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## Abstract

An intervention study was conducted to reduce errors in indicators of monthly report in Analamanga region, Madagascar. As comparing before and after intervention, our results indicated that error visualization model was the most effective in preventing the errors.

## Background

Based on Ministerial ordinance by Ministry of Health in 1998, private and public health facilities ought to submit monthly activity report (RMA) to health districts office.

JICA HIV Prevention Strengthening project in Madagascar has integrated STI/HIV indicators in routine Monthly Activity Report (RMA) and updated RMA database software in 2010 and in 2011. As a result, the national coverage rate and completion rate have recorded the highest rates in 2011 since 1998.

## Objectives

The objectives in this study were to evaluate the quality and find better approach to reduce error events in HIV and other indicators.

## Methods

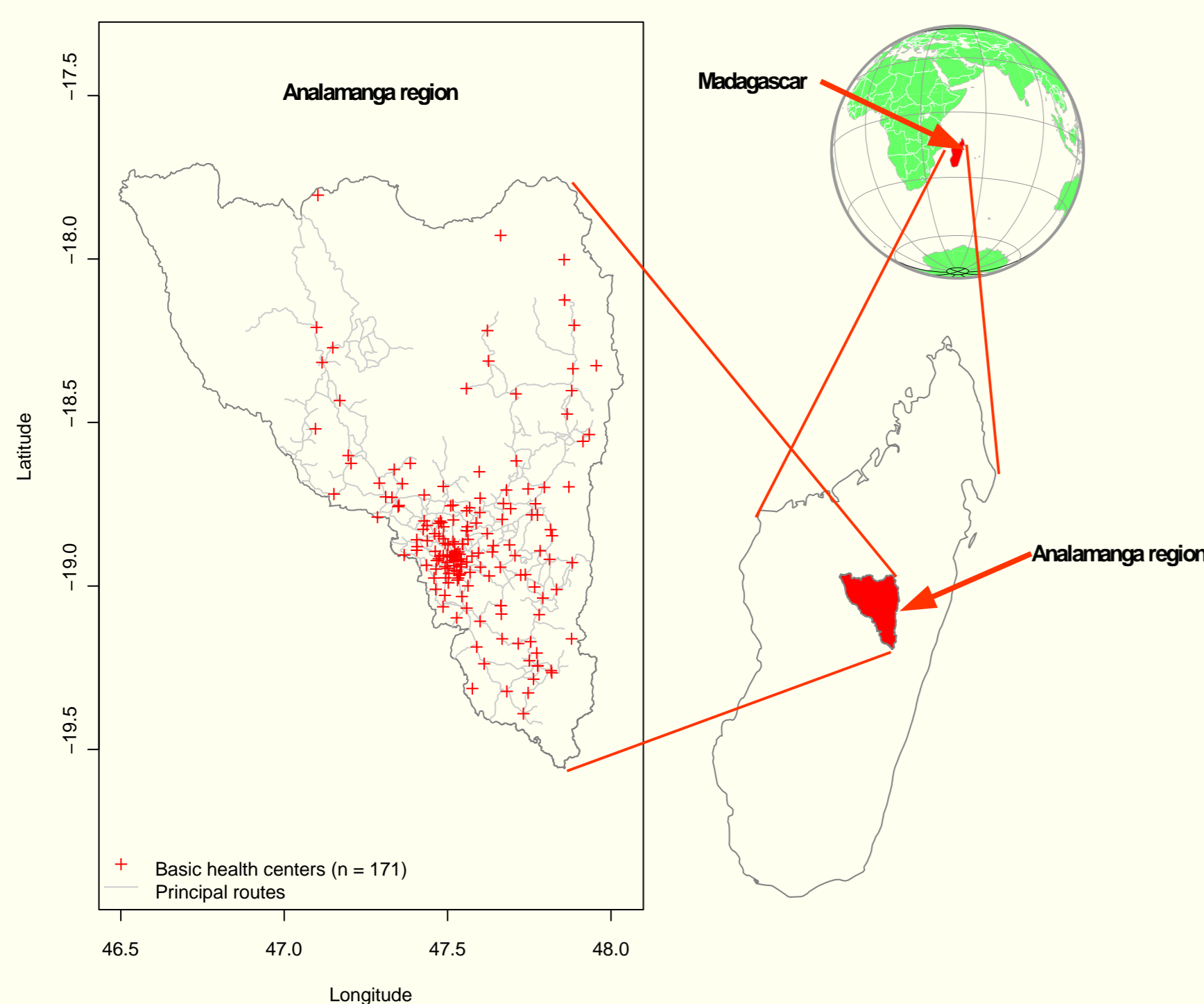


Figure 1: Map of health facilities involved in this study, Analamanga region, and Madagascar

## Subjects

In Analamanga region there were 507 health facilities (469 basic health centers, 26 district hospitals, and 12 university hospital/specialized facilities) in 2011 (Ministry of Health in Madagascar, 2012). Of the 469 basic health centers, 183 provide HIV testing services. In this study, 171 basic health centers have been selected after excluding of 12 basic health centers due to the missing monthly reports.

## Error counts

Table 1: Targeted indicators

Categories	Targeted errors indicators	Number of errors indicators	Type of errors		
			Omission	Incoherence	Miscalculation
Identification of Health facilities	Identification number and statement in front pages, and in each page	3	2	1	0
Outpatients consultation	Total number of consultation, number of consultation per age group et per diagnostics.	32	16	8	8
Antenatal Consultation (ANC)	Number of pregnancy mothers with HIV pretest counseling in 1st ANC, Number of pregnancy mothers with HIV testing in 1st ANC, Number of pregnancy mother for HIV Positive in 1st ANC, Number of pregnancy mother with Syphilis test, Number of Pregnancy mother with Positive Syphilis test	15	7	8	0
Pharmacy	Genital discharge treatment kits stock, Genital ulceration treatment kits stock, 1st HIV testing kits stock, Syphilis testing kits stock	9	4	5	0
HIV Counseling and testing	Number of clients with pretest counseling per ages group, sex, risky group, Number of clients tested for HIV per per ages, sex, risky group, Number of clients with post test counseling per ages group, sex, risky group	25	18	7	0
STI treatment	Number of Genital discharge patients, Number of Genital ulceration patients	2	0	2	0
	Total	86	47	31	8

In this study errors counts were counted in 86 indicators of STI/HIV and other indicators in RMA (Table 1), which have been discussed with central staff and district health staff in Analamanga Region in 3

days workshop in May 2012 based on similar study result in 2011. The error events were separately counted by omission, incoherence, and miscalculation. The count has been done by central staff of Ministry of Health and district health office staff in trimester follow-up workshops and checked again by study team with the copies of selected health facilities' RMA.

## Interventions

In this intervention study, 171 health facilities providing HIV testing in Analamanga region were randomly assigned to a control arm ( $n = 35$ ) and 4 interventions arms: Training ( $n = 34$ ), Supervision ( $n = 37$ ), Distribution with RMA with filling up notes ( $n = 31$ ), and Error visualization model ( $n = 34$ ). For 86 indicators of STI/HIV and others indicators in RMA, the frequency of errors in each arm has been compared before (January 2012) and after intervention (January 2013).

**Training** two responsible persons for monthly activities report per health facilities were participated in 2-day training with total of 4 sessions between June and August 2012

**Supervision** two or three persons of central staff in Ministry of Health visited selected health facilities for verifying reports and teach how to fill up reports. Supervisions have done between June and August 2012.

**Distribution with RMA with filling up notes** The study team integrated filling up notes in RMA in order to avoid common mistakes. RMA with filling up notes were distributed for selected sites between July 2012 and January 2013.

**Error visualization model (EVM)** The graphic of number of errors for targeted indicators per month by selected health facility has been posted in health district office between July 2012 and January 2013. In addition to the error graphics, RMA with filling up notes and additional manual for RMA were distributed.

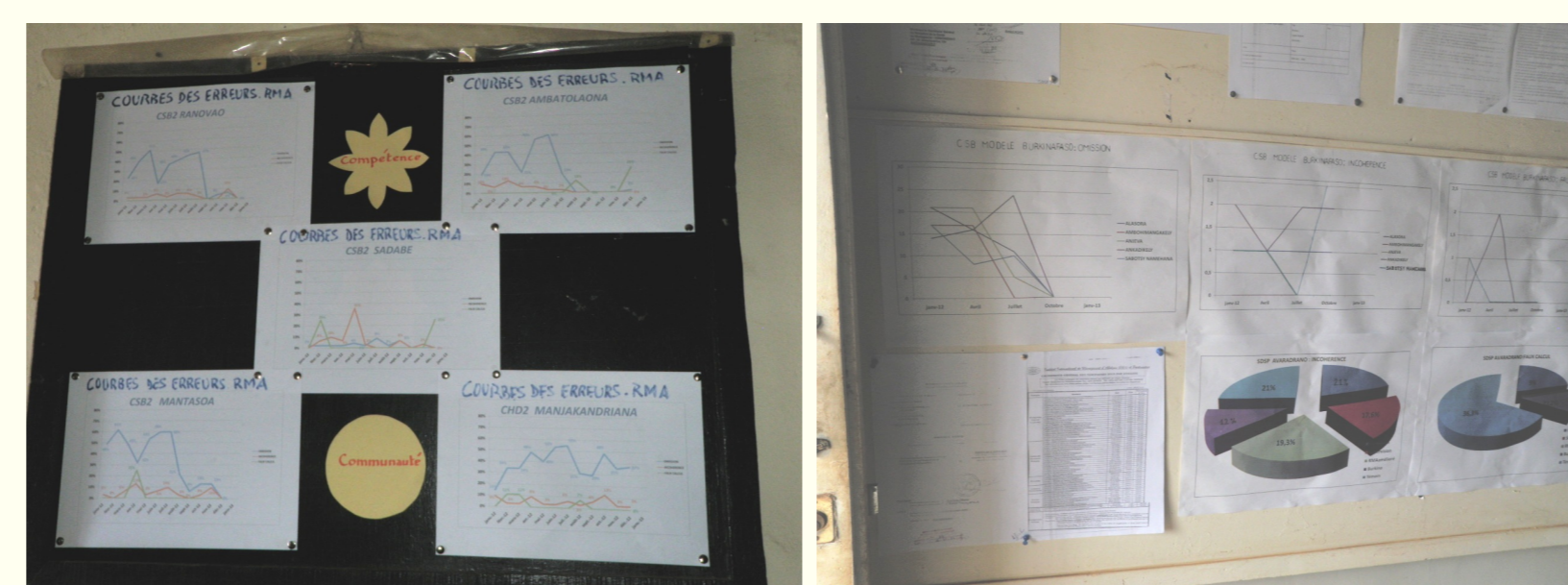


Figure 2: Error graphics in Majakandriana District Health Office (left) and Antananarivo Avaradrano District Office (right). Both were used for EVM intervention

## statistical analysis

Basic statistics of monthly median of errors by arm were computed. Statistical calculation was performed using the stats package in R version 3.0.2 (R Core Team, 2013)

## Results

### Type of errors

More errors were observed in pharmacy stock indicators such as genital discharge treatment kits stock, genital ulceration treatment kits stock, 1st HIV test kit stock, syphilis test kit than in other indicators.

After intervention, the omission errors have been more reduced than incoherence and miscalculation.

### Interventions

The monthly median of errors in total groups has been drastically reduced from 17 in January 2012 to 2 in January 2013 ( $P < 0.001$ ).

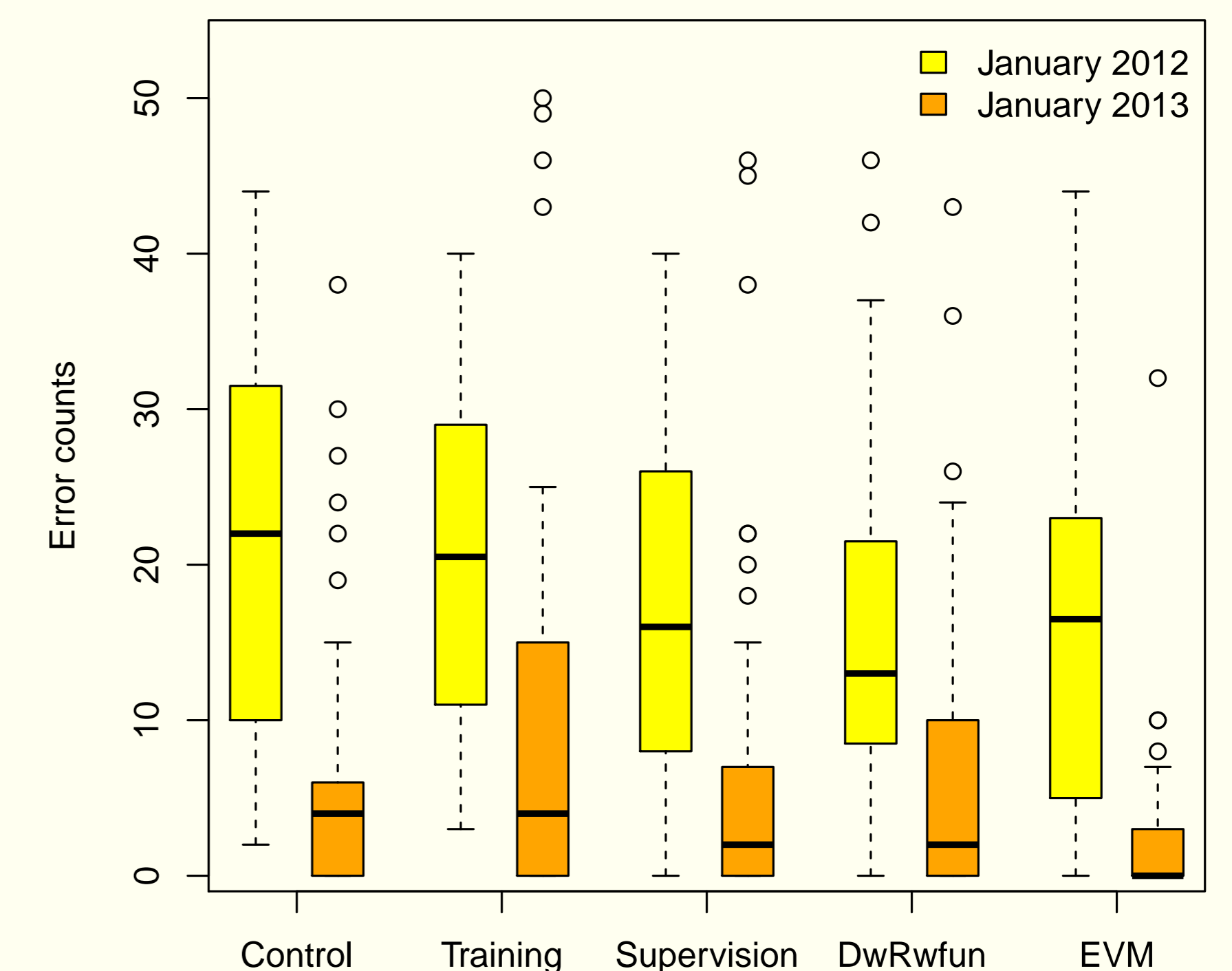


Figure 3: Monthly error counts in each health facility at before (January 2012) and after intervention (January 2013) by arm. The DwRwfun arm denotes "distribution with RMA with filling up notes," and the EVM arm denotes error visualization model.

Figure 3 depicts the errors drastically declined after intervention, even with the control arm. The median of errors of the EVM arm was almost 0. From January 2012 to January 2013, the median in the control and 4 experimental arms reduced 18.0, 16.5, 14, 11, and 16.5, respectively.

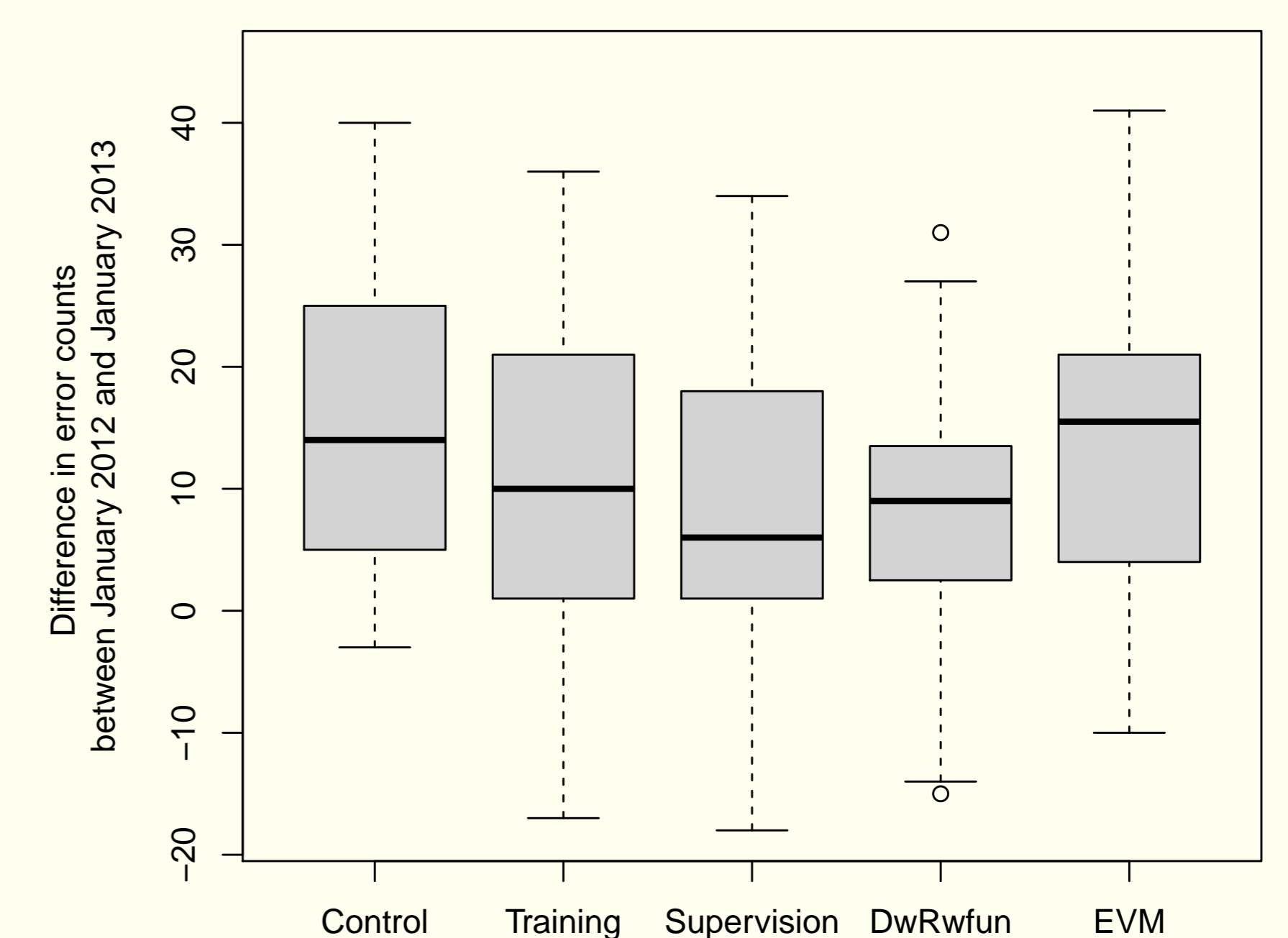


Figure 4: Difference in monthly error counts of each health facility between before (January 2012) and after intervention (January 2013) by arm. The DwRwfun and EVM arms denote "distribution with RMA with filling up notes," and error visualization model, respectively.

The difference of monthly error event number in each health facility is displayed in Figure 4. Not all health facilities reduced errors. The control arm had higher median (14.0) than Training (10.0), Supervision (6.0), and "Distribution with RMA with filling up notes" (9.0) arms. The EVM arm showed the highest median (15.5).

## Discussion

The large reduction in the control arm might be explained with the Hawthorne or compensatory rivalry effects as errors graphics of EVM were posted in district offices. However, the EVM arm indicated most effective in the reduction of errors.

## Conclusion

The error visualization model has more prevented errors than other conventional costly interventions such as training and supervision.

## Acknowledgement

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## References

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