# Willingness to pay for ITM vaccine using BDM mechanism \*

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When individuals have limited available funds, their reported willingness to pay (WTP), a measure of demand, for a product or service may not accurately reflect their true valuation. Particularly, neglecting the budget constraint can result in overestimated price coefficient parameters and underestimated preference for quality parameters (Pesendorfer et al., 2023). Because the demand function for a commodity depends not only on individual preferences but also on budget constraints, this study aims to analyze how bidding prices respond to external constraints.

To overcome the above issues, this study aims to estimate the WTP for vaccines against East Coast Fever (ECF) in Narok, Kenya, using the BDM method. ECF, a tick-borne cattle disease, leads to several mortality and morbidity losses in Sub-Saharan Africa (Norval et al., 1992). Vaccination, also called as Infection and Treatment Method (ITM), has been identified as an effective measure for preventing and controlling ECF (Nyangito et al., 1996; Homewood et al., 2006; Sitawa et al., 2016; Ikaal et al., 2020). However, the adoption of ITM has been low, leading to continued outbreaks <sup>1</sup>.

Becker-DeGroot-Marshack (BDM) is a well-established revealed-preference method for estimating individuals' WTP for public goods and services (Becker et al., 1964). Extensive research in experimental economics has been dedicated to studying how subjects behave when using the BDM mechanism within controlled laboratory environments. Moreover, there are studies that have recently employed the BDM mechanism to estimate demand in the context of developing countries (Dougherty et al., 2020; Zahno et al., 2020; Smith et al., 2021; Berry et al., 2020; Grimm et al., 2020; Brenneis et al., 2023).

The BDM method works as follows: Participants state their maximum WTP for a product. A random price is then drawn from a predefined distribution. If this random price is less than or equal to the participant's WTP, they can purchase the product at that price. If the random price is higher, they cannot buy the product. This method incentivizes participants to reveal their true WTP. Bidding too low may prevent them from purchasing the product while bidding too high might force them to buy it at an unwanted price. Since participants typically do not pay their stated bid, the BDM method reduces incentives for bargaining or distorting the product's value.

Existing studies in the literature employing the BDM mechanism have concentrated on a single measurement of WTP without considering variation over time in the budget constraint. Several studies estimate demand based on an unconstrained utility maximization problem, neglecting the consideration of consumers' budget constraints overtime. These constraints refer to the financial limitations individuals or households face when making purchasing decisions. While budget constraints are particularly important in the case of expensive products, they can have an impact on low-priced items too (Miravete et al., 2015).

This study will take place in Narok County, Kenya, from November 2024 to March 2025. Participants will be able to purchase the ITM vaccine at a subsidized rate. The findings from this study will provide contributions and policy implications in the following ways. This is the first study to employ the revealed preference for the BDM method to examine vaccine adoption for ECF control. The method will provide estimates, which will be important for setting prices and optimal subsidies to maximize the adoption of the vaccine. Secondly, the study will also uncover factors that hinder the adoption of vaccines, shedding light on their potential role in ECF control and the broader context of agricultural and livestock development in Kenya.

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<sup>&</sup>lt;sup>1</sup>Based on qualitative discussions at least 50% of the herd should be fully vaccinated to prevent spread of ECF.

Lastly, this study's main contribution lies in its integration of the impact of exogenous liquidity constraints on the prices eliciting the WTP. In addition to providing precise estimates of WTP, the data collection structure will enable us to address a key research question: how sensitive are WTP measures to household constraints, such as seasonal income fluctuations or unexpected health expenses? Understanding whether these external factors influence households' stated prices will help assess the overall reliability of these measures. Practically, the findings could guide the optimal timing and marketing strategies for ECF vaccines.

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