RESEARCH ARTICLE

Willingness to pay brand premiums for generic medicines in Kenya: A bidding game experiment

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Abstract

Background: Recent growth in the market share of higher priced branded generic medicines in low- and middle-income countries (LMICs) has raised concerns around affordability and access. We examined consumer willingness to pay (WTP) for branded versus unbranded generic non-communicable disease (NCD) medicines in Kenya.

Methods: We randomly assigned NCD patients to receive a hypothetical offer for either a *Novartis Access*-branded medicine or for an unbranded generic equivalent. We then analysed WTP data captured using a bidding game methodology.

Results: We found that WTP for *Novartis Access* medicines was on average 23% higher than for unbranded generic equivalents (p = 0.009). The WTP brand premium was driven almost entirely by wealthier patients.

Conclusions: Our findings suggest that the dominance of branded generics in LMICs like Kenya reflect in part consumer preferences for these medicines. Governments and other health sector actors may be justified in intervening to improve access to these medicines and equivalent non-branded generics, particularly for the poorest patients who appear to have no preference for branded medicines.

KEYWORDS
access to medicines, Kenya, non-communicable diseases, willingness to pay

> **Highlights**
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> - First study to estimate WTP brand premiums for generic medicines in an LMIC
> - Wealthier consumers were willing to pay more for branded generic NCD medicines
> - Poorer consumers were not willing to pay more for branded generics
> - Interventions that shift demand to unbranded generics should be considered

1 | INTRODUCTION

Most medicines on the WHO's Model List of Essential Medicines are off-patent and are available in originator, branded generic, and unbranded generic forms in low- and middle-income country (LMIC) markets.[1] Branded generic medicines account for an increasing share of the global pharmaceutical market and are particularly dominant in LMICs.[2] According to a recent estimate, two-thirds of medicines sold in low- and lower-middle-income countries are branded generics, while around 5% are unbranded generics.[3] This is in stark contrast to many high-income countries, including the United States, where unbranded generics dominate the market on a volume basis.[4] Branded generic medicines are molecules that are off-patent but still produced and sold under a proprietary brand name. Originator brand medicines that continue to be sold after patent expiration are not branded generics according to our definition, based on the methodology adopted by the World Health Organisation (WHO).[5]

Prices for branded generic medicines are consistently higher than for unbranded generic equivalents[6] and the growth of the branded generic market in LMICs has raised concerns around affordability and access.[1] In some local medicine markets, key essential medicines may only be available in higher priced originator or branded generic forms. Price premiums for branded generics may reflect in part higher consumer willingness to pay (WTP), often due to historical brand loyalty or perceptions of higher quality.[7] Price itself may be interpreted as a signal of medicine quality independent of brand; empirical studies consistently find that consumers associate lower medicine prices with lower quality.[8] In LMICs, where national medicines regulatory authorities are often weak and low-quality medicines may be common, perceived signals of quality may be particularly important in driving demand for branded generics.

There is clear commercial logic in manufacturers of generic medicines using branding to differentiate their products in the minds of consumers, including on dimensions of perceived quality.[9] However, the few empirical studies that have compared branded and unbranded generic medicines available in the same LMIC markets have found no difference in quality on average.[7,10] This suggests that consumers of generic medicines may overestimate the relative benefits of branded forms.[11] The propensity of advertising to exaggerate the merits of branded products is well documented[12] and may contribute to brand premiums that result in consumer welfare losses.[13] Furthermore, demand for brands is often highly income elastic.[14] If WTP higher brand premiums for generic medicines is concentrated among wealthier consumers in LMICs, the dominance of these brands in local medicine markets may limit access to unbranded essential medicines among poorer consumers and exacerbate health inequities, contributing to social welfare losses. As such, governments and other health sector actors may be justified in intervening in generic medicine markets to improve access. However, more evidence of consumer preferences for branded and unbranded generics is needed to inform policy discussions.

Novartis Access is a commercial brand that offers several branded generic medicines for treatment of non-communicable diseases (NCDs) in a small but growing number of LMICs.[15] We examined WTP for *Novartis Access*-branded NCD medicines and unbranded generic equivalents in Kenya.

2 | METHODS

2.1 | Setting

Medicine expenditures in Kenya are financed in several ways. The largest insurance fund in the country is the National Hospital Insurance Fund (NHIF).[16] Other large healthcare purchasers include the national government, county governments, and private insurers. For the most part, these purchasers offer core benefit packages that include coverage for NCD medicines included on the Kenya Essential Medicines List. However, despite recent government efforts to expand insurance coverage, most Kenyans remain uninsured and out-of-pocket spending on medicines in the country is high.[17]

In Kenya, public sector medicine purchasing is managed at the county level. Public and faith-based health facilities from local dispensaries through county referral hospitals order from the Kenya Medical Supplies Authority (KEMSA) and the Mission for Essential Drug Supplies (MEDS). A few recent studies have documented instances of low NCD medicine quality in Kenya,[18,19] but to our knowledge no evidence exists on differences in quality between branded and unbranded generics in the country.

2.2 | Sample

The study was conducted in eight counties in Kenya in October and November of 2019, during the endline household survey for a cluster-randomized controlled trial evaluating the impact of *Novartis Access* (ClinicalTrials.gov registration number NCT02773095). A random sample of 639 participants was enroled at the start of the trial in 2016. Details of the sampling strategy have been published elsewhere.[20] Briefly, households were randomly selected in two stages of sampling. In the first stage, 80 census enumeration areas (10 in each county) were randomly selected with probability proportional to population size. In the second stage, 10 households were randomly chosen from within each enumeration area. Additional enumeration areas were randomly selected as needed to arrive at the target sample size for each county. All participants were at least 18 years old and had been previously diagnosed and prescribed treatment for one of four NCD conditions: cardiovascular disease (including hypertension, heart failure, and dyslipidemia), diabetes, asthma, or breast cancer. At the trial endline when data for this study were collected, 516 of the original participants remained enroled. Of those surveyed, all who had been prescribed at least one of three medicines—amlodipine (for hypertension), metformin (for diabetes), or salbutamol (for asthma)—were eligible to participate in the bidding game experiment. These three medicines were chosen because they were commonly prescribed in the study area and they were manufactured under the *Novartis Access* brand. Eligibility was determined prior to the endline home visit based on data collected at previous waves of the trial and through a telephone surveillance system.

2.3 | Study design

Eligible participants were assigned prior to the home visit to one of two groups for the bidding game experiment using a simple randomisation procedure within county strata. Participants randomized to the first group were presented with a prompt that described a *Novartis Access*-branded version of their prescribed medicine. Participants randomized to the second group were presented with a similar prompt that described an unbranded generic form of their prescribed medicine. After each prompt, participants in both groups were presented with the same bidding game questions.

2.4 | Prompts

Novartis Access: Participants were shown a picture of their medicine in a box with the *Novartis Access* brand (Figure 1) and were read the following script: "*Novartis Access* is a programme implemented by Novartis Pharmaceuticals to

FIGURE 1 Pictures presented in *Novartis Access* prompt. [Colour figure can be viewed at wileyonlinelibrary. com]

improve access to quality and affordable medicines for non-communicable diseases. I have in my hand a picture of a *Novartis Access* medicine which contains a 1-month supply of treatment for your NCD [show picture and indicate name of medicine]."

Unbranded generic: Participants were read the following script: "Please imagine that I have a box with a 1-month supply of [medicine name] to treat your NCD." No picture was shown and no brand was mentioned.

2.5 | Bidding game

All participants were presented with the same three-stage bidding game after the prompt. The bidding game method involves offering respondents a series of hypothetical offer prices and eliciting their willingness to pay each price. Subsequent offer prices are contingent on willingness to pay the previous offer price. For example, if the respondent is willing to pay the initial offer price, the next offer price is higher; if the respondent is not willing to pay the initial offer price, the next offer price is lower. At the end of the series, respondents are asked to indicate the maximum amount that they are willing to pay. The aim of the hypothetical price series is to guide the respondent towards the upper bound of their willingness to pay. This method has been used extensively in LMICs to elicit WTP for health products, including: community-based health insurance in Burkina Faso,[21] Nigeria,[22] and Bangladesh[23]; vaccines in Burkina Faso[24]; condoms in several countries in sub-Saharan Africa including Kenya[25]; and insecticide treated bed-nets in Nigeria.[26]

For this study, the initial offer price for both experimental groups was 100 Kenyan Shillings (KSh) [US$0.98] and was followed by an offer price of 50 KSh [US$0.49] for those who rejected the initial offer or 150 KSh [US$1.46] for those who accepted the initial offer (Figure 2). After the series of two hypothetical offers, respondents were asked to indicate their maximum willingness to pay in an open-ended format. Previous research conducted among rural communities in sub-Saharan Africa suggests that the three-stage bidding game format minimises complexity and elicits robust WTP estimates.[27] Overly complex bidding game designs can confuse participants and generate poor quality estimates.[28] The initial price was set at the price that *Novartis Access* intended for its medicines to be sold at and follow-up prices were selected to minimise complexity.

2.6 | Data collection

WTP data were collected during interviews conducted at households. Household demographic and asset data were collected during the same interviews. Data on medicine prices were collected in the same time period during visits to public and non-profit facilities in study counties that purchased medicines from the Mission for Essential Drugs and Supplies (MEDS). MEDS was main distributor of *Novartis Access* medicines in Kenya at the time of the study. WTP

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          ┌─────────────────────────────┐
          │ Are you willing to pay 100 KSh │
          │    for this box of medicines?  │
          └─────────────────────────────┘
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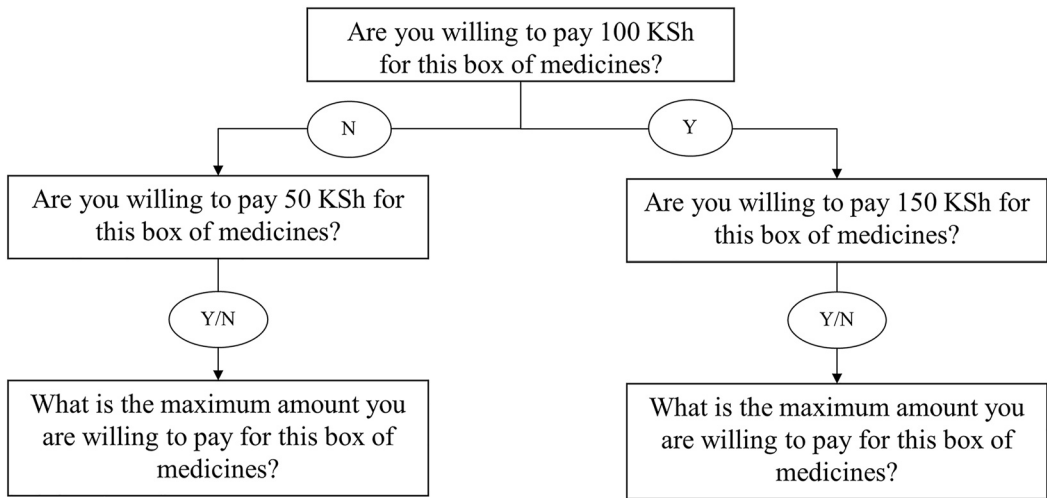

FIGURE 2 Description of bidding game questions.

and price data were collected in KSh. Around the midpoint of the study on 1 December 2019 the exchange rate was 102.5 KSh to 1 US dollar.[29]

2.7 | Variables

The main variable of interest is WTP for a 1-month supply of medicine, captured by the response to the final open-ended question of the bidding game. For analysis, we log transformed WTP estimates using natural log, ln (WTP), so that brand premiums estimated in regression models are interpreted as percent changes. Data on key demographics, including age, gender, marital status, and years of education, were collected during the same home visit. A wealth index was created based on household asset information collected at the trial baseline for all 516 respondents included at the trial endline. The selection of household assets was based on the 2014 Kenya Demographic and Health Survey.[30] Higher and lower wealth strata were constructed using the median wealth index score as the cut point.

2.8 | Analysis

First, we describe the study population, summarising demographics for all who participated in the trial endline and the subset that participated in the bidding game experiment, including stratified by experimental group. Then, we fit a series of linear regression models to estimate mean differences in ln (WTP) comparing the *Novartis Access* and unbranded generic groups, that is, the WTP brand premium for *Novartis Access* medicines. We estimate WTP brand premiums for the full experiment sample, for each medicine strata, and for higher and lower wealth strata. Finally, we summarise price data for *Novartis Access* and other generic versions of the three medicines of interest at public and non-profit health facilities in study counties. For all models, standard errors were adjusted to account for clustering. All analyses were conducted using Stata v14.

3 | RESULTS

In total, 185 of the 516 participants in the trial endline met the inclusion criteria for the experiment and agreed to participate. Of those, 14 respondents did not provide household asset information (eight from unbranded group;

TABLE 1 Demographics of study participants.

		Experiment			
	Trial endline (n = 517)	Full sample (n = 171)	Unbranded generic (n = 72)	Novartis access (n = 99)	p-value[a]
Age (years), mean (SD)	61.6 (16.3)	58.7 (15.4)	60.0 (15.5)	57.8 (15.3)	0.359
Female, n (%)	385 (74.5)	122 (71.4)	50 (69.4)	72 (72.7)	0.642
Married, n (%)/	330 (63.8)	119 (69.6)	46 (63.9)	73 (73.7)	0.169
Completed primary school, n (%)	241 (46.6)	93 (54.4)	38 (52.8)	55 (55.6)	0.721
Household wealth index, mean (SD)	0.0 (1.0)	0.1 (1.0)	0.1 (0.9)	0.1 (1.1)	0.749
NCD					
Hypertension, n (%)	390 (75.4)	92 (53.8)	39 (54.2)	53 (53.5)	0.935
Diabetes, n (%)	125 (24.2)	76 (44.4)	31 (43.1)	45 (45.5)	0.757
Asthma, n (%)	114 (22.1)	71 (41.3)	31 (43.1)	40 (40.4)	0.730
Heart failure, n (%)	17 (3.3)	1 (0.6)	0 (0.0)	1 (1.0)	0.395
Dyslipidemia, n (%)	11 (2.1)	4 (2.3)	3 (4.2)	1 (1.0)	0.180
Trial intervention group, n (%)	275 (53.2)	84 (49.1)	38 (52.8)	46 (46.5)	0.418
Medicine presented in bidding game					
Amlodipine	-	38 (22.2)	13 (18.1)	25 (25.3)	0.530
Metformin	-	64 (37.4)	28 (38.9)	36 (36.4)	
Salbutamol	-	69 (40.4)	31 (43.1)	38 (38.4)	

[a]Based on comparison of experimental groups, unbranded generic and *Novartis Access*.

six from *Novartis Access* group) and were excluded from the analysis. Table 1 describes the full endline sample and the 171 respondents included in the main model, overall and stratified by experimental group. Participants in the experiment were more likely to have diabetes and asthma than those in the full trial sample and less likely to have hypertension. Within the experiment sample, participant characteristics were well balanced across the two groups. Participants were on average 58.7 years old. Nearly three-quarters (71.4%) were female and around half (54.4%) had completed primary school. Overall, 22.2% of participants in the experiment were presented prompts for amlodipine, 37.4% for metformin, and 40.4% for salbutamol.

Average WTP for a one-month supply of unbranded generic medicines was 131 KSh compared to 174 KSh for *Novartis Access* medicines (Table 2). Adjusting for respondent characteristics, WTP for *Novartis Access* branded medicines was 23% higher on average (95% confidence interval [CI]: 8%, 39%; $p = 0.009$) than for unbranded generics. The WTP brand premium for metformin was highest at 49% (95% CI: 16%, 80%; $p = 0.010$). Differences in WTP for branded versus unbranded generic amlodipine (β 33%; 95% CI: −8%, 74%; $p = 0.094$) and salbutamol (β 12%; 95% CI: −16%, 39%; $p = 0.338$) were not statistically significant. The WTP brand premium in the full sample was concentrated among respondents in higher wealth households, who were willing to pay 40% more on average (95% CI: 4%, 76%; $p = 0.033$) for *Novartis Access* medicines. Among respondents in lower wealth households, there was no difference in WTP for *Novartis Access* medicines compared to unbranded generics (β 4%; 95% CI: −30%, 39%; $p = 0.771$).

4 | DISCUSSION

We examined WTP brand premiums for generic medicines in Kenya using a bidding game experiment. The study produced three main findings. First, WTP for *Novartis Access* NCD medicines was on average 23% higher than for unbranded generic equivalents. Second, the estimated WTP brand premium was heterogeneous by type of medicine

TABLE 2 Mean difference in ln (WTP) comparing *Novartis Access* and unbranded generic groups.

	Unbranded generic Mean WTP (SD)	*Novartis access* Mean WTP (SD)	Mean difference in ln (WTP) unadjusted[a]		Mean difference in ln (WTP) adjusted[b]	
			β (95% CI)	*p* value	β (95% CI)	*p* value
Full sample	130.7 (82.6)	174.3 (173.1)	0.20 (−0.06, 0.47)	0.113	0.23 (0.08, 0.39)	0.009
Medicine						
Amlodipine	153.8 (124.9)	176.0 (170.9)	0.01 (−0.43, 0.45)	0.960	0.33 (−0.08, 0.74)	0.094
Metformin	112.5 (51.9)	166.9 (165.9)	0.30 (−0.07, 0.66)	0.096	0.49 (0.16, 0.80)	0.010
Salbutamol	137.4 (83.1)	180.3 (185.2)	0.21 (−0.16, 0.58)	0.218	0.12 (−0.16, 0.39)	0.338
Household wealth						
Lower wealth	123.4 (71.0)	135.6 (92.5)	0.09 (−0.21, 0.39)	0.508	0.04 (−0.30, 0.39)	0.771
Higher wealth	138.8 (94.4)	204.1 (211.7)	0.25 (−0.21, 0.70)	0.239	0.40 (0.04, 0.76)	0.033

Abbreviations: CI, Confidence interval; WTP, Willingness to pay.

[a]Controls: medicine presented.

[b]Controls: medicine presented, diseases, age, gender, marital status, education, household wealth, trial group.

and was highest for metformin and was not statistically significant for amlodipine and salbutamol. Third, the WTP premium for the *Novartis Access* brand was driven almost entirely by wealthier consumers. The relatively low WTP premium for salbutamol appears to be explained in large part by wealth; respondents with asthma were predominantly in the lower half of the wealth distribution.

Our findings have important implications for efforts to improve access to essential medicines and universal health coverage in LMICs like Kenya. Consumer preferences for branded forms of generic medicines have been found in many settings and are usually based on perceptions of quality.[7,10,31] One previous study found that consumers were not willing to pay brand premiums for generic medicines in Switzerland, likely due to a lack of concern about medicine quality in the country.[32] To our knowledge, no previous studies conducted in LMICs have directly examined willingness to pay brand premiums for medicines. While consumers in LMICs often have good reason to be concerned about the quality of the medicines they buy, there is evidence that branded and unbranded generics available in these markets are generally of equal quality.[7,10,33] If the quality of branded and unbranded generics in Kenya is indeed equal, then the WTP brand premiums found in this study may constitute a market failure that generates consumer and social welfare losses and the government could be justified in intervening to advance the public interest. Several policy levers might be used to shift medicine availability and consumer demand from branded to unbranded generics, for example, through medicine registration and procurement practices, price regulations, advertising regulations, public sensitisation including efforts to increase trust in regulatory agencies and measures, and prescriber training programs and incentive schemes.[34]

Manufacturers of branded generics might also play a role in improving access in LMICs. *Novartis Access* is a social program designed to provide affordable generic medicines by offering them a reduced wholesale price. This type of price subsidy, if passed through to consumers, could mitigate negative effects that branding might have on access. Based on data collected from public and non-profit facilities in study counties at the time of the WTP experiment, prices of *Novartis Access* medicines were nearly identical to prices of other branded generic equivalents (see Table S1). However, fewer than 10% of facilities had unbranded generic forms of the medicines of interest in stock, and we are not able to estimate brand premiums with the precision necessary to draw meaningful conclusions.

Poorer consumers were not willing to pay a premium for *Novartis Access* medicines. This suggests that the dominance of branded generics in Kenya is driven by the preferences of wealthier patients and may disproportionately burden poorer patients. The higher price of branded generics already disadvantages the poor from an affordability perspective, that is, in their ability to pay. To the extent that willingness to pay captures an aspect of demand that

differs from ability to pay,[35] the poor being forced to pay higher prices for branded medicines that they find to be of no extra value also limits their access from an acceptability perspective.

This study had important limitations. First, respondents who were aware of *Novartis Access* at the time of the study may have been influenced by knowledge of the program's price subsidies when stating their WTP. However, participants in the *Novartis Access* trial were blinded to their treatment status and in practice very few medicine outlets in the study area had *Novartis Access*-branded medicines available during the trial and up to the time of this experiment. Indeed, only 5% of respondents reported having heard of *Novartis Access* outside of it being mentioned by study staff and only two respondents reported having previously purchased *Novartis Access*-branded medicines. Removing those respondents from the analysis had no substantive effect on the results. Second, our methodology relied on hypothetical rather than real scenarios, which previous research suggests may have led to an overestimation of WTP.[36] Third, the bidding game method has been shown to exhibit starting point bias and we cannot rule it out here.[37] Around three-quarters of respondents in both experimental groups stated a final WTP higher than the 100 KSh starting point; we might expect starting point bias to lead us to underestimate WTP in both groups and similarly to underestimate the difference in mean ln (WTP) between the groups, that is, to bias toward the null. Finally, we are unable to examine reasons for the observed higher WTP for the *Novartis Access* brand. Among the small number of participants that had previously heard of the program, two-thirds indicated that they believed *Novartis Access* medicines were of higher quality than other medicines, but we do not have the data to determine whether WTP responses were influenced by perceptions of quality or other factors.

5 | CONCLUSIONS

WHO has established a target as part of the Global Action Plan for the Prevention and Control of NCDs of 80% availability and affordability for essential medicines.[38] Expanding the supply of low-cost generic medicines in LMICs is important to achieving this target. To our knowledge, this is the first study to formally estimate WTP brand premiums for generic medicines in LMICs, a topic of growing importance. WTP studies have the potential to improve understanding of patient preferences for medicines. Our results contribute to ongoing discussions related to global access to essential medicines and universal health coverage,[39] as well as a growing literature on WTP for essential health products in LMICs, including for vaccines,[40,41] malaria prevention,[42] clean water,[43] and nutrition products.[44] Our findings suggest that the dominance of branded generics in LMICs like Kenya reflect in part consumer preferences for these medicines. Governments and other health sector actors may be justified in intervening to improve access to these medicines and equivalent non-branded generics, particularly for the poorest patients who appear to have no preference for branded medicines.

CONFLICT OF INTEREST STATEMENT

PCR reports grants from Access Accelerated, Gilead Sciences, F. Hoffmann-La Roche, and Amgen outside the submitted work. ROL reports non-financial support from Novartis International AG, Gilead Sciences, and F. Hoffmann-La Roche outside the submitted work. VJW reports grants from Access Accelerated, Gilead Sciences, F. Hoffmann-La Roche, and Amgen outside the submitted work.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Participants provided written informed consent prior to study initiation. The study was approved by the Maseno University Ethics Review Committee in Kenya (protocol number MUERC/00461/17) and at the Boston University Medical Center Institutional Review Board in the United States (protocol number H-348730).

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SUPPORTING INFORMATION

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