Using mHealth to improve the knowledge of obstetric warning signs in the low-ressource setting of Ambanja district, Madagascar

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Background

Madagascar retains a high maternal mortality rate (365/100,000 live births). Major complications that account for nearly 75% of all maternal deaths are direct obstetric causes, such as severe bleeding, obstructed labor, infections, high blood pressure during pregnancy, and/or unsafe abortion. (1) It has been assumed that most of these complications can be avoided if women have skilled birth attendants during pregnancy and childbirth. (2)
Furthermore, previous studies have shown a positive association between the knowledge of danger signs before, during or after delivery and increased health facility delivery. (3, 4)

Objective

The objective of the study was to assess if a mHealth application called PANDA providing antenatal-care (ANC) increases maternal knowledge of obstetric warning signs.

Material and Methods

In 2015 a case-control study including 372 women in the postpartum was conducted in Ambanja district using a questionnaire. Women were asked to mention spontaneously warning signs during pregnancy, childbirth or in the postpartum. We compared the correct responses in the intervention group consisting of 161 mothers having participated in PANDA mHealth ANC to 211 women having attended conventional ANC (control group).

PERSONAL INFO   SCREENING

MEDICAL HISTORY   HEALTH EDUCATION
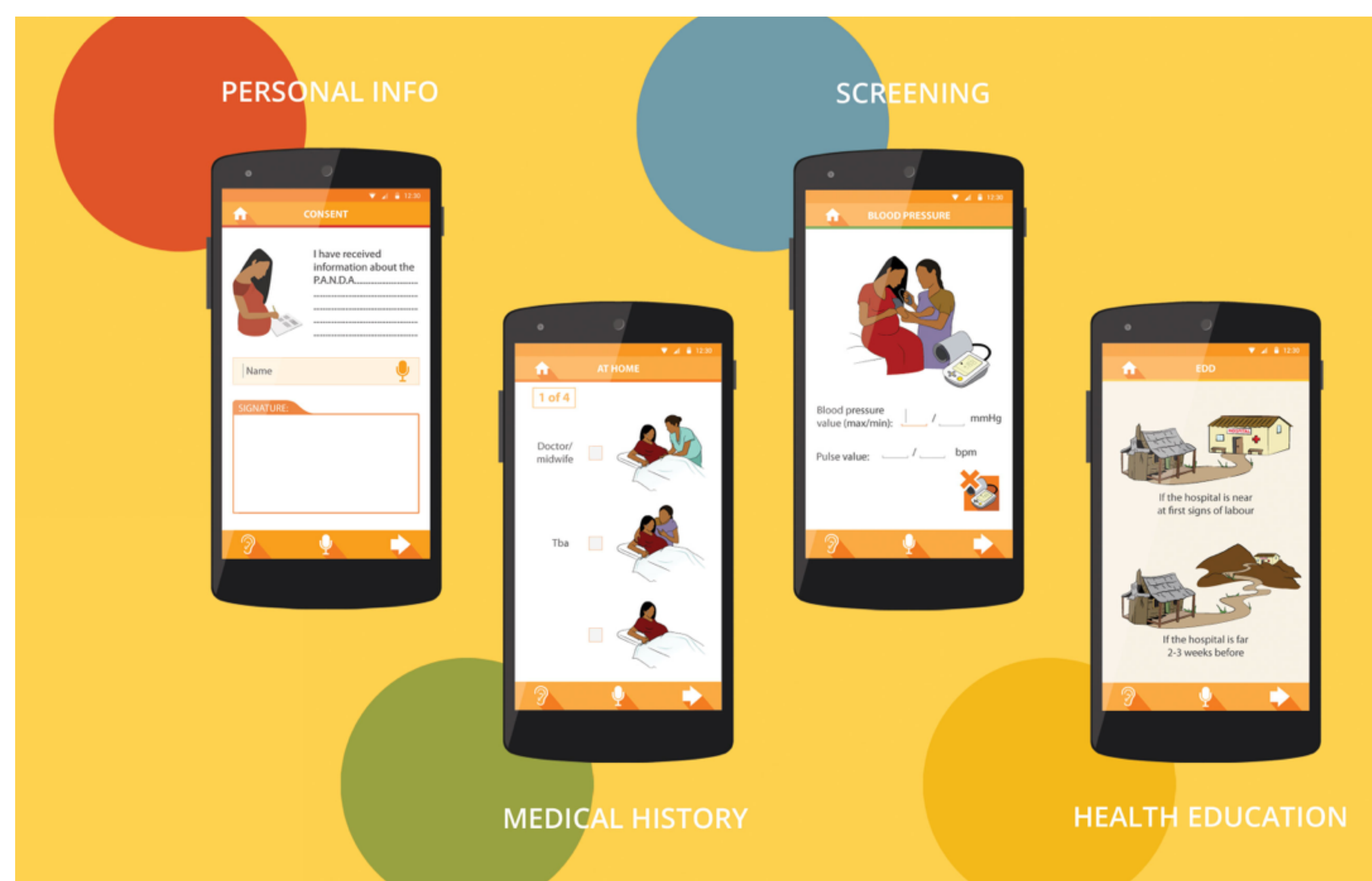
The PANDA (Pregnancy-And-Newborn-Diagnostic-Assessment) is a mHealth system that supports health care workers in the provision of a structured and comprehensive ANC according to the WHO guidelines. Additionally, it generates for each patient an electronic record. Furthermore, it contains a small educational part about problems which might occur during pregnancy and delivery.
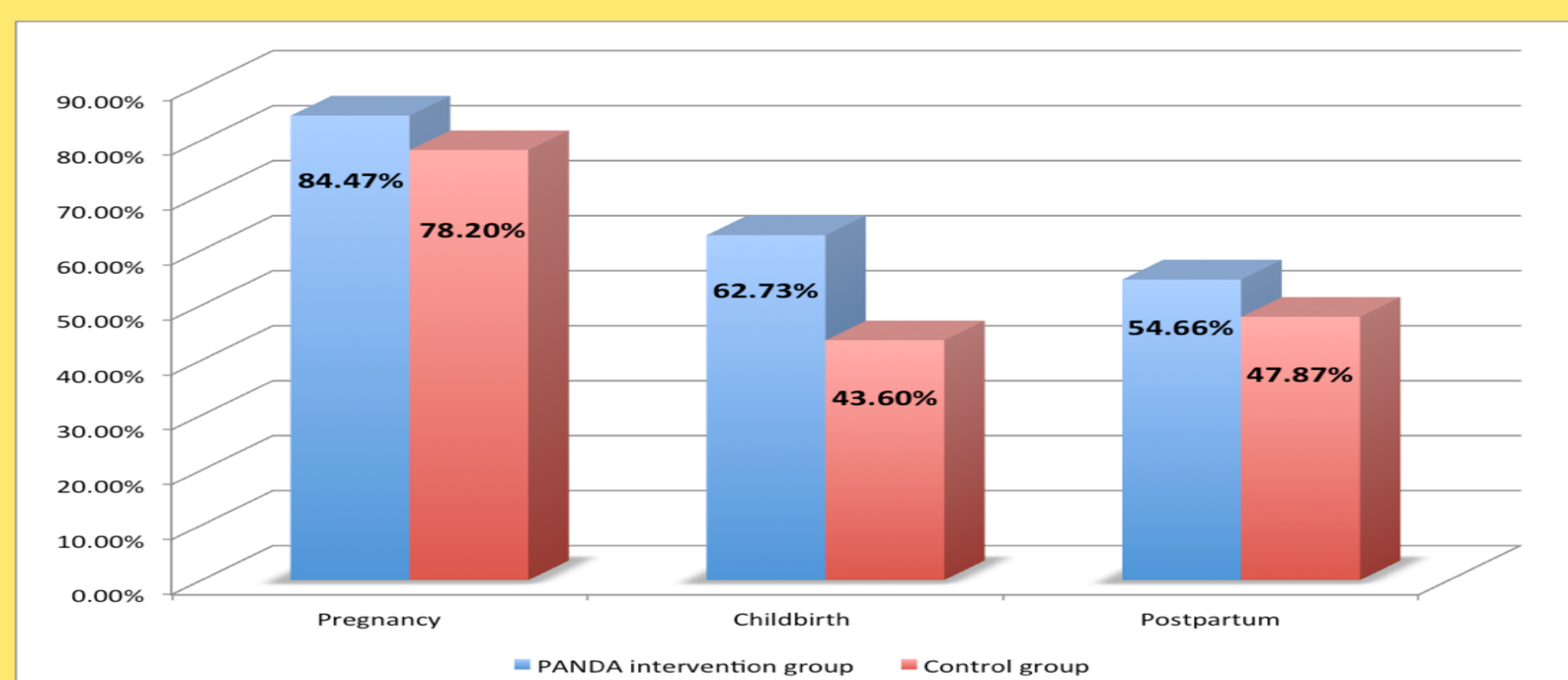Statistical analysis was performed using the STATA software.

Figure 1: Percentage of women who could mention correctly ≥1 danger signs during pregnancy, childbirth and post-partum.

References :
1)   Say L et al. *Global Causes of Maternal Death: A WHO Systematic Analysis.* Lancet Glob Health. 2014 Jun;2(6):e323-33.
2)   UNICEF, WHO, World Bank, UN-DESA Population Division. *Level and trends in child mortality.* Publication 2014. New York.
3)   Karkee R et al. *The role of obstetric knowledge in utilization of delivery service in Nepal.* Health Educ Res. 2014 Dec:29(69:1041-8.
4)   Moyer CA and Mustafa A. *Drivers and deterrents of facility delivery in sub-Saharan Africa: a systematic review.* Reprod Health 2013 Aug 20; 10:40.

Results

The majority of the 372 women participating in the study were multipara (65.6%), less than 30 years old (69.8%), single (68%) and living in the rural areas (68.8%). The economic situation was poor with 51.3% having a family income less than 100 000 Malagasy Ariary/month (=28.7 Euro), no electricity (77.4%) or cell phone (51.3%). However, nearly all (99.2%) had already benefited of ANC visits and 85.7% lived less than an hour walking from the next health facility. Awareness of at least one danger sign was best for problems that might occur during pregnancy, while awareness of problems during the postpartum was lower (Table 1).

Women having participated in the PANDA mentioned significantly more frequently at least one danger sign during childbirth correctly (PANDA 62.73% vs. 43.60%, p<0.01). (Figure 1) No difference could be shown during pregnancy or in the postpartum.

In the multiple regression model this difference remained statistically significant. PANDA participants were 1.8-times more likely to mention correctly at least one warning sign during childbirth. Also, women with an income over 100 000 Malagasy Arias were 1.9 times more likely to mention danger signs correctly. Other variables such as educational, marital status or age did not remain statistically significant. (Table 1)
The multiple regression did not show any difference in the postpartum or during pregnancy in both groups.

Table 1: Factors associated with the knowledge of danger signs during childbirth	CRUDE OR (95% CI)	Adjuste d OR (95% CI)
Age		
<= 19 years	1.00	1.00
20-29 years	1.44 (0.87-2.38)	1.28 (0.73-2.23)
>=30 years	1.52 (0.88-2.61)	1.34 (0.72-2.49)
Martial Status		
-single	1.00	1.00
-married or living with a partner	1.51 (0.95-2.39)	1.43 (0.84-2.44)
-seperated or divorced	0.60 (.21-1.72)	0.75 (0.25-2.27)
Education		
-no education	1.00	1.00
-primary education only	1.07 (.56-2.05)	1.08 (0.53-2.18)
-secondary education	1.35 (0.75-2.45)	1.26 (0.65-2.46)
-tertiary education	2.88 (.81-10.30)	1.60 (0.42-6.09)
Information received about danger signs during pregnancy?		
-yes	2.18 (1.43- 3.31)**	1.50 (0.90-2.49)
-no	1.00	1.00
Household income		
<=100 000 Malagasy Arias	1.00	1.00
>100 000 Malagasy Arias	2.31 (1.52-3.50)**	1.90 (1.21-2.97)**
PANDA participation		
-yes	2.18 (1.43-3.31)**	1.83 (1.15-2.91)*
-no	1.00	1.00
*significant at p<0.05 ** significant at p<0.01		

Discussion

The results of our study indicate that the PANDA mHealth application might increase obstetric awareness during childbirth as PANDA participants were significantly more likely to mention at least one danger sign during childbirth correctly.
The PANDA mHealth application includes an educational tool about danger signs during pregnancy and childbirth. However, no difference could be shown in between the groups in respect to the knowledge of danger signs during pregnancy. This can be possibly explained by the good overall knowledge of danger signs during pregnancy in both groups: 78.2% in the control group and 84.47% of participants in the intervention group could mention at least one danger sign during pregnancy correctly. (Fig 1)

On the other hand, the spontaneous knowledge of at least one danger sign during the postpartum was low and no difference could be shown in both groups. This might be due to the fact that the PANDA mHealth educational part does not explain problems that might occur in the postpartum period.

Since at least 20% of maternal death occur due to complications during the postpartum (such as bleeding or infection), we recommend that education about postpartum problems should be strengthened. (1) Future studies should also evaluate on a larger scale the efficacy of the educational part of the PANDA mHealth application. Furthermore, it needs to be evaluated if women with an increased knowledge of danger signs deliver more frequently in a health facility. This analysis was not possible in our sample as 74.9% of patients delivered in a health facility and only 13/93 (13.98%) of the women who delivered at home had planned their birth at home.