Vaccine xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Brief report

# The potential acceptability of infant vaccination against malaria: A mapping of parental positions in Togo

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ARTICLE INFO

*Article history:*
Received 23 July 2015
Received in revised form
29 November 2015
Accepted 1 December 2015
Available online xxx

*Keywords:*
Malaria vaccine
Infants
Acceptability
Mapping
Togo

ABSTRACT

*Objective:* To map the acceptability to parents in Togo of infant vaccination against malaria.
*Methods:* From July to October 2014, a study of 209 parents of infants in Togo was conducted to assess their willingness to have their infants vaccinated against malaria. Participants were exposed to 48 vignettes, designed using the main constructs of health-protective theories.
*Results:* Five qualitatively different positions were found, which were labeled Neighbors' Attitude (5%), Cost Only (21%), Neighbors' Attitude and Cost (22%), Risk and Cost (33%), and Always Vaccine (20%).
*Conclusion:* The diversity of parental positions regarding vaccinating their infants against malaria implies that malaria vaccination campaigns in Togo, and possibly in other sub-Saharan African countries, must not be "one size fits all," but must be tailored in design and implementation to match the diversity of parents' needs and views.



## 1. Introduction

In 2013, 437,000 children under the age of five died of malaria in sub-Saharan Africa [1]. Among the most vulnerable of this population are infants, among whom malaria prevalence is between 10.2 and 21.7% [2], while its mortality rate ranges from 20.1 to 46.2% [3]. Considerable progress is being made in developing a malaria vaccine [4], which is the most effective long-term strategy for preventing malaria. However, research on "vaccine hesitancy"—defined as "delay in acceptance or refusal of vaccination despite availability of vaccination services" [5,p.4161] —strongly suggests that the advent of a preventive malaria vaccine would not guarantee its uptake [6]. It is important, therefore, to begin planning how to promote its widespread uptake, particularly among parents of infants in sub-Saharan Africa.

Studies about parental decisions to vaccinate their children or not have identified several factors, including those suggested by health-protective behavior theories: perceived susceptibility to the disease [7]; effectiveness of the vaccine [8]; perceived severity of the disease [7]; cost of the vaccine [9]; and perceived social approval of vaccination [10]. However, very little is known about the relative contributions of these factors to African parents' willingness to vaccinate their infants against malaria and about the possibly diverse vaccination positions of these parents. Addressing this gap in knowledge is important since an unrecognized heterogeneity of parents' positions about childhood vaccination has undermined prior interventions to promote childhood vaccination [11,12]. As the SAGE Working Group on Vaccine Hesitancy asserts, "the specific factors leading to hesitancy in the subgroup need to be identified so that the most appropriate intervention options can be applied" [12,p.4176].

## 2. Methods

### 2.1. Study area

The study was conducted in Togo, a western sub-Saharan African country where malaria is endemic. In 2013, malaria prevalence among infants between 6 and 11 months of age was 21.5% [13]. It is the leading cause of death among children under 5 years of age, representing 18% of all deaths [14], and is responsible for 50% of hospitalizations [15]. The study site was Kara, a city in northern

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http://dx.doi.org/10.1016/j.vaccine.2015.12.008
0264-410X/

**Table 1**
Demographic characteristics of the sample and composition of the clusters.

| | | Cluster | | | | | |
|---|---|---|---|---|---|---|---|
| Characteristic | Level | Others | Cost | Others and cost | Risk and cost | Always | Total |
| Gender | Female | 9(8) | 27(23) | 29(24) | 34(29) | 19(16) | 118 |
| | Male | 1(1) | 17(18) | 16(18) | 34(37) | 23(25) | 91 |
| Age | 18–28 | 8(11) | 7(9) | 16(21) | 36(47) | 9(12) | 76 |
| | 29–34 | 2(3) | 16(24) | 14(21) | 14(21) | 21(31) | 67 |
| | 35+ | 0(0) | 21(32) | 15(23) | 18(27) | 12(18) | 66 |
| Education | Primary | 0(0) | 7(14) | 25(51) | 8(16) | 9(18) | 49 |
| | Secondary | 3(5) | 13(21) | 7(11) | 29(46) | 11(17) | 63 |
| | Post-secondary | 5(10) | 19(37) | 4(8) | 16(31) | 7(14) | 51 |
| | Tertiary | 2(4) | 5(11) | 9(20) | 15(33) | 15(33) | 46 |
| Religion | Christian | 10(8) | 28(22) | 25(20) | 37(29) | 27(21) | 127 |
| | Muslim | 0(0) | 12(26) | 15(33) | 17(37) | 2(4) | 46 |
| | Animist | 0(0) | 3(13) | 4(17) | 12(50) | 5(21) | 24 |
| | Others | 0(0) | 1(8) | 1(8) | 2(17) | 8(67) | 12 |
| Income | Less than $100 | 1(1) | 34(39) | 24(27) | 18(20) | 11(12) | 88 |
| | $100–$300 | 4(6) | 6(9) | 17(26) | 28(43) | 10(15) | 65 |
| | More than $300 | 5(9) | 4(7) | 4(7) | 22(39) | 21(37) | 56 |
| Total | | 10 | 44 | 45 | 68 | 42 | 209 |

Togo that has a population of around 100,000 and is the capital of the Kara region. In that region, the prevalence of malaria infection among children aged between 6 and 59 months is estimated at 52%, the highest of the country [13].

### 2.2. Participants

Participants were parents of infants (up to 12 months of age) seeking parenting support services (free-of-charge) in one of the three maternal-child community centers in Kara. From July to October 2014, research assistants approached 265 consecutive parents. After receiving full explanation of the study and its procedures, 209 (118 mothers and 91 fathers) agreed to participate. The participants received no incentive. Their demographic characteristics are shown in Table 1.

### 2.3. Material

The material consisted of 48 vignettes, composed of all combinations of the five main constructs of health-protective behavior theories [15]: Perceived susceptibility to malaria (one chance in 10 or in 50); Effectiveness of the vaccine (50% or at least 75%); Perceived severity of malaria (lethal or curable owing to the availability of treatment); Cost of the vaccine (free, $100, or $200); and Neighbors' attitude toward vaccination (encourage parents to do it or do not encourage parents to do it). The question under each vignette was, "If you were a parent of [the baby's name], what is the likelihood that you would get your baby vaccinated?" The response scale was an 11-point scale with anchors of "Surely NO" (0) and "Surely YES" (10). Two examples of scenarios are given in the appendix.

### 2.4. Procedure

For all participants, the researchers arranged for a quiet place to administer the experiment. The site was either a vacant classroom in the local university or the participant's private home, depending on what was the most convenient for the participant. Each person was tested individually according to the procedure recommended by Anderson [16]. The researchers explained to participants what was expected, i.e. that for each scenario they were to indicate their level of willingness to have the infant receive the vaccine. They gave ratings at their own pace, and the researchers made certain that the participants understood all relevant information before they gave ratings.

The study was approved by the Institutional Review Board of the University of Quebec (Teluq). Informed consent was obtained from all participants and full anonymity was provided.

### 2.5. Statistical analyses

As expected, we detected strong individual differences in responses during data gathering. Accordingly, we performed cluster analysis on the data using the K-means method. We then conducted separate ANOVAs on the data of each cluster, using a Susceptibility × Severity × Effectiveness × Cost × Neighbors, $2 \times 2 \times 2 \times 3 \times 2$ design. Finally, we performed Chi$^2$ test to test the effects of demographic characteristics.

## 3. Results

The participants' mean ratings for the scenarios ranged from 2.21 to 9.11 (overall mean = 5.42) on the scale of 0 to 10. The cluster analysis gave a five-cluster solution. The main patterns of data that correspond to each cluster are shown in Figs. 1 and 2. The detailed results of the corresponding ANOVAs are available from the corresponding author.

For 68 participants (33%), the ratings depended on the severity of the risk incurred by the child, $F_{(1,67)} = 172.97$, $p < 0.001$, $\text{Eta}^2_p = 0.72$, and on the cost, $F_{(2,134)} = 276.66$, $p < 0.001$, $\text{Eta}^2_p = 0.81$. When the risk was severe, the ratings were always relatively high ($M = 7.49$) and only moderately depended on the cost. When the risk was not so severe, the ratings where lower and mainly depended on the cost: they were high ($M = 8.48$) when the vaccine was free, low ($M = 3.04$) when the cost was $100, and very low ($M = 1.94$) when it was $200, $F_{(2,134)} = 61.14$, $p < 0.001$, $\text{Eta}^2_p = 0.48$. This cluster was called Risk and Cost.

For 45 participants (22%), the ratings depended both on the neighbors' attitude, $F_{(1,44)} = 30.63$, $p < 0.001$, $\text{Eta}^2_p = 0.41$, and on the cost, $F_{(2,88)} = 64.86$, $p < 0.001$, $\text{Eta}^2_p = 0.60$. When the neighbors' attitude was negative, the ratings were always low ($M = 2.73$), but when it was positive, they depended on cost: they were relatively high ($M = 6.90$) when the vaccine was free, low ($M = 2.60$) when the cost was $100, and very low ($M = 1.90$) when it was $200, $F_{(2,86)} = 257.30$, $p < 0.001$, $\text{Eta}^2_p = 0.86$. This cluster was called Neighbors' Attitude and Cost.

For 44 participants (21%), the ratings were high ($M = 9.62$) when the vaccine was free, low ($M = 2.74$) when the cost was $100, and very low ($M = 0.61$) when it was $200, $F_{(2,86)} = 257.30$, $p < 0.001$, $\text{Eta}^2_p = 0.86$. This cluster was called Cost Only.

Please cite this article in press as: Kpanake L, et al. The potential acceptability of infant vaccination against malaria: A mapping of parental positions in Togo. Vaccine (2015), http://dx.doi.org/10.1016/j.vaccine.2015.12.008