Impact of rotavirus vaccine on all-cause diarrhea and rotavirus hospitalizations in Madagascar the first four years after rotavirus vaccine introduction

1Rahajamanana Lalaina, 2Weldegebriel Goitom, 3Seheri Mapaseka, 4Mphahlele Jeffrey, 5Vuo Masembe Yolande, 6Burnett Eleanor, 1Raboba Julia Liliane 1, 4Mwenda Jason, 6Nimpa Marcellin

1Centre Hospitalier Universitaire Mère Enfant Tsaralalana Antananarivo, Ministry of Health Madagascar, 2WHO Inter-Country Support Team: East and Southern Africa (WHO IST/ESA), 3Regional Rotavirus Reference Laboratory, MRC/Medunsa Diarrheal Pathogens Research Unit, University o, 4WHO Country – Madagascar, 5Centers for Disease Control and Prevention, Division of Viral Diseases, Atlanta, USA, 6WHO Regional Office for Africa (WHO/AFRO),

Background
Rotavirus vaccine was introduced into the Extended Program on Immunization in Madagascar in May 2014. Nationally, rotavirus vaccination coverage increased from 39% in 2014 to 77% in 2017. We analyzed trends in prevalence of all cause diarrhea and rotavirus hospitalizations in children < 5 years of age before and after vaccine introduction at Centre Hospitalier Universitaire Mère Enfant Tsaralalana (CHU MET).

Methods
We reviewed the hospital admission logbook from January 2010 to December 2018 and recorded the number of hospitalizations due to all-cause acute gastroenteritis (AGE) among 11,540 children < 5 years old admitted during the peak diarrhea season. Peaks rotavirus season were in April-June and October-November. For the logbook analysis, we considered 2010-2013 to be the pre-rotavirus vaccine years and 2015-2018 to be the post-rotavirus vaccine years. Active sentinel hospital rotavirus surveillance was conducted June 2013-Dec 2018, with support from the World Health Organization. We compared the percentage of rotavirus positive stool specimens during the peak rotavirus season in the pre-rotavirus vaccine introduction period (June 2013-May 2014) with the post-vaccine period (June 2014-May 2018). Rotavirus was detected at the sentinel site laboratory by EIA from stool specimens of eligible children with gastroenteritis.

Results
Diarrhoea hospitalizations decreased after rotavirus vaccine introduction. During the peak rotavirus season, the average proportion of hospitalizations due to AGE was 37% (range: 41% to 23%) before vaccine introduction; the proportion was 39% the year of vaccine introduction, 22% in 2015, 19% in 2016, 20% in 2017, and 16% in 2018. The post-vaccine introduction average is 44% lower than the proportion of hospitalizations due to AGE pre-vaccine introduction during the peak rotavirus season. Rotavirus positivity in the sentinel surveillance data paralleled patterns observed in AGE hospitalizations at the site. Before vaccine introduction, 68% of stool specimens tested positive for rotavirus during the peak diarrhea season; the percent positive was 47% in 2014/2015, 17% in 2015/2016, 25% in 2016/2017 and 20% in 2017/2018. The rotavirus positivity in 2017/2018 was reduced by 71% compared to the percentage of positive specimens in 2013/2014.

Conclusion:
Following rotavirus vaccine introduction, AGE and rotavirus-specific hospitalizations declined dramatically during the peak rotavirus season in Madagascar. As vaccination coverage increased, we observed a corresponding decline in rotavirus diarrhea and AGE. While our study was limited to a single sentinel site in Antananarivo, the capital city of Madagascar, we expect these benefits in other parts of the country as coverage continues to improve nationwide. Ongoing sentinel surveillance should be supported to measure the long-term rotavirus vaccine impact in Madagascar.