a subsequent increase in child morbidity and mortality. If this concern is not evaluated and addressed, IPTi could lower malarial incidence only to create a resurgence of diseases like measles and polio, currently under control by routine childhood immunizations.

In addition to community and parental acceptance, there were concerns regarding health care workers acceptance. First, the drug of choice for IPTi, Sulfadoxine-pyrimethamine (SP, commercial name Fansidar), has been phased out from malaria endemic countries for the treatment of malaria due to the emergence of high levels of drug resistance [6]. A vast campaign has taken place in malaria-endemic regions to push for the replacement of SP with Artemisinin-based Combination Therapy (ACT). The campaign to replace SP use in treatment generated negative press about the drug, which could have affected communities’ and health workers’ willingness to use this drug in prophylaxis. Thus, perceptions by health workers on why such a drug would be re-introduced in malaria control programmes was of concern.

Another important concern is the contradiction between public health messages delivered on the recommendation of exclusive breastfeeding in infants less than 6 months of age and the need to add water to SP to produce a drinkable solution appropriate for infants intake. This recommendation is based on the risk of giving contaminated water to infants, which is associated with a 6-fold higher risk of contracting infectious diseases [7]. Furthermore, in SP-IPTi infants weighing more than 5kg receive half a tablet of SP and those weighing less than 5kg receive a quarter tablet. Since there are no SP pediatric formulations available, the SP tablets need to be
crushed and dissolved in water before administration, which significantly increases the amount of time for administration of the intervention. Indeed, results from UNICEF’s cost analysis study showed that 60% of the time required for health workers to administer IPTi is spent on producing a pediatric SP drinkable solution [8][9]. Finally, even after such care is taken by the health workers, infants often regurgitate the medication and must then rest 30 minutes before receiving another dose, very common in younger infants due to crumbs still present in the solution.

Despite these concerns the choice of SP in IPTi was favored because it can be administered by the health staff as a single dose, making its compliance rates very high, it is very inexpensive, it is readily available, it is safe to administer jointly with vaccinations [10], and the documented incidence of serious adverse events resulting from the use of SP is low [11][12].

4. Rumors and acceptability of malaria prevention and other prophylaxis interventions

Since intermittent preventive treatment with antimalarial medication is a new strategy, there are questions pending on its acceptability by the health workers providing it as well as the target communities. Therefore it is useful to consider the acceptability of other new prophylaxis intervention and of vaccination programmes, as their reception at the community level could be comparable to that of IPT.

Current strategies of preventing malaria have become common throughout sub-Saharan Africa, and are generally well accepted. Although coverage remains low [13], IPTp acceptability by pregnant women is high [14]. Initiatives to put every pregnant woman and child under five years of age under an insecticide-treated mosquito net (ITN) are typically met with enthusiasm by village communities [15-18] although ownership of ITN is still considerably higher than its actual usage [19]. Indoor residual spraying and efforts to treat household items such as curtains, clothing and blankets with permethrin have also generally been accepted by recipient communities [20]. Adoption of such interventions by a community is further eased by the fact that they are generally provided without cost, and are conveniently brought to them.

The degree to which a community accepts vaccination is influenced by several factors. One important consideration that may hinder local acceptance of a vaccination campaigns in sub-Saharan Africa is the role that such campaigns have played historically, particularly during the colonial era. During the colonization of Cameroon, for example, large national vaccination campaigns were carried out by the French military by rounding up large segments of the population and forcibly vaccinating them, with the goal of curbing death and disability due to smallpox, sleeping sickness and leprosy with the primary goal of maintaining the productivity of the labor force [21]. Mistrust resulted from such campaigns in which the population believed that vaccinations were not given for their benefit but were imposed as part of a self-serving government agenda.

Rumor theorists have proposed that miscommunication is a necessary component of the generation of rumor. Rumors have developed surrounding vaccination campaign countless times in recent decades throughout sub-Saharan Africa. Theorists view rumor as “a form of individual and collective information-seeking when a formal information gap exists” [21]. This information gap may exist due to incomplete information provided by vaccinators, or due to a mistrust of official information sources. The latter cause of rumor generation typically occurs in times of political, social or economic unrest. The content of a rumor about a new vaccination campaign is influenced by not only social, political and economic context, but also by which population is targeted. The tetanus vaccine that was administered to women in Cameroon in 1990, for example, was associated with sterilization because of a rumor created due in part to political ethnic tensions, in part to the concurrence of the launch of a national family planning policy, and historical perceptions of vaccines. The link to reproductive health effects was influenced by the fact that the vaccine was only for women, when in reality that population was targeted simply to
decreasing the incidence of neonatal tetanus in the community. Anthropologists later posited that the link to reproductive health was made in this community as part of a larger trend to use reproductive health rhetoric as symbolism for larger social and economic problems [21].

Recently, a mass polio and measles immunization and de-worming campaign in Ghana was devastated by a rumor among the population. In the past these campaigns had been delivered by health workers but in 2007 it was decided by the MOH and the Ghana Education Service that mebendazole tablets should be administered to schoolchildren by teachers. Prior to the campaign, minimal sensitization and social mobilization took place in the community and caregivers received very little information regarding the drug, possible adverse events or precautions. On the day of the campaign, some parents kept their children home from school because they heard that school children would be receiving a drug that could kill them or make them very sick. Parents who did not hear the news before rushed to the schools soon after the intervention was started to ask for their children to be withdrawn from the de-worming exercise or to take their children home. About two to three hours after the teachers had started administering the de-worming medication there were reports on the radios (mostly private and community-based) that children had collapsed, vomited, had severe abdominal pain or died after swallowing the de-worming medication. This created a pandemonium throughout the country during which teachers were attacked by parents, and the intervention had to be immediately discontinued. An investigative body put together by the MOH found that in fact no such adverse events had occurred, and that all the unfortunate events were due to the rumors and inadequate sensitization of the community [22].

Community members’ concerns about safety are particularly relevant when introducing a new technology into a community. Injections are by now common in health centers of sub-Saharan Africa and thus any opposition to a vaccination campaign would unlikely be due to this method of administration. Rather, a community’s trust in the health staff administering and supporting a vaccination campaign plays a prominent role in determining the perceived safety of the injection. If a new campaign is introduced with the support of respected community leaders, this support extends into trust in the proposed intervention by the community, resulting in acceptability. If this trust is not established prior to the intervention, the vaccine campaign risks being destroyed by negative rumors circulating among the target population. In 2003 for example, a polio campaign in Nigeria was suspended following a widespread rumor that the vaccine caused sterility in girls [23, 24]. Subsequently, the incidence of polio increased dramatically in the region, and as many as 12 neighboring countries that had previously been polio-free began documenting new cases. Before the polio vaccine campaign was resumed in 2004, the outbreak had spread as far as Yemen. The far-reaching public health consequences of the Nigerian rumor and subsequent vaccination campaign suspension is further demonstrated by the infection of 20 Indonesian children as recently as June 2005 by a strain of polio that was genetically traced back to Nigeria.

A more recent example of miscalculations leading to an unsuccessful vaccination campaign took place in 2008 in Madagascar [25]. The Integrated Campaign for Children combined tetanus vaccine for women with vitamin A supplements, de-worming medication and vaccinations for children. The donor pushed for Deprovera birth control to also be provided to women within the scope of the campaign. The pairing of birth control methods with vaccines being offered for mothers of young children conjured up fears of sterilization reminiscent of the 2003 polio vaccination campaign in Nigeria mentioned above. The lesson is for programme design to take into account the perceptions of the target population. Each element added to a vaccination campaign needs to be logically related to the theme of the campaign, so that the goal of the intervention will not be misunderstood by the community.
In addition to homegrown rumors, community perception of a health intervention’s efficacy may be based on anecdotal evidence from other communities who have already undergone such an intervention. In the case of vaccination, if the disease outcome does not occur after some time, the perception of efficacy may strengthen as good health continues. If, however, the recipient of a vaccine falls ill by a disease similar in appearance to the disease against which the vaccine is intended to protect, then the vaccine’s reputation of effectiveness may be doubted.

Although cost of an intervention plays a role in its acceptability, there is no general rule regarding cost that is appropriate globally in efforts to increase adherence. If a health service is very expensive in a low-income community, it is unlikely that it will be accepted due to practical economic reasons. However, some reports suggest that health services are less valued by a target population if they are offered without cost. In the case of the 1990 tetanus vaccination campaign in Cameroon, the free vaccine was met with widespread suspicion since a national fee-for-service policy had recently been instituted for nearly all other health services in the country [21].

UNICEF conducted a large anthropologic study across three countries in Africa in order to capture communities and health workers perceptions and acceptability of IPTi. The study incorporates in-depth anthropological explorations of the response to IPTi in different settings, in order to provide support for future recommendations regarding the implementation of IPTi across Africa.

II. STUDY OBJECTIVES

General objectives. The primary study objective was to understand how IPTi, a new intervention, was accepted by the beneficiaries (target communities) and the service providers (health workers deploying it). The concept of acceptability is multi-faceted, and so in order to reach this objective we also considered contextual factors that may play a role in facilitating or hindering acceptability, such as rumors and relationships between community members and health workers.

A secondary study objective was to understand the decision-making process regarding the health care of young children in communities and the socio-cultural factors that may influence this process, in order to best target communication campaigns to obtain the desirable effect.

Specific objectives. This study aimed specifically to:

1) Examine whether communities and health workers were well informed on the nature of IPTi after half a year of implementation, and whether they used this knowledge in practice;
2) Evaluate factors that explain participation or refusal as well as other behaviors related to IPTi;
3) Identify social, cultural, and organizational factors which may constitute a handicap or an advantage for delivering IPTi within the context of EPI;
4) Analyze the acceptance of SP use in IPTi by health workers and communities.

III. METHODOLOGY

The present study was a qualitative investigation conducted in Benin, Madagascar and Senegal, and aimed at examining the acceptability of health workers and of community members regarding IPTi in malaria endemic areas.
1) Data collection

Data was collected through direct observation, in-depth interviews (IDIs) and focus group discussions (FGDs).

**Direct Observation.** DO was aimed at better understanding how community members approached the new IPTi intervention based on the community context and social and familial dynamics, especially the identification of current practices at the sites of investigation such as the endogenous dynamics as well as the physical features of the communities that could promote or limit the IPTi project. Beyond the statements provided by the study individuals, the investigators observed adult interactions with children at home and at the health centers. Direct observation took place in target communities and the health centers in which vaccination campaigns were carried out. The observations particularly targeted healthcare providers’ interactions with parents during vaccination appointments. Also noted were the reactions of parents either in the healthcare center or at home in regards to IPTi, the use of ITNs, and other infant caretaking behaviors. Observation was used to understand the manner in which information about IPTi disseminated through strategies of social mobilization and sensitization, including public radio broadcasts or other public messages addressing the intervention, was perceived. Researchers’ immersion in the community was intended to expose them to any rumors circulating in regards to IPTi, SP medication, and undesired side effects of IPTi.

**In-Depth Interviews.** IDIs were conducted with caregivers and health workers involved in administering IPTi and EPI, encouraging the participants to share their thoughts about malaria prevention, positive and negative rumors that they had heard concerning IPTi, perceptions of medications, concerns about adverse side effects, and perceived advantages of the intervention. Themes explored during open discussions were: representations of the child in a family, malaria representations, practices in relation to treatment of malaria, rumors on vaccination and/or IPTi, dynamics around the child health, and other community dynamics related to IPTI-EPI, the perception on the gratuity of IPTi, and attitudes about modern medical care including reasons for adhering to or refusing IPTi and other prescribed interventions (available upon request). Community members and health workers were interviewed until saturation of themes was obtained, using standard anthropologic methodology [26-30].

**Focus Group Discussions.** FGDs consisted of discussions within a small homogeneous group of approximately 10 persons (selected by criteria such as age, gender, marital status, and membership) about their experiences, visions, opinions, perceptions and prejudices without looking for a consensus. FGDs were organized verbally and took place in a language common to all participants. The methodology of a FGD was a semi-structured discussion, using techniques of group leadership and guided through open questions. The focus group was steered by a team consisting generally of a presenter/moderator and a reporter who recorded the discussion on cassette at the same time as he/she took notes. The FGD was held in a neutral place sheltered from persons other than the participants and lasting from 1-1.5 hours. FGDs were led with caregivers (parents and grandparents of infants) and healthcare providers who were either delivering the IPTi intervention or otherwise involved in providing health care services to infants in the community. The participants were divided according to their gender and age, while maintaining a diverse representation of ethnicities, cultures, and socio-familial characteristics. Groups were constructed in such a way that participants to felt comfortable expressing their various points of view concerning malaria prevention, differences between IPTii and vaccination, the efficacy of IPTi, side effects and rumors about IPTi, and reasons to adhere to or refuse IPTi. In addition, the parents were encouraged to speak about any changes they had noticed in caring for their infants after the combination of IPTi with EPI, advantages and inconveniences of IPTi, and the impact of IPTi on the health of their infants. Additional topics of discussion for the healthcare personnel included their perceptions of and degree of support for IPTi, their methods
for implementing the protocol, and any noted impact of the additional IPTi workload on their work conditions, motivation, or quality of care provided to patients. The selection of community participants in particular for FGDs was facilitated by assistants and community health workers familiar with communities, and to whom selection criteria was explained.

The data obtained between 6 and 12 months of IPTi implementation focused on observations of implementation strategies and how they may differ between health centers, and on preventive measures parents practice at home concerning childhood illness; questions on knowledge, attitudes and behaviors in regards to IPTi among health care providers and the broader community; and factors that may influence parents’ decisions to bring their infants to vaccination centers. Observations were made specifically on the dynamics and interactions between actors occurring in the community during immunization days, and at the health centers when immunization and IPTi were being administered. Discussions and questions addressed to parents focused on representations of children health, and specifically malaria, community dynamics concerning children’s health, preventive and curative practices regarding infants, knowledge and perceptions of IPTi, perception of delivering IPTi in the context of the EPI, attitudes and behaviors towards IPTi, community dynamics regarding health center attendance, rumors about IPTi and EPI, knowledge and attitudes concerning adverse effects, perception of IPTi gratuitousness, and report to and interaction with health workers. Questions addressed to health workers focused on their, education level, professional itinerary, responsibilities and activities performed, opinion about own profession, malaria preventive and curative practices, attitudes and opinions about vaccination, IPTi protocols knowledge, perception of combining IPTi with EPI, and knowledge and report practices on SP adverse events. Each interview guide (available upon request) was divided into seven parts: (1) identification of the respondent; (2) knowledge of childhood illnesses including malaria; (3) therapeutic practices regarding malaria; (4) perceptions about EPI; (5) perceptions about IPTi (6) perceptions of adverse drug effects; and (7) suggestions to improve IPTi services.

To capture the decision-making process concerning infant health, we asked primary caregivers who was in charge of the health problems of a child in the community, and who gave permission to send a child for vaccination, and we then observed who took the initiative to take the child for treatment and for prophylaxis.

2) Training of interviewers

Interviewers were trained technicians with university education and confirmed experience in the collection of qualitative data. Their training was done both at central level for three days before field immersion, and at location a one day refresher was conducted, in both cases by the project responsible anthropologist in each country. Specifically, data collection training was based on an instruction manual that included the study objectives, the methodological approach, the geographical field covered in the study, the definition of the target population, tools for data collection, examples of questions, their mode of administration, and the type of information aimed to be collected. A dozen interviewers were recruited per country and worked as two-person teams.

Each interviewer explained individually to potential respondents the objectives of the survey, its importance, and the procedures. Once they obtained respondents’ verbal consent, they performed the interview. All interviews were digitally recorded. Records and transcripts were checked daily and the interviewer returned to the location if additional information was needed. Only interviews that could be fully transcribed, and respondents correctly identified were entered in a common software database and used in the comparative analysis.
3) Study sites

The present anthropological study was conducted in eight districts across three francophone African countries (Benin and Senegal in West Africa and Madagascar in East Africa) where IPTi pilot implementation has been deployed by MOHs with technical support from UNICEF and its operational research study teams, since early 2007. All study sites were located in districts where malaria transmission is high (malaria incidence per person-year in infants of 0.12, 0.07 and 0.10 in Benin, Madagascar and Senegal, respectively) [31-34] and endemic throughout the year, although seasonal peaks are seen during the rainy season. In each country, the sanitary zone or districts are divided into communes or municipalities, and these into villages where primary health centers are located.

The pilot implementation districts where the study took place involved a total population of 1,601,732 individuals distributed among 8 districts (2-3 per country) where 170,011 doses of SP in IPTi where administered to 65,681 infants, during the study year (2007) or first year of implementation (see Table 1). The implementation districts were predominantly rural (above 80%) with only a small percentage living in semi-urban areas. In two countries (Benin and Madagascar) the predominant religion is largely Christian, whereas in Senegal it is largely Muslim. Most communities live of subsidiary agriculture, and fishing.

Table 1: Characteristics of Anthropological Study Sites

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Benin</th>
<th>Madagascar</th>
<th>Senegal</th>
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<tbody>
<tr>
<td>Study population</td>
<td>1,601,732</td>
<td>447,957</td>
<td>821,150</td>
<td>332,625</td>
</tr>
<tr>
<td># infants receiving IPTi</td>
<td>65,681</td>
<td>15,335</td>
<td>32,846</td>
<td>17,500</td>
</tr>
<tr>
<td># SP doses administered</td>
<td>170,011</td>
<td>48,739</td>
<td>81,234</td>
<td>40,038</td>
</tr>
<tr>
<td>Districts</td>
<td>8 districts</td>
<td>Adjohoun-Bonou-Dangbo, Djidja-Abomey-Agbangnzoun</td>
<td>Amparafaravola, Ambatondrazaka, Moramanga</td>
<td>Vélingara, Kédougou, Saraya</td>
</tr>
<tr>
<td>Distribution of population</td>
<td>83 % rural</td>
<td>100% rural</td>
<td>88 % rural</td>
<td></td>
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<tr>
<td>Principal ethnicities represented</td>
<td>Weme, Fon</td>
<td>Sihanaka, Bezanozana</td>
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<tr>
<td>Languages spoken</td>
<td>Weme, Fon, French</td>
<td>Malagasy, French</td>
<td>Fula, Maninka, Diakhanke, Bamana</td>
<td></td>
</tr>
<tr>
<td>Religions represented</td>
<td>Christian (66%), Traditional (25%), Muslim (9%)</td>
<td>Christian (45%), Traditional (52%), Muslim (7%)</td>
<td>Muslim (95%), Christian (&lt;5%), Traditional (&lt;1%)</td>
<td></td>
</tr>
<tr>
<td>Common livelihoods</td>
<td>Agriculture, fishing, handcrafted goods</td>
<td>Agriculture, commerce, transportation, civil servant</td>
<td>Agriculture, commerce, breeding</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: IPTi Intervention Sites, Benin

In Benin, the research was conducted in the districts of Adjohoun-Bonou-Dangbo (ABD) and Djidja-Abomey-Agbangnzoun (DAA) (see Figure 1). ABD district has an area of 6,78 square kilometers and DAA, 2,570 square kilometers. The total population of this study area was estimated to be 447,957 in 2008. The population of ABD district consists entirely of the Weme
ethnic group, who support themselves primarily through agriculture and fishing. Although the soil of the ABD valley is among the richest in Africa, the local farmers lack the resources necessary to fully take advantage of all the land has to offer. Residents of DAA district are of the Fon ethnicity. In this region the land is too poor to allow extensive agriculture, although Djidja Commune located within this district produces the majority of the area’s agricultural yield. Other than agriculture, the population of DAA produces various handcrafted goods. The study area is rather homogenous linguistically, because Weme and Fon are related, thus speakers of these two languages are able to communicate. Approximately two-thirds of the population is Christian, one quarter practice traditional religion, and a minority is Islamic. However, we should be cautious with such percentages, as religious affiliations are often multiple and overlapping.

In Madagascar, data were collected in eleven sites across three districts in the Alaotra Mangoro Region (see Figure 2). Approximately 52% of people in the region practice indigenous cults, while 45% are Christian. Another 7% of the population is Muslim. Amparafaravola district has an area of 6,496 square kilometers, and is home to a population whose majority is of the Sihanaka ethnic group, with Bezanozano and Betsimisaraka minority groups. Agriculture dominates the economy, as this district is among the highest rice-producing in the country. The district of Ambatondrazaka is composed of a mix of people of different origins, with the majority being of the Sihanaka ethnic group. This district of 6,967 square kilometers includes urban areas, so the economy is based not only on rice cultivation but also on commerce, transportation and other service jobs. The third and final district is Moramanga, which has an area of 9,396 kilometers squared. The majority ethnicity in this district is Bezanozano, although the Merina and Betsileo ethnic groups are also represented. The economy is dominated by agriculture and hand crafts. The town of Moramanga serves as a crossroads for vendors, situated between the country’s capital of Antananarivo and the capital of the province, Toamasina. Thus, the district serves as the transit center for fuel transporters from Toamasina, and the entire district bustles with travelers between the two provinces. The language spoken in the 3 districts is Malagasy, although French is widely understood by the majority of the people in the main town of the three districts, probably left over from the presence of colonialists in this area in the past.

**Figure 2 : IPTi Intervention Sites, Madagascar**
In Senegal, UNICEF’s research was conducted in three study sites located in the South of the country: Velingara, Kedougou and Saraya (see Figure 3). These three districts share similar epidemiological profiles, but differ culturally. After the start of IPTi implementation, the Department of Kedougou split into two districts: Kedougou and Saraya. Although these two study sites share similar characteristics, the researchers decided to continue with these sites in order to keep the organization of the research and avoid bias. The district of Kedougou has an area of 16,896 square kilometers. Three-quarters of the population of Kedougou district are of the ethnicity Fula or Mandingue (which includes Maninka Diakhanke, and Bamana). The rest of the population is a mix of Bediks, Bassari, Dialonkes, Koniaguus ethnic groups, who typically live apart from the community, in mountainous areas that are difficult to access. Although this district is rich in natural resources, it is one of the poorest pockets in Senegal.

Velingara represents one of the departments of Kolda region, situated in the Southeast of the country. It has an area of 5,435 square kilometers and has 11 local authorities distributed between the municipality and three districts. Its population was estimated to be 215,188. Velingara possesses enormous agricultural potential thanks to its vast arable soils and a pluviometry which exceeds the national average. The population is mainly composed of Fulas. Their economic production derives from wintry cultures of off-season fisheries, activities of breeding and commerce. Households are mainly poor in a context of weak schooling, and survival issues are worrisome.

Figure 3 : IPTi Intervention Sites, Senegal

4) Sampling

IPTi was being pilot-implemented in 8 administrative districts among the 3 study countries. Each district is sub-divided into smaller administrative areas called “communes” or “municipalities” (on average between 4 and 6 per district), and each municipality comprises a set of villages (varying between 3 and 14, in average 4 per commune). Communes were first allocated into three strata on the basis of 1) immunization coverage (coverage rate of routine measles immunization); 2) the degree of urbanization (the 8 districts were predominantly rural, with just a small semi-urban area per district); and 3) ethnic groups. The stratification was made
to provide contrast and investigate if diverse contexts may influence the implementation and community acceptance of IPTi.

Communes were divided into three initial groups: (1) where measles immunization coverage rates were below 50% (none was identified in Madagascar, thus they only had 2 groups); (2) where measles coverage rates varied between 50% and 70%; and (3) where coverage rates were above 70%. In each of these initial groups, three villages were randomly selected in order to capture the views of rural but also semi-urban residents (if any present), and all major ethnic groups. As this is a qualitative study, we favored cultural and social factors involved in acceptability, such as the ethnicities and places of residency, over quantitation, as well as focusing communities with different levels of immunization coverage.

In Benin, with 40 villages sampled (see Table 2), all communes had a high immunization coverage, and thus could not be stratified in three groups; thus rural and semi-urban villages were immunization coverage was below 70% and below 50% were randomly selected proportionally covering the two major ethnic groups. In Madagascar, with 28 villages sampled, communes were stratified in only two measles immunization coverage groups (above 70% and 50%-70%) and since all villages were rural, they were further simple randomized between the two major ethnic groups. In Senegal, with 31 villages sampled, only one commune showed measles immunization coverage levels below 50%, and only the higher coverage group had some semi-urban villages. Villages were sampled among the two largest ethnic groups (Fula and Maninka).

Table 2: Immunization coverage distribution of villages

<table>
<thead>
<tr>
<th>Country</th>
<th># Communes in implementing districts</th>
<th>Immun. coverage high</th>
<th>Immun. coverage medium</th>
<th>Immun. coverage low</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td></td>
<td>6 0 0</td>
<td>47</td>
<td>40</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td># Villages in communes</td>
<td>24 16 7</td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td># Villages sampled</td>
<td>18 15 7</td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Madagascar</td>
<td># Communes in implementing districts</td>
<td>17 4 0</td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td></td>
<td># Villages in communes</td>
<td>32 11 NA</td>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td># Villages sampled</td>
<td>21 7 NA</td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Senegal</td>
<td># Communes in implementing districts</td>
<td>5 1 1</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td># Villages in communes</td>
<td>23 7 1</td>
<td></td>
<td></td>
<td>31</td>
</tr>
<tr>
<td></td>
<td># Villages sampled</td>
<td>11 1 1</td>
<td></td>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

5) Recruitment of respondents

Two types of populations were targeted: providers of IPTi services (health workers) and indirect beneficiaries (caregivers in charge of infants and other community members). Two categories of health workers were involved in the study: professional health workers (doctors, nurses, midwives, etc.) and auxiliary health workers (health assistants, and community health workers). Community respondents were infant caregivers (either parents or grandparents or other close family members that were in charge of the infants care) and other members of the community (women and men that were not infant caregivers).
In each selected village, the health center performing IPTi activities was visited. After obtaining verbal consent a nurse or midwife and at least two health assistants were interviewed. Both public and private health centers providing IPTi were included in the study. Health workers were interviewed in their workplace (health center, or on the round during IPTi-EPI activities). At community level, village leaders were approached to obtain verbal authorization. The village’s headman indicated a facilitator to help investigators contact community members. Households were selected by simple random sampling, and after consent was obtained from the head of household respondents were chosen using the snowball sampling technique, where one respondent indicates another. Observations, interviews and group discussions were made until reaching a point of saturation when no new information emerged from the interactions.

Community members were interviewed at their homes (when conducting IDI) or in neutral places (when conducting FGD) in order to avoid biased responses that may accompany the healthcare setting. Parents of children who were expected at vaccination centers but did not come were also interviewed in their homes, as the reasons for their absence were important to take into consideration. Thoroughly maintained records detailing names and addresses of infants expected at vaccination, as well as who did or did not attend, allowed the researchers to reliably locate families who declined participation in vaccination efforts.

We analyzed using the software Nvivo, a total of 605 IDIs (407 with community members and 198 with health workers) and 51 FGDs (48 with community members and 3 with health workers) (see Table 3). In the integrated analysis we also took into account information collected during the observational studies.

**Table 3: Methodology of anthropological study**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Benin</th>
<th>Madagascar</th>
<th>Senegal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start date of IPTi implementation</strong></td>
<td>NA</td>
<td>Jan 2007</td>
<td>Apr 2007</td>
<td>Dec 2006</td>
</tr>
<tr>
<td><strong>Peak of malaria transmission (rainy season)</strong></td>
<td>NA</td>
<td>May-Jun Sep-Oct</td>
<td>Dec-Apr</td>
<td>Jun-Oct</td>
</tr>
<tr>
<td><strong>Total # IDIs conducted</strong></td>
<td>1,014</td>
<td>562</td>
<td>132</td>
<td>420</td>
</tr>
<tr>
<td>Within communities</td>
<td>778</td>
<td>388</td>
<td>110</td>
<td>280</td>
</tr>
<tr>
<td>Among health workers</td>
<td>336</td>
<td>174</td>
<td>22</td>
<td>140</td>
</tr>
<tr>
<td><strong>Total # IDIs analyzed in Nvivo</strong></td>
<td>605</td>
<td>471</td>
<td>54</td>
<td>80</td>
</tr>
<tr>
<td>Within communities</td>
<td>407</td>
<td>307</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Among health workers</td>
<td>198</td>
<td>164</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total # FGDs conducted</strong></td>
<td>95</td>
<td>31</td>
<td>0</td>
<td>64</td>
</tr>
<tr>
<td>Within communities</td>
<td>79</td>
<td>31</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Among health workers</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total # FGDs analyzed in Nvivo</strong></td>
<td>51</td>
<td>31</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Within communities</td>
<td>48</td>
<td>31</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Among health workers</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

NA – Not Applicable; ND – Not Done
6) Analysis

Data were collected on a tape recorder and later transcribed and compiled following a pattern defined according to the type of interview used. Data were analyzed according to grounded theory, by which themes emerge from the data through coding rather than being made to fit into an existing framework [35]. Each country research team submitted a preliminary analysis report describing the most important themes that emerged from the observations, qualitative focus group and in-depth interviews. Countries independent preliminary analysis contributed to highlight important themes for further investigation. Once main commonalities and differences in results obtained between sites were review and discussed, all audio-recorded data was subsequently merged in a common database for comparative analysis performed using NVivo 7 qualitative data analysis computer software. Approximately 54% of all data collected were entered into Nvivo software, analyzed and included in this report. The lack of Nvivo integration of the remaining data was due to several reasons including interviews partially transcribed due to failure of recording devices (20%), incomplete recording or incomplete respondent identification (18%), and loss of data (7%).

IV. RESULTS

A. Brief overview of routine immunization services in the study area

Vaccination services were offered in most peripheral health centers existent in the study areas. However, some immunization clinics were not located in centers with personnel who dealt specifically with EPI activities. Instead, sometimes EPI was offered in maternity clinics and in private clinics. In most cases vaccinations took place in the health center (fixed strategy) or villages, in open space or under a tree, (advanced strategy). Sometimes vaccination was done after active search (using the immunization registry health workers researched children who had missed their vaccine appointment) to limit cases of loss.

Generally health centers in urban areas were more equipped than in rural areas. EPI service was under the responsibility of a skilled health worker who had, among other responsibilities: to ensure the vaccine supply, and security, programming, monitoring and control of immunization sessions, to be in touch with the hierarchy to improve as soon as possible services offered, report on performance and difficulties, etc. In each health center, the head of EPI service was assisted by health workers during vaccination. Within communities, health workers were assisted by elected community health workers (CHWs), (based on the honesty and volunteerism) to look after the community's health problems. CHWs contributed to the social mobilization of community members to access health services and specifically to participate actively in the National Immunization Days (NIDs). They also received complaints and concerns of the community in relation to vaccination and IPTi and conveyed them to health centers. CHWs were among the best vehicles of communication for communities to get information on EPI-IPTi.

B. Socio-demographic characteristics of respondents

The average age of respondents was 30 years old (from a group of 1,020 respondents) ranging from 18 to 84 years, and the gender partition was 75% females, and 25% male. Caregivers were mostly female and illiterate, while health workers had middle school level 1 or 2. Health assistants and relays, designated here as Community Health workers (CHWs), usually had primary school level of instruction.
C. Study results

Results collected from observations, IDIs, and FGDs were organized according to specific themes as outlined in the study specific objectives and described in the methodology. In brief, the themes covered were: 1) communities perceptions of malaria 2) perceptions of IPTi; 3) health workers’ perceptions of IPTi and SP; and 4) family decision-making regarding children health.

1) Communities’ perception of malaria

In moderate to high transmission areas such as the study sites, the knowledge of malaria among communities was important. Most interviewees recognized that malaria was a disease caused by the bite of a mosquito and many indicated that humidity (rain, stagnant waters) was a favorable factor for the proliferation of mosquitoes and hence malaria presence all year. Only a marginal proportion attributed malaria to other causes such as exposure to the sun, diarrhea, shyness, red eyes and ghosts.

In the study regions health workers instructed the population to consider any case of fever as malaria in order to facilitate the appropriation of messages and to raise awareness on malaria within the communities. Thus, the majority of respondents declared that malaria is recognized by the fever and convulsions it produces. Other signs quoted were tiredness, anorexia, vomiting, and anemia. The majority considered children to be the most threatened by malaria, and just a few thought that everybody was threatened by malaria.

“When mosquitoes bite or houses are unhealthy, children get malaria and they get warm and feel cold … Malaria shows itself in children by fever, coughing, tiredness, pale eyes. With malaria, children do not play as usual, and they refuse to eat. It becomes serious and can result in convulsions. Malaria is more frequent during the rainy season, but we also find it during the dry season”. FGD, Women, Djidja centre village, DAA district, Benin.

"Malaria is a dangerous disease which shows itself in children by fever and refusal of food and drink. The child who is affected does not even play anymore and can die. Malaria is passed on by the sting of mosquito”. Woman, weaver, 23 years old, Ambodiakatra village, Moramanga District, Madagascar.

"Malaria is a serious illness especially in children and pregnant women. If a child with malaria is not looked after early on, he can die. If a child does not sleep under ITN, he can catch malaria”. Woman, housewife, 18 years old, Kandia village, Velingara District, Senegal.

Families were concerned with preserving children’s health, and understood the advantages of prevention compared to care. Most respondents declared that to protect children against malaria they must sleep under a bed net. Generally, community members recognize fever or malaria as a danger for children that can also affect their daily activities, and showed a positive attitude towards seeking quick treatment for fever or malaria.

"Malaria is the main illness that affects people here. When a child falls ill with malaria he/she is given tablets of paracetamol and chloroquine, and if it does not work we go to the health center. To prevent malaria, one must sleep under bed nets, and the same goes for the children ... I attend meetings of awareness against malaria but when people come to the health center they do not find mosquito nets.” Male, drug seller, 35 years old, Mougnon village, district DAA, Benin.

"In my view, malaria is a dangerous disease if left untreated. We must prevent it otherwise we may be in danger. To prevent malaria in my child I clean the bushes from stagnant water and use ITN. When my child has malaria I give him pills.” Woman, weaver, 20 years old, Ambohimanarivo village, district Moramanga, Madagascar.

Although communities’ knowledge of malaria’s etiology and diagnosis was generally high, and attitudes towards modern anti-malaria drug treatments were positive, the behavior concerning the therapeutic choices made contradicted them. Self-medication dominated the therapeutic
practices, and resort to health center came often as an ultimate choice. The reasons for this choice included: economic difficulties, problems of geographical accessibility to health centers, trust in indigenous beliefs, and commitment to the virtues of traditional medicine, and sometimes aversion or distrust of the modern health system.

“If [we are] not satisfied with the health center, we go to our church if we are Christian or to our divinity if we practice traditional religions. I am saying this because if it is an illness caused by witches the health center cannot do anything, and you have to resort to other strategies.” FGD with women with a child eligible for IPTi, Agbokpa village, Abomey Commune, DAA District, Benin.

"There are moms who do not respect the drug dosage given at the health centers and the disease worsens. Then, the fathers forbid them to take the child to the health center again, and instead they prepare herbal teas to treat the child. They think the drug of the health center is bad.” FGD, WOMEN, Zounzonmey village, district DAA, Benin.

"When the child has fever, you should try to get drugs if you are near a health center. But if the child has a fever and you are far from a health center or you do not want to go there, it may end badly.” Woman, weaver, 18 years old, Ambodiakatra village, Moramanga district, Madagascar.

"To protect children against diseases, they must be covered and supervised, and also protected against the cold. In our tradition, we learn that we can use gray-gray (a plant) to prevent disease.” Woman, housewife, 30 years old, Linkering village, Velingara district, Senegal

“I lost my child when he was two or three years old because of malaria. Malaria is a very serious illness for a child because he will die from fever. Before I used roots to treat this illness but now I bring my child directly to the health center.” Women, housewife, 25 years old, Pélel village, Velingara district, Senegal

2) Communities’s perception of IPTi

Regarding the purpose of IPTi and its mode of administration, a large number of community members considered that IPTi aims to reduce the postvaccinal fever, and others indicated the drug offered was an antipyretic like paracetamol (often used by parents after vaccinations to decrease the postvaccinal fever). Furthermore, the majority of community members considered IPTi as an answer from the health providers to their concern of postvaccinal fever based on several facts: the message health workers delivered during the education sessions was that IPTi fights fever, in many regions fever is synonymous with malaria, and the coupling of IPTi with the routine immunizations. Postvaccinal fever was disliked by caregivers who felt they attended vaccination with healthy children and often returned with feverish children. Interestingly, both mothers and health workers claimed to have observed a reduction of postvaccinal fever since the introduction of IPTi. Only a few respondents declared that IPTi aims to protect against malaria although it is offered at the time of routine vaccinations.

"During vaccination, tablets are given to children to protect them against fever.” Male, unemployed, 37 years old, Linkering village, Velingara district, Senegal.

“When I brought my child to be vaccinated they gave him a medicine. I don't know the name of the drug but the health worker said to me that it was to prevent fever. I am convinced that this medicine is good because after my child swallowed it, he did not have fever anymore.” Woman, weaver and farmer, 20 years old, Ambodiakatra village, Moramanga district Madagascar.

“Concerning IPTi, things take place as follows: when you arrive in the health center they give you a spoon, a small tumbler, and some water to clean the utensils first. Then they give you ½ tablet of a drug (I believe that it is paracetamol) and you mix it with the water and give it to the child in front of the health worker. When you finish you give the whole material to your neighbor who rinses everything to use it for her child. We were told that it is because some of us complained about postvaccinal fever that IPTi is brought to us.” Woman, seller of porridge, 25 years old, Bonou village, ABD district, Benin
"Last time, I accompanied my wife to vaccination and I asked the health worker the reasons for my child's fever. During vaccination, a drug was administered to my child. I asked why and was told it was to alleviate fever" Male, profession not documented, 40 years old, Kalifourou village, Velingara district, Senegal

“When you bring your child to be vaccinated, the health worker gives you a tablet, but I don't know the tablet’s name. It is a medicine to prevent children’s malaria. I think that it works well because when my child took it, he did not get sick. This medicine does not play the same role as the vaccination, it aims to prevent malaria whereas vaccination aims to avoid diseases like measles, and tuberculosis”. Woman, farmer, 25 years old, Amparafaravola district, Madagascar.

“We were told that with IPTi which we call VINANGAN1 even if mosquitoes bite the children, they get no malaria. IPTi is given to the 3 and 9 months old children. This drug is fractioned, crushed, and diluted with water before giving it to children. It is the health workers who crush the tablet and ask us to administrate it to children”. Woman, housewife, 28 years old, Agondji village, DAA district, Benin.

Young children were generally at the exclusive care of their mothers or other women in the household. While attending the immunization services with their children these women were exposed to health workers education, information and communication (EIC) programme on IPTi. Thus women tended to be more knowledgeable concerning IPTI compared to men, mainly because of their exposure to the intervention when attending immunization services.

"We have not yet heard of a new drug coupling to EPI, it is the first time we hear about it" Male, trader, 35 years of age, Dalaba village, Kédougou district, Senegal.

"Women should tell us what happens during the vaccination sessions, but they do not, and we do not ask. That is why we do not know that new tablets are now been given at vaccination. " Male, unknown profession and age, Linkering village, Velingara District, Senegal

Community members showed a positive attitude towards IPTi. Even mothers of non-eligible children often requested IPTi. Sometimes the demand for IPTi was so important that populations of villages where IPTi was not being implemented came to the pilot districts to receive it. This attitude was interpreted to be due to the high level of demand for free anti-malaria drugs, and also to the association of SP with paracetamol that many mothers offer to their children to lower the postvaccinal fever. This explains why often the coverage of IPTi administration was above the expected EPI target.

“IPTi is good for children. Before, when I brought my children to vaccination, they gave them medicines to decrease postvaccinal fever, but with IPTi my child had no fever. This medicine (SP) that we received during the vaccination acts against fever and malaria. That is why they (health workers) forbid us to give them more tablets at home. Instead, they ask us to return with the children to the health center if abnormal signs appear.” Woman, housewife, 36 years old, Dangbo village, ABD district, Benin.

“I let my child receive the medicine (IPTi) during the DTP2 vaccination because it is necessary to take care of the children, to protect them so that they don’t catch malaria. I am satisfied with IPTi because my child feels well.” Woman, farmer, 23 years old, Ambodinifody village, Moramanga district, Madagascar.

Positive attitudes towards IPTi were also commonly identified among caregivers that had not experienced the intervention on their children but were present at the health centers when IPTi was being deployed.

“I know about this new medicine and I hope that my child will receive it in the next vaccination. The nurse said that it is good to prevent malaria and we know that malaria is a serious illness for

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1 “VINANGAN” means : “child will survive”
children and that the MOH promotes this drug. I received the information and allowed my child to receive it”. Woman, housewife, 18 years old, Kandia village, Velingara district, Senegal.

Positive behaviors were identified in the demand of IPTi by caregivers otherwise not concerned. Often community members were informed and encouraged by their neighbors to attend the health clinics in order to receive IPTi. Both caregivers and the community at large had a positive opinion on IPTi due to its ability to prevent or decrease fever, and that it was a gratuitous service.

“I went to the health center to get vaccines and a medicine for my child because my neighbor told me about it. I do not know exactly the name of the medicine but I know that they give it at each vaccination session. It is good and effective because it can prevent malaria in children and even if they catch malaria, they will not be so tired.” Woman, farmer, 29 years old, Payoungou village, Velingara district, Senegal.

“A child who takes IPTi can fall ill of another disease but not of malaria. IPTi plays the same role as vaccination because it allows children to stay healthy. After vaccinating the child, they dilute the tablet and make the child drink it. I believe in this tablet. I am really satisfied with the health workers.” Woman, housewife, 22 year old, Yoroguoli village, Velingara district, Senegal.

"The health worker spoke to me and I made a firm decision for my wife to follow the correct vaccinations. Now as we are aware of new drugs being offered she is not going to miss a single vaccination session”. Man, worker, 32 years old Dalaba village, Kédougou district, Senegal.

No IPTi refusal cases were observed or heard about within the communities observed. Observations and interviews results show that in most cases the trust put into the health providers was so high that people were happy to accept any measure offered. They considered that the health worker could not suggest a bad product. However, it was reported that in some areas of Senegal, women were intimidated by the nurses if they refused the treatments given to them in health centers and were threatened to be punished later. In Senegal, IPTi is seen as a "law of the hospital", a mandatory measure that must be respected. Thus, individual consent was not always sought and communities were given no information about their rights to not consent therefore it is possible that the high adherence to IPTi in this case was also the result of fear of reprisals by the health workers. This was not the case in the other study sites were consent was sought during the education for health sessions that precede vaccination.

“Those who receive routine vaccines do not refuse IPTi even if they do not always know what it is”. Female, CHW, 37 years old, Linkering village, Velingara district, Senegal.

“I did not know about IPTi but when I came to the health center my child received it. I think that it is good. I trust the health worker. A child who receives IPTi should not have malaria.” Women, market seller, 35 years old, Nianaw village, Velingara district, Senegal.

“We explain IPTi to mothers of small children who are close to us and ask for advice” FGD, Women. Setto village, DAA district, Benin.

“We tell our relatives that we have vaccinated our children with IPTi. We encourage them to do likewise”. Woman, housewife, 23 year old, Gangban village, ABD district, Benin.

“I have accepted this medicine (IPTi) for my child so that he does not catch malaria and I am satisfied with because today my child feels well” Woman, farmer, 25 years old, Anororo village, Amparafaravola district, Madagascar.

“I used this drug for my child and I think it is good for children. Until now there are no side effects. I do not know the name of the drug, but I know it’s good for children. It prevents many diseases in children, it makes my child healthy and of course it also prevents malaria”. FDG, Woman, Nafadj, Saraya district, Senegal.
3) Health workers' perception of IPTi

After receiving training at district level the nurses organized training sessions with their assistants to share the information and define a communication plan and awareness for communities, but cascade training was not always effective. Instead, knowledge was often conveyed through informal discussions during immunization sessions, a “learn on the job” technique that at times failed to maintain technical standards. Most health workers showed good knowledge of IPTi. The level of knowledge was higher among skilled professional staff (nurses, doctors, and midwives) compared to unprofessional staff (CHWs). According to most respondents, IPTi was a strategy for prevention and/or treatment of malaria among children, and involved giving the child doses of SP alongside penta2, penta3 and measles vaccinations.

"IPTi is used to prevent or reduce the incidence of malaria. When we say IPTi it is the SP that we give to children, and this product has a curative and preventive property at the same time. Since IPTi was implemented the rate of malaria in children dropped significantly and this is what is currently promoting EPI. The 1st dose is given with the penta2 at 2½ months, the 2nd dose with the penta3 at 3 months, and the 3rd dose with measles at 9 months. Before the administration of the product, we weigh the child and give ¼ or ½ tablet of SP if the weight is less or more than 5 Kg. We mix the product in a cup and the mother gives it to the child in front of us." Man, nurse, 31 years old, Gangban village, ABD district, Benin.

"In November I had the SP tablets with me. I had a timetable for each village, and for each child vaccinated I put a cross and the stamp for each immunization and for SP in the child’s card. I gave the tablet to the mother, and with the help of my assistant they mixed it with water, but it took time. In December I changed: I crushed the tablets into powder before arriving in the village to vaccinate the children, then took a cup with some water and added the powder kept in half-compresses, mixed it and gave it to the child. This was much quicker." Male nurse, 45 years old, Dindifelo village, Kedougou district, Senegal.

"The tablets given at the time of immunizations are designed to protect against diseases such as intestinal worms because there are children who do not eat well. They get these worms by eating sand. For this reason in every vaccination we give tablets. These tablets treat intestinal worms and fever. Vaccination is to prevent children against hepatitis B, diphtheria, tetanus, pertussis, meningitis and so on." Man, Community Health Worker, 37 years old, Diaobé village, Velingara district, Senegal.

Health workers also showed a positive attitude towards IPTi implementation. Many indicated that since the implementation they perceived a decreasing number of malaria cases in the clinics. Most health workers also felt that the implementation of IPTi was helping to improve EPI adherence, in particular by reducing the cases of post-vaccination fever which, in their opinion, was the essential reason why some parents were reluctant to vaccinate their children. On many occasions health workers reinforced communities’ positive perception and attitudes towards IPTi, by reinforcing its anti-fever attribution.

"With the raising in awareness the moms understood that when they use ITN and IPTi the child is healthy. With IPTi we prevent malaria in children for free, because SP is given free of charge" Woman, nurse, 30 years old, Agbangnizoun village, DAA district, Benin.

"IPTi is a good policy, because we noticed that there are fewer sick children and malaria rate seems to be in decline". Man, nurse, 24 years old, Zoungue village, ABD district, Benin.

"The MOH ought to continue this project. It helps the children a lot and communities note that their children have no more malaria since we added IPTi". Women, midwife, 43 years old, Antanandava Nord village, Ambatondrazaka district, Madagascar.

"Although IPTi is an overload of work time for us, it is important that the MOH continues to implement IPTi during vaccination days so that mothers are not obliged to return for it. IPTi is
very appreciated by mothers. In my opinion I dedicate around 5% of my time to give IPTi". Woman, drug dispenser, 26 years old, Andasibe village, Moramanga district, Madagascar.

Although CHWs’ technical understanding of IPTi was not as good as that of professional health workers (nurses, midwives, doctors), they had a very positive attitude towards the intervention and were even more enthusiastic about it. An important concern among community health workers was the desire for additional training on the intervention.

"When IPTi arrived I saw the rate of malaria decreasing in the villages. Before in villages I used to find many sick children. I would suggest to raise more awareness about IPTi in health centers, because it is easier work especially for Community health workers ". Male, CHW, 40 years old, Nemataba village, Velingara district, Senegal.

"If the government can implement training for health workers so we are trained each year it will be good. We also need materials as motorcycles since there are no bikes to carry out peripheral activities. " Man, health assistant, 44 years old, Agbangnizoun village, DAA district, Benin

“If there were still trainings on [IPTi] it would work better. Because the training is never sufficient, even if they repeat it one, two, three times… what we are lacking is training.” Male, CHW, 58 years old male, Tomboroukoto village, Kédougou district, Senegal.

Some qualified health workers considered IPTi as an intervention in which they had little to gain at the individual level since there was no extra pay and little impact in equipment for the health center. Many expected support from the project, in terms of motorcycles for the implementation of immunization strategies in progress, which has not been the case.

"Before, we did not slow at all for immunization, now because of IPTi we weigh all children, it takes time. If they can help us to have staff specifically for IPTi-EPI it will be good. There are so many things to do." Male, CHW, 28 years old, Hozin village, ABD district, Benin

"It is good but a little difficult, it is a small surcharge as it takes more time because of others who do not have the same amount of information” Man, CHW, 46 year old, Tomboronko village, Kédougou district, Senegal

"Of course there are small problems. Working time increases greatly. For example, since the arrival of IPTi, we must weigh all the babies, after which moms are lining up to see me. In my office we must put the stickers. In fact, there are three cards: card score, infant card and child health card. And it does not end there, you must crush the tablet. Then you must give it to the baby. Sometimes when the baby fails to swallow it, you must give it again. So it is really long." Woman, CHW, 28 years old, Ambodiakatra village, Moramanga district, Madagascar

Health workers perceived a decrease in anemia cases during the first half of 2007 compared to the same period the previous year (2006). However, some health workers had difficulties to manage the coupling IPTi-EPI.

"With IPTi, we are finding a positive change in the population. In 2006, we evacuated several infants due to severe anemia, but since January 2007 until now (July 2007) we have registered no cases of anemia among infants attending our health center. Is this because of IPTi? We cannot say yet but we continue to monitor the situation until the end of the year before concluding. Cases of fever after vaccination have sufficiently declined this year compared with 2006.” Man, nurse, 30 years old, Hozin village, ABD district, Benin.

"This year because of IPTi there are much fewer problems of severe malaria among children. I recognize that in the past we were not consulting with children prior to vaccination but with IPTi, consultation is compulsory and systematic" Man, nurse, 32 years old, Affame village, ABD district, Benin.

"We should continue IPTi because it is beneficial to people. A new organization was established by the doctor at the beginning of the implementation of IPTi and everybody is now working well." Woman, nurse, 49 years old, Anororo village, Amparafaravola district, Madagascar.
"At the moment there are no rumors about the drug. If people came to scale up SP-IPTi, I think malaria will soon diminish in the country". Women 33 years, Community Health Worker, Linkering village, Velingara district, Senegal.

Health workers perceived that EPI coverage was improved due to IPTi. They also noted that IPTi has helped to increase compliance with the immunization schedule. In some occasions, and areas (Senegal), health workers threatened caregivers who did not want to comply with the immunization instructions to exclude them from the IPTi programme.

“When the child health card shows that parents do not respect the calendar of immunization, we do not receive him/her. To receive IPTi, parents are required to comply with vaccination.” Woman, Community Health Worker of a private health center, 40 years old, Tanve village, DAA district, Benin.

The main difficulty reported was the increased work burden, especially at the onset of the intervention, and mainly due to the handling of the drug (the need to weight babies to identify the correct dosage, and to transform the tablet into a drinkable solution for infants).

“Of course there are some small problems. The work burden has increased a lot, because with IPTi we need to weigh the babies, then add the stickers to the health cards, the infants cards, and the tallies, and if that was not enough we also have to crush the tablet and give it to the baby. Sometimes they cannot swallow it, and we have to start all over again. Thus it is really very long” Woman, nurse, village, Ambodiakatra district, Madagascar.

“At the beginning we felt an increase in the work burden, but now that we have integrated it into the routine we don’t feel it anymore. Some days we even finish earlier.” Woman, Community health worker, 28 years old, Ampasikely village, Amparafaravola district, Madagascar.

“The administration of IPTi added some difficulties to the children because sometimes they vomit the solution. We need to wait some time and try again” Woman, nurse, Senegal.

“We would like the drug to be a syrup because its dissolution takes a lot of time and we lose many doses when cutting the tablets.” Woman, nurse, 30 years old, Dabala village, Kédougou district, Senegal

“We usually do not weigh babies during classic immunizations, but with IPTi we must weigh all babies to know which dose of SP to give. It is also necessary to extract the milk from mothers for children less than 6 months and crush the tablet.” Woman, Nurse, 49 years old, Anororo village, Amparafaravola district, Madagascar

Due to the lack of a pediatric formulation of SP, its administration required the SP tablets to be cut to the right dosage, then crushed, and dissolved in water to be administered to infants. The use of water to administer IPTi was a contradiction with WHO and UNICEF health messages precluding water before the age of 6 months and recommending instead the exclusive breastfeeding of infants. During the health workers training for IPTi, the recommendation made was to boil the water used to dissolve the tablets. In some cases, especially in Madagascar, health workers took the initiative to request mothers to express breast-milk to mix in the SP tablets. However, after a few months these practices were largely abandoned either because boiling the water included an increase work burden for health workers and waiting time at the clinics for mothers, or because expressing breast-milk limited the participation of secondary caregivers such as grandmothers and fathers to attend the children’s immunization clinics.

“The work burden has increase a lot since we need to weigh the babies, and extract the milk from the mothers of babies younger than 6 months, and also all the monitoring: adding the stickers to the cards and filling them up”. Health workers from Ampitatsimo, Ambatondrazaka, Madagascar.

"IPTi is good but it takes time. It would be ideal to have the medicine powder in a pouch. The dose will be marked and we will not need to crush it.” Woman, health worker, Ambohibary village, Moramanga district, Madagascar.
The administration of SP takes a long time, but I have no problem because this strategy is everybody’s interest” Nurse, female 33 years, Linkering village, Velingara district, Senegal.

When asked if the use of a phased out drug like SP presented obstacles that could compromise adhesion of communities to IPTi, health workers generally answered that it did not.

“There are no obstacles to SP. People like the drug. If it was an injection many would run away, but it is a tablet like albendazole so they adapt easily” Male nurse, 47 years old, Tanvè (Agbangnizoun) DAA Bénin

“There is no difficulty with SP except for the case of children who do not like the tablet but with the cooperation of their mothers, we manage to give it to them.” Female nurse's aide, 26 years old, Tanve village, DAA district, Benin.

“When we changed from chloroquine it was because there was a high rate of resistance. It was replaced by amodiaquine and SP, and recently by ACT. I have no problem with these changes because we felt the need for them. It does not bother me more as it is for the health of the population” Female nurse, 25 years old, Kandia village, Velingara district, Senegal.

Soon after IPTi was launched a pharmacovigilance campaign was deployed which aimed at increasing awareness of adverse events among caregivers, and at increasing the spontaneous report of symptoms to the health centers following the administration of SP in IPTi. Thus in this study, health workers were asked if they observed concerns or heard of any rumors concerning SP safety. No negative perceptions related to safety were identified in all three sites.

"Since I started doing IPTi I saw that SP is well tolerated. I have not heard any negative rumors concerning SP. I suggested to my assistants to ask moms about side effects but so far we have not seen any”. Male health worker, 46 years old, Tomboronko village, Kedougou district, Senegal.

“I have not heard any rumors concerning SP safety. I think IPTi is good because it protects children against malaria. In fact, since we started we have been noticing a decrease in malaria morbidity”. Female nurse, Dabala village, Kédougou district, Senegal.

Observations showed a progressive trend towards greater acceptability of IPTi by health staff regarding the initial complaints mentioned above, especially when they perceived IPTi as a factor increasing the EPI coverage and adherence to the immunization schedule, and in some cases attributing the decrease in malaria morbidity as well to IPTi pilot implementation. In addition, the complaints regarding the excess work load due to weighing the infants and preparation of SP for infants intake disappear with time.

4) Family decisions toward children’s health

In general, decisions concerning the recourse to a medical structure were made by the head of the household, usually the father. In his absence, health care decisions were made by the mother (or the child’s paternal grandmother) or by other close relatives. Immunizations and IPTi were supplied free of charge at the health centers, which was a factor of motivation. However immunization was not free for caregivers as these had to consider the costs of their transportation to the health centers. Thus decisions whether to vaccinate or not, or when to vaccinate the children, were dependent on the beneficiaries financial capacity. It was usually the father that was in charge of the household financial expenses, including the cost of care and of transportation to the health centers. However, in these patriarchal societies women were gaining commercial independence and with it the capacity to make decisions on their own. If the woman could afford to cover the expenses they often took the lead, and in some cases the father was not consulted in matters concerning child health.

“When our children fall sick, we bring them to the health center ourselves. Their father deals later with the expenses. Usually it is the father who makes the decision of where we take the children, but many times it is the mother who takes the initiative”. Woman, 25 year old, commercial, Bonou centre village, ABD district, Benin
“If the child is sick, and if it is fever, I bring him to the health center instead of waiting for my husband. I can take care of the child. When my husband returns he refunds me”. Woman, teacher, 28 year old, Lissazounme village, DAA district, Benin.

“If the child falls ill, I ask authorization from my husband to bring my child to the hospital. He gives me money and I bring him to the hospital”. Woman, housewife, 24 year old, Sare Madi village, Velingara district, Senegal.

"No, my wife does not ask permission to take the child for immunization. But when they make a prescription I am the one who pays” Man, MD D.

"In some families, it is the mother who supports the child in cases of illness. Sometimes she walks for miles to bring her child to the health center while her husband does nothing. Perhaps this is due to poverty. But some parents panic when their child cries and do not hesitate to sell chickens to provide for their child” Man village FGD Linkering Senegal.

V. DISCUSSION

Acceptability was assessed as a favorable behavior towards the new malaria preventive treatment, and based mostly on the participants’ attitudes and adherence to the IPTi strategy and their consent to have their children receive the SP drug. Caregivers considered that IPTi contributed to prevent fever, and thus decreased the risk of episodes of malaria and post-vaccinal fever. The concern that the negative press SP had received to best facilitate its replacement with the more efficient and less prone to drug-resistance malaria treatment using ACT could affect health workers’ acceptability of the intervention was therefore not seen. In the three study countries (Benin, Madagascar, Senegal) the few concerns raised among health workers about using SP were related to the potential adverse events and the lack of a drug solution formulation rather than to drug resistance.

Caregivers and health workers across all three country sites exhibited a good acceptance of IPTi, and no cases of refusal were observed. No major differences in the acceptability of the intervention were identified between the three sites investigated, which is striking between two West African countries of very different cultural background (Benin and Senegal) and between West and East Africa. Likewise, there were no differences in IPTi acceptability identified between villages where the immunization coverage was high, medium or low, or between different ethnic groups, suggesting that IPTi is a strategy with potential for universal acceptability in malaria endemic countries. In a similar multi-country study in Africa conducted in five Anglophone countries high IPTi acceptability was observed [36]. Together, these results suggest that IPTi is a strategy with great potential for high acceptability across African countries regardless of their cultural background.

The main lesson to be drawn from this study is that knowledge, although an important element when assessing the benefits and drawbacks of an intervention, is not always what drives community members’ behaviors. Therefore, it was important to understand other factors that led to the adherence behaviors observed during IPTi implementation.

1) Communities’ perception of malaria. In the study areas most community members placed malaria as the major concern among children’s illnesses, followed by respiratory, gastric and cutaneous affections. The large majority had a correct understanding of the disease causes and of its manifestations, as well as a good knowledge of malaria preventive measures. Care seeking behavior concerning children’s malaria was often a long therapeutic itinerary initiated by self-medication with drugs either purchased in pharmacies or in street markets, herbal tea, or prayers. When the illness did not improve, the resort to the health center was ultimately sought.
The acceptance of a new intervention is all the more efficient as its social and psychological costs are weak and as the target disease is felt by the population [37]. In our study sites where malaria burden and child mortality are high, the demand for health care including vaccination services is also high, and thus the conditions for acceptance of IPTi were very favorable. However, even if fever was recognized as a priority health concern in a community, a programme seeking to decrease children’s malaria morbidity may not be viewed as a priority if not locally recognized as the cause of disease. Understanding local perceptions regarding the cause of malaria was crucial in determining whether the community was going to perceive the intervention as useful. In our case, such local perceptions were addressed through education, information and communication programmes conducted at health centers during implementation.

2) Communities’ perception of IPTi. Communities’ attitudes towards IPTi across sites were generally very positive. Mothers and fathers of young children also helped ensure that their neighborhoods and other children in the community attended health centers to receive IPTi medication. Women were often more knowledgeable on IPTi due to their exposure to information during participation in the immunization sessions. Some had a good understanding of the role of SP in fighting malaria, although a large number considered SP as an antipyretic given to their children during immunization sessions to lower post-vaccinal fever, and a few saw IPTi as part of children’s immunization. With IPTi, immunizations were perceived as having a lesser risk, therefore IPTi helped increase the acceptance of EPI. On the other hand, because children’s immunization was collectively well accepted, the coupling of IPTi with EPI explains why even in the absence of sufficient or clear information, drugs administered during the immunization sessions were perceived as positive and integrated into the same dynamics as EPI. Thus IPTi received the aura of the successful immunization programme and IPTi helped building acceptance of EPI. Although IPTi was not always perceived by beneficiaries as a means to control malaria, it was well integrated into their system of thinking and well accepted. Therefore, the acceptability of the intervention could not be measured in terms of knowledge but in terms of attitudes and practices in adopting the new sanitary measure, which is a common circumstance [38].

Women’s acceptance of IPTi was a behavior based on a perceived utility, but also a distorted utility: it was part of the vaccination programme, it protected against malaria, and it was a drug added to the vaccination programme to reduce fever, making vaccination safer. This perception was widely shared with health staff greatly contributing to further enhance women’s behavior to request the drug even when their children were not eligible. In some cases, women participated in the proposed programme on the basis of the beneficial effects observed in neighbor’s children who received the drug, and the benefits perceived and granted through discussions between caregivers. They adjusted their behavior based on their neighbors’ participation, and the perceived benefit that children who received the drug did well and had less fever. Importantly, we observed that community members having received IPTi maintained the use of others malaria control measures, such as usage of bed-nets and practice of environmental sanitation.

An important factor for acceptability of IPTi was the fact that it is provided for free. Because many parents fear the financial burden of their child’s sickness, malaria prevention was perceived as potential savings for the parents. Furthermore, no cases of EPI or IPTi refusal were identified, as well as specific reasons why women would not consent to receive IPTi. Although the addition of IPTi to the routine immunization services led to additional waiting time at the health facility, this delay was well accepted by families.

In another study on IPTi acceptance in Southern Tanzania [39] it was also found that some respondents thought IPTi was given to “cool down” post-vaccinal fever, but the study found a higher number of complaints regarding the lack of information on EPI and IPTi as well as unfriendly health workers. Acceptability of IPTi was found to be very high mostly because of an
attributed effect in general health and wellbeing (prevention of general illness rather than malaria). In Mozambique, where IPTi was initially rejected due to rumors on research and medical intervention, after an information campaign and revised procedures were implemented acceptance was achieved [2]. Taken together, these results and the ones presented here highlight the importance of information activities and campaigns by people immersed in the community and the health staff in charge of administering the intervention locally. High acceptability was also observed in the only other multi-country study on IPTi acceptability to date, conducted in five African countries - Kenya, Tanzania, Gabon, Ghana and Malawi - where the addition of IPTi to the EPI was perceived positively even though the range of settings and mode of drug administration varied [36]. This study was linked to efficacy trials of IPTi (in Gabon, Kenya and north-eastern Tanzania) and undertaken only after the trial had ended (in Gabon) or was late in the trial phase (in Kenya and Tanzania). As in our study, the mothers believed that IPTi prevented post-vaccination fever, and both mothers and health workers were not fully satisfied with the mode of administration of SP due to the water used, rejection by some infants who vomited it afterwards, the hygiene of the tools used to make the solution and the extra time required to prepare it [36]. Additional concerns about the drug were observed in Malawi and Ghana where there were some reports of SP home administration, and as a result there was non-compliance [36]. However, we showed that in the context of pilot implementation, when SP is given in IPTi with EPI, compliance and acceptance were very high, aided in part, as shown in the study mentioned, by the additional factor influencing acceptability that vaccination sessions were social events to which many women looked forward to dressed up for and to get away from daily chores.

Communities’ attitudes and behaviors toward an intervention are not necessarily based on their knowledge of the strategy, contradicting a fundamental idea that there is a unidirectional link between knowledge and practice [40]. The involvement of nurses that had a reassuring position in the community, and in whom there was faith and trust in matters related to childcare, was a pledge of trust and induced consistent positive behavior. Even when people did not have the correct information about the intervention’s objectives, the nurse was perceived as the one who knew what is good for children’s health, and therefore when he/she offered a drug for a child, the likelihood of acceptance was very high as it was during the pilot IPTi implementation in the three study countries.

In sum, we found that behaviors were not only based on objective aspects related to the intervention’s perceived effectiveness or usefulness, but also on subjective and normative facets. The latter, based on cultural and social characteristics, have limited rationality [41-43] as they are based on social norms, values of respect for the elder, gender relations, and also in the confidence and the legitimacy of the nurse. These are complex rationalities where caregivers and communities behave not only according to their cognitive and economic individual resources, but also according to social values that set constraints and guidelines for their actions. These behaviors of cooperation respond to assumptions drawn from reasoning mechanisms based on the observed benefits, and the perceive legitimacy of the target intervention. They result in behaviors of acceptance that draw their foundations on the social structure of society more than on individual decisions.

3) Health workers’ perception of IPTi. Generally health workers had a positive attitude towards IPTi's policy and its implementation: it prevents a high burden disease in their communities, and it appears to be an incentive for mothers to attend health centers for child immunizations due to its effect in preventing postvaccination fever. Some health workers saw IPTi as an intervention that could reduce health facility demand for severe malaria treatment, and could reduce child mortality due to malaria.
Skilled health staff had a fairly good level of knowledge of IPTi, compare to less skilled health workers such as health assistants and community health volunteers. CHWs attributed these differences to the low emphasis placed on their training. Since IPTi was a strategy administered exclusively in combination with EPI, a service that was provided exclusively at the health centers, CHWs had not received a specific training on the intervention. Although IPTi training principal recipients were nurses, observations of immunization sessions showed that it was the health assistants that performed most of the services, and the ones also involved in the communication and awareness of IPTi at community level. Health assistants who were more particularly involved in the administration of IPTi proved to be highly motivated, showed effective participation in its administration despite the lack of knowledge, and were very active in the search of children lost to immunization, and in social mobilization at community levels. The extra time caused by IPTi was also not perceived negatively.

Ultimately, health staff (nurses and their assistants) saw IPTi not only as an intervention that can help to reduce children’s malaria burden, but one that also increases immunization coverage, and re-activation of other beneficial medical practices such as systematic weighing of the child, sharing information on child welfare with the mother, and diverse advocating.

4) Family decisions regarding children’s health. Child health care decisions related to curative treatments or prophylaxis were made by the father, head of the household, who usually had the financial and social control. However, a discrepancy was identified between the responses obtained and the observations made. The normative discourse attributed the decision-making process to the father, although decisions rested progressively more on women as they acquired financial autonomy and could support expenses related to child health. It is known that women with paid work are more likely to be involved in household decisions including child health [44-46], as are also women with some education. Resources are used differently by men and women [47]; unlike men, women spend most of their resources on children’s health and on better nutrition [48] but it is harder for them to transform their work in income and welfare, and their unpaid work time is greater than that of men [49].

5) Study limitations. Data limitations included the reduced sample of interviews recorded that could be transcribed into the Nvivo programme for appropriate qualitative analysis, decreasing the scope of the analysis. In Madagascar, for example all but 54 IDIs out of 132 conducted were excluded from the analysis due to poor quality recordings in the field, and none of the FGDs were tape recorded. In Senegal, only 80 out of 420 IDIs and 20 out of 64 FGDs conducted were entered into Nvivo software programme, due also to low quality of the recording and incomplete identification of the respondents.

Another study limitation was the lack of ability to differentiate the perceptions and attitudes collected at the onset of the intervention and the ones collected at a later time point, since the interviews in Madagascar and Senegal were not always properly dated. Progressive trends in implementation acceptability were not made therefore from the Nvivo recorded interviews but based on dated observations of health staff.

Finally, this study was limited to francophone countries, that although spanning a great diversity of cultures, religions and geographic locations, could have a specific common aspect possibly not shared with the anglophone and lusophone African countries. However, other studies on IPTi acceptability when deployed in these settings have also shown high acceptability [2] [36].
VII. CONCLUSIONS

Communities’ and health workers’ acceptability is an important factor influencing the future of IPTi implementation programmes since without the approval and acceptance of society, all policies and practices are doomed to failure, and this is especially important now that a positive recommendation on IPTi by the WHO has been issued.

In this study we observed that IPTi is a strategy widely accepted by both health workers and community members. The IPTi-EPI coupling seemed to enhance acceptability. Due to the coupling with EPI services, IPTi was immediately given the legitimacy and acceptance that EPI has gained in Africa. Reciprocally, because the anti-malarial drug given in IPTi is often associated with an anti-pyretic drug capable of decreasing the feared post-vaccinal fever, IPTi has the ability to boost EPI adherence due to this and other perceived advantages of IPTi. Although in some cases misperceptions of the role of SP in IPTi had a positive effect on its acceptance, it should be appropriately corrected when launching the intervention at scale. Finally, IPTi did not seem to have a negative influence on other malaria control strategies, and no negative rumors were captured. In view of these results we suggest that the training and communication programmes further clarify the objective of the intervention offered when implementing IPTi.
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