

# COST-EFFECTIVENESS ANALYSIS OF IMPLEMENTING A NON-INVASIVE SCREENING TOOL (NEOSONICS) FOR MENINGITIS AMONG NEWBORNS IN MOZAMBIQUE, MOROCCO AND SPAIN.

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## Background:

Meningitis can be a devastating disease that poses a significant public health challenge, particularly in low- and middle-income countries (LMICs), which account for 98% of the estimated 5.6 million disability-adjusted life years (DALYs) attributed to the disease. Children, especially the youngest, are the most vulnerable. Underdiagnosis or delayed antimicrobial treatment exacerbate these lifelong consequences and increase mortality rates. The gold standard to diagnose meningitis is the obtention of cerebrospinal fluid (CSF) through a lumbar puncture (LP), to detect abnormally elevated counts of white blood cells (WBC) or pathogens. Neosonics, a non-invasive device using a high-frequency ultrasound system (HFUS) and a deep learning (DL) algorithm, can detect and count WBC in CSF through the permeable fontanel. The objective of this study is to compare the cost-effectiveness of implementing Neosonics with the Status quo, which involves performing an LP on all suspected cases of meningitis. We assess the cost-effectiveness of Neosonics across three countries with varying income levels and disease incidence: Spain, Morocco, and Mozambique.

## Methods:

We are assessing a scenario in which the HFUS would operate as a primary screening tool, followed by a LP only in the cases with an elevated WBC count and compared it to the status quo. Data were collected from Hospital Sant Joan de Déu, Spain; Hôpital des Enfants de Rabat, Morocco; and Manhica District Hospital, Mozambique. The model relies on a decision tree that was designed and analyzed in TreeAge. The effectiveness estimates measured in DALYs were derived from the sensitivity and specificity of the tools – 98% and 82% respectively. The model was estimated by applying deterministic, sensitivity and probabilistic analyses.

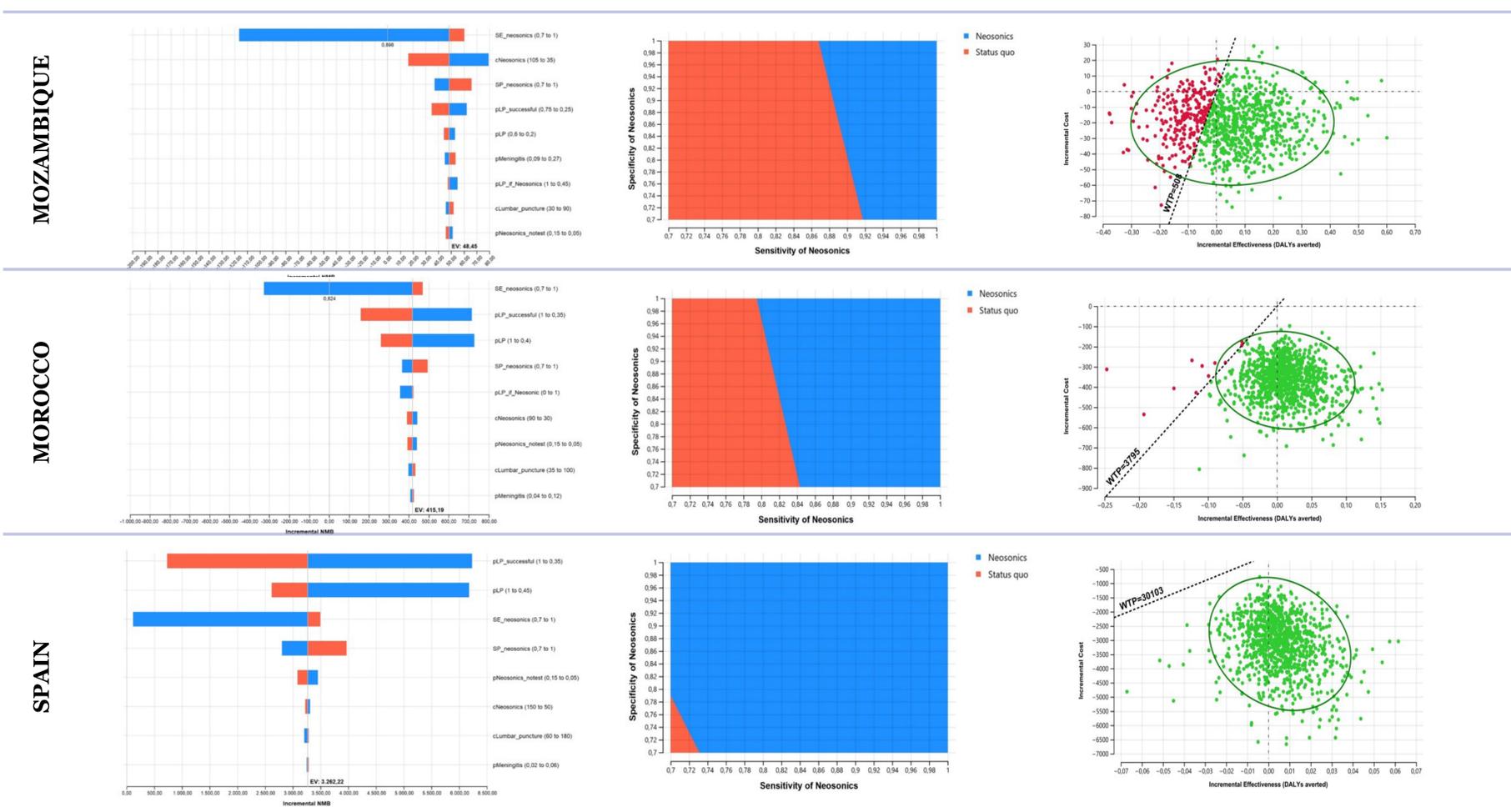
## Results:

Employing the HFUS screening method compared to the Status quo appears cost-effective in all three countries, including when accounting for uncertainty in the parameters. The HFUS screening method saves 19.03 USD per suspected case in Mozambique, 362.76 USD in Morocco and 3,095.46 USD in Spain. HFUS is also more effective as it averts 0.0579 DALYs per suspected case in Mozambique, 0.0138 DALYs in Morocco and 0.0055 DALYs in Spain.

**Tornado Diagram  
Incremental Net Monetary Benefit**

**Two-way sensitivity analysis on the  
sensitivity and specificity of Neosonics**

**Cost-effectiveness plane comparing  
Neosonics to the Status quo**



## Conclusions:

Neosonics dominates the status quo both in terms of costs and effectiveness in all three countries. In Spain, where medical expenses are the highest, it is the most cost-saving, while in LMICs, with a much higher incidence, it is the most effective, making the device particularly promising in outbreak or epidemic situations.

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