All eyes on the price: An assessment of the willingness-to-pay for eyeglasses in rural Burkina Faso

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RESEARCH ARTICLE

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All eyes on the price: An assessment of the willingness-to-pay for eyeglasses in rural Burkina Faso

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Abstract

Vision impairment is the most common disability worldwide and it is untreated in large parts of the developing world. We assess the willingness-to-pay (WTP) for eyeglasses among adults in a resource-poor rural setting. We elicit the WTP using the Becker-DeGroot-Marschak (BDM) method. We combine this approach with a layaway scheme and a video intervention to probe to what extent liquidity constraints and information influence the WTP. Our results show that the average WTP is close to the cost of production for corrective glasses. Nevertheless, we find evidence for information constraints. Our video intervention raises the WTP for corrective glasses by 16 percent. We do not find evidence of screening effects, that is after 6 months, use is unrelated to the initial WTP.

KEYWORDS
Burkina Faso, demand, glasses, information, willingness-to-pay

JEL CLASSIFICATION
C93, D12, D83, I11, O12

1 | INTRODUCTION

Vision impairment is the most common disability worldwide. At least every third person in the world suffers from refractive error (Bourne et al., 2017; Fricke et al., 2018; Holden et al., 2016). The two most frequent types are myopia (nearsightedness) and presbyopia (age-related farsightedness).[1] Both are expected to surge in the near future. Lifestyle changes and population aging are the main drivers of this trend (Bourne et al., 2017; Holden et al., 2016; Morgan et al., 2012).

Holden et al. (2016), for example, estimate that by 2050 myopia alone will increase more than threefold, affecting 4.8 billion people (50% of the world's population by then). The increase in myopia is to a large extent driven by a combination of decreased time outdoors and an increase in near-work activities, especially digital screen time (Morgan et al., 2012). At the same time, refractive error is easily and completely treatable. Ready-made glasses are an inexpensive and effective way to address the problem. Yet, of the 1.8 billion people suffering from presbyopia over 45% do not have adequate correction (Fricke et al., 2018). The burden of uncorrected refractive error is particularly high in middle- and low-income countries. While in Western Europe and North America the prevalence of uncorrected refractive error is less than 1%, in sub-Saharan Africa it is around 87% (Fricke et al., 2018). There are a number of potential supply and demand factors that may explain why people do not use glasses including poor information and awareness, limited accessibility and affordability problems.

Uncorrected refractive error limits people in their day-to-day activities, and is associated with a lower quality of life (Bekibele & Gureje, 2008; Goertz et al., 2014; Laviers et al., 2010; Patel et al., 2006). In a study in rural Tanzania, between 30 and 50% of respondents reported having difficulties performing agricultural tasks such as winnowing grain, sorting rice or grain, weeding, and harvesting sorghum–tasks that are at the core of their livelihood (Patel et al., 2006). A study by Reddy et al. (2018) shows that glasses indeed have positive effects on income. In a randomized controlled trial with tea pickers in India, who are paid on a piece rate, they find that glasses increase productivity by 39%. Globally, estimates suggest that each year USD 269 billion is lost in productivity due to the lack of glasses (Frick et al., 2015; Naidoo et al., 2019).[2]

In this article, we study the demand for low-cost eyeglasses distributed by the nongovernmental organization (NGO) GoodVisionGlasses (GVG) in Burkina Faso, West Africa. Our aim is to inform pricing and subsidy policies for eyeglasses in a resource-poor setting. We relax the supply-side constraint by visiting villages and offering free vision screenings. We use a Becker-DeGroot-Marschak (BDM) bidding process to study the demand for glasses in this context. A randomized video intervention and a layaway scheme allow to examine the role of information and liquidity constraints. Liquidity constraints refer to a situation where the participant lacks the cash to pay for glasses within a short period of time. We provide two types of glasses: corrective ones and sunglasses for cataract patients. We concentrate our discussion on the results for corrective glasses as sunglasses do not serve a curative purpose in our setting and are also much more widely available. Six months after the bidding event, we revisited a sub-sample of the study participants to assess their satisfaction with the corrective glasses and their usage behavior.

We concentrate on information and liquidity constraints as other factors such as distrust and suspicion about the product, which have been reported in other contexts, are less relevant in our setting. In contrast to evidence from China, where there is a strong and persistent belief that eyeglasses worsen refractive error (Ma et al., 2020), data collected as part of this study indicates that less than two percent of the people in our context think that eyeglasses have negative effects. Generally, eyeglasses are well accepted in our context and even seen as a status item signaling knowledge and wealth.[3]

Our results show that there is a sizable demand for glasses. Three-quarters of the bids come at least close to a price that covers 80% of the production costs. The video intervention, increases WTP for corrective glasses by 16% suggesting that information matters. In our case, and in contrast to the work by Ashraf et al. (2013), Dupas (2011) and Jensen (2012) who also focus on health products, we find that information even works in isolation, that is even without a built-in price subsidy. In contrast, our layaway scheme was unsuccessful and could not increase uptake. Revisiting those who had taken up eyeglasses after 6 months revealed a high level of satisfaction among the users. There is also suggestive evidence of an increased WTP. Yet, overall use of eyeglasses is low and uncorrelated to the initial WTP.

Our contribution lies in estimating the demand for eyeglasses in a resource-poor and still underserved setting. We add to the literature on demand and pricing policies of eyeglasses in low-income countries, which is still small in volume. Laviers et al. (2010) measured the WTP for eyeglasses in Zanzibar, and found an average price of USD 2.17 (Laviers et al., 2010). In Rwanda, figures range between USD 3 and 15 (Glewwe & Schaffer, 2014). Both studies relied on self-reported information. Hence, the figures might be upward-biased. Our contribution is to use an incentive-compatible approach to elicit the WTP. We also contribute to the increasing literature which applies the BDM approach to elicit the WTP for healthcare products and health related technologies in low-income country contexts (Berry et al., 2020; Grimm et al., 2020; Guiteras et al., 2016). Furthermore, we also contribute to the literature on the role of liquidity constraints and information vis-à-vis the WTP (Beltramo et al., 2015; Devoto et al., 2012; Grimm et al., 2020; Tarozzi et al., 2014). Thus far, work on the WTP concentrated on preventative healthcare products such as insecticide-treated bed nets (ITNs), water treatment, and improved cooking stoves (Ahuja et al., 2010, 2015; Ashraf et al., 2010; Bates et al., 2012; Beltramo et al., 2015; Cohen & Dupas, 2010; Cohen et al., 2015; Devoto et al., 2012; Dupas, 2014; Tarozzi et al., 2014). Studies show that the WTP for such products is low (see, e.g., Berry et al. (2020) for a study on water filters in Ghana). Furthermore, they also indicate that for preventive healthcare products small fees lead to drastic reductions in uptake (Ahuja et al., 2015; Bates et al., 2012; Cohen & Dupas, 2010; Dupas, 2014), strengthening the case for the free distribution of these products. On the other hand, Beltramo et al. (2015) and Tarozzi et al. (2014) show that time payments and micro-consumer loans lifting liquidity constraints can have positive effects on the WTP and uptake of fuel-efficient cooking stoves and ITNs respectively. Only a few studies focus on information constraints and uptake, for instance in relation to voluntary health insurance (Bocoum et al., 2019) or cooking stoves (Beltramo et al., 2015).

We also contribute to the broader discourse on eye health in middle- and low-income countries and to encouraging the take-up of eyeglasses. Social benefits might arise if corrected vision helps reduce the risk of accidents, especially road traffic accidents, enhances workers' productivity as the studies by Frick et al. (2015), Naidoo et al. (2019), Reddy et al. (2018) and Smith et al. (2009) suggest and raises educational outcomes as shown by Glewwe et al. (2016). So far, we are still lacking a good understanding of the productivity effects and hence they do not yet find consideration in pricing policies for eyeglasses.

The paper proceeds as follows. The next section provides a brief conceptual framework that guides our empirical analysis. Sections 3 and 4 describe the study design and the data. Section 5 presents the empirical results, and Section 6 concludes.

2 | CONCEPTUAL FRAMEWORK

This framework aims to guide our empirical analysis and outlines how we think about different factors influencing the WTP for glasses.

2.1 | Information constraints and the WTP for glasses

We assume that an individual who has been screened and diagnosed with a vision impairment (the "consumer" hereafter) has initial expectations about the benefits of corrective glasses (the "product" hereafter). We further assume that these benefits are positively correlated with the price that the consumer is willing to pay. Glasses are an experience product. Hence, we also assume that the consumer is not fully informed about the product, and thus does not know the true benefit of it or doubts the claims of the vendor. Such a lack of information can drive a wedge between the market price and the WTP. We expect that consumers rather underestimate than overestimate the benefits. Formally, this can be presented by a factor γ with $0 < \gamma < 1$ with which the consumer discounts the market price p^*. The WTP in the presence of an information constraint p^{ic} would thus be defined as $p^{ic} = \gamma p^*$. Hence, lifting the information constraint, and abstracting from any other constraint including affordability, would imply that γ approaches 1, narrowing the gap between the WTP and the market price.[4]

2.2 | Liquidity constraints and the WTP

Previous research has shown that lifting liquidity constraints through microloans and time payments can have a positive effect on the WTP and product uptake (Beltramo et al., 2015; Devoto et al., 2012; Tarozzi et al., 2014). We believe the same will apply in our context as most people are rather poor and have typically only little cash. But even richer people may accumulate their wealth in the form of land, livestock or consumer durables, which are all assets which are difficult to liquidize at a short notice, and hence even for them relaxing the liquidity constraint through a deferred payment could increase their WTP for glasses. Abstracting from liquidity, we expect that income and wealth more generally will lead to an increase in the WTP as richer people can easier afford glasses.

2.3 | Other factors explaining heterogeneity in the WTP

Apart from information, liquidity constraints and wealth, we expect that a number of other factors also influence the WTP. Better educated consumers, for example, should demonstrate a higher WTP. This can be driven by a variety of underlying factors: We might expect literate consumers to have better (access to) information. Furthermore, the potential gain from vision correction should be higher for a literate person than for an illiterate person if the vision impairment reduces the ability to read. More generally, the WTP should increase in the expected productivity effect and income gains that come with a vision correction. Glasses may allow the consumer to work more hours, increase the speed of production, reduce errors, and thus improve the quality of their work or product–which might result in higher prices, sales, and ultimately income. Hence, occupation should influence the WTP. Related to this latter point, we would also expect that the degree of vision impairment matters for the WTP. Consumers who require major correction might be willing to pay more for glasses. Similarly, consumers who have experienced eye infections and related illnesses in the past, for which they might also have incurred healthcare costs, might be willing to pay more for glasses if they expect the incidence of illness and costs incurred to diminish from wearing glasses. Finally, we expect a positive relationship between the expected quality of the eyeglasses, especially the durability, and the WTP.

3 | STUDY DESIGN

3.1 | Context

This study was conducted in 21 villages in the department (county) of Kaya. Kaya is the seventh largest city in Burkina Faso, located in the Center North region of the country about 100 km northeast of the capital Ouagadougou. The department covers seven urban sectors and 71 villages, and has a total population of 117,122 (INSD, 2016). There is no major industrial activity in Kaya. The department is dominated by subsistence agriculture and livestock production, and is relatively poor. In 2014, some 47% of the population lived below the national poverty line. This is seven percentage points above the national average (INSD, 2016).

We chose this site because GVG, with whom we collaborated for this study, was in the process of launching their activities there and up to that date access to glasses in the area was limited. Apart from GVG only one other shop in Kaya sold eyeglasses.

GVG provides low-cost glasses in Burkina Faso (see Figure A1). The aluminum frame of the GVG glasses is produced locally in the NGO's own workshops, providing employment particularly to people with special needs. Lenses are imported, and fitted into the frames at the point of sale. At the time of our study, the NGO sold the eyeglasses at a price of USD 8.55 (XOF 5000).[5] This price is composed of production costs of USD 2.05 (XOF 1200) and overheads of USD 6.5 (XOF 3800), mainly costs for logistics, distribution and the screening.

There are no national statistics on eye health and vision impairment in Burkina Faso. Yet, a study from the Center West region provides some insights into the prevalence of vision impairment locally. Among the population surveyed who were aged 50 and older, the prevalence of moderate to severe impairment was 14.5%. The most common causes hereof were refractive error and cataracts. The study reports that 27% of those impaired had a pair of glasses, but it does not provide any information on whether the glasses also had the correct lens strength (Ministry of Health of Burkina Faso, 2014). In our study, about 30% of the people who attended the vision screening were in need of glasses. Only those in need of glasses could participate in the WTP experiment.

3.2 | The willingness-to-pay experiment

The fieldwork for this study took place from October to November 2017. In this period, we offered free eye testing in selected villages with an opportunity to purchase glasses thereafter. We informed village residents about this opportunity two to three days prior to our visit using village criers–traditional information custodians used for publicizing and sharing information in this context. The public announcements which were repeated at least three times prior to the event, informed villagers that the event consisted of a free vision screening with the opportunity to purchase glasses thereafter. There was clear communication that glasses were for sale only and not distributed for free as a result of the event. Hence, there should not have been any expectation on free distribution of eyeglasses depressing the demand. All people that presented themselves on the day received a free eye test.[6] Participants were informed about the screening results, whether they required a vision correction, and if so, were randomly assigned to treatment and control groups (Figure 1 below). The sample consisted of four groups, with roughly 25% of the sample in each receiving either no treatment, one of the two possible treatments (i.e., further information or the layaway offer), or a combination of both.

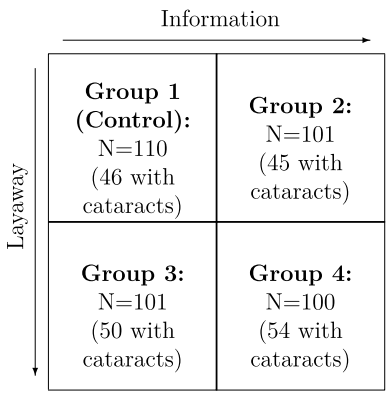


FIGURE 1 Treatment groups and number of observations (N)

The information treatment consisted of a three-minute video showcasing people wearing corrective glasses in different situations of day-to-day life. The video also included accounts of five people narrating their experience with glasses.[7] The personal statements included in the video were positively framed. The video was intended to give people a better idea of the potential benefits of corrective glasses. The objective was to overcome the perceptions that glasses are harmful and useful only for reading. The personal statements made these points more salient and reinforced the idea that glasses can have multiple, not only work-related, benefits. They matter for other aspects of life too, such as schooling, general well-being, and independence.

The second intervention was a zero-interest layaway. Half of the participants were offered the option to pay for the glasses in two installments. The first installment was set at 25% of the purchase price, and was due on the day of the village event. The remainder (75%) was due one week later. The participant received the glasses only at this later stage, once the outstanding balance had been paid. If a participant was not able to pay, the 25% deposit would have been returned, yet this was not communicated to participants upfront. Hence, the scheme works as much as a credit as well as a commitment device. The motivation for this, potentially rather unusual, setup, was to give participants time to acquire funds either through short-term saving or informal borrowing. We opted for this low-cost intervention and decided against a microloan as in this context informal borrowing and transfers are common practice, especially for low amounts.

Following the diagnosis and treatment assignments, an enumerator received the participant. All participants were given a pair of glasses to try on and inspect in detail. Having the physical experience of vision correction coming from trying on glasses can also be a decisive moment in determining the WTP. Yet, and particularly with higher degrees of correction, people do not immediately feel comfortable with glasses. Participants had between 5 and 10 min time to try out the glasses before making their bid.

The enumerators then proceeded to elicit the WTP. Following the BDM approach, participants make a bid for the product, but can only purchase it if the stated price is at or above a randomly drawn transaction price. We opted for the BDM approach, because unlike self-reported WTP, it provides an incentive-compatible measure of the maximum WTP, which should reflect the participant's expected utility associated with purchasing the glasses. If participants overstate their reservation price, they have to buy the product at a price higher than their actual valuation. In contrast, by understating the reservation price, they miss the opportunity to purchase the glasses at a price less than or equal to their valuation. Another advantage of the BDM is that it yields more precise data compared to take-it-or-leave-it approaches, which only provide bounds. In contrast to Vickery second-price auctions, it prevents collusion between bidders because participants do not bid against each other but against a random price. Despite the advantages listed, the BDM approach has also been criticized for its complexity.[8] In this study, we carefully explained the bidding process to each participant. We made clear that bids are nonnegotiable and cannot be changed retrospectively. Enumerators inquired several times throughout the presentation whether there were any questions, and were instructed not to proceed until the participant understood the process. Moreover, we conducted at least two hypothetical practice rounds with a pack of rice. Responses to the practice rounds did not point to problems in understanding the task at hand. Participants were prompted to make their bid only after the practice rounds had been completed.

After the bid was made the enumerators asked a brief set of survey questions collecting information on the participant's socioeconomic background, vision problems and other health conditions, experiences with eyeglasses, and perceived advantages and disadvantages wearing them. We conducted the survey after the bidding, to avoid distorting effects on the participant's behavior. We set up our space so that participants could not communicate with each other until they had made their bid and completed the survey. Furthermore, to avoid strategic bidding influencing our results neither the enumerators nor participants were informed of the price range in the draw or the market price of the glasses. The transaction price was drawn at the village level in the presence of all participants, after all interviews had been finalized. Although doing this might undermine the inherent incentive compatibility of the BDM approach, it nevertheless helps avoid social tensions that could arise if participants within the same village end up having to pay different prices for the same product. Prices in the draw ranged between XOF 400 to 2500, thus well below GVG's usual ‘market’ price. The intention was to end up with enough successful bidders. The draw was changed whenever we went to a new village. The drawn price applied to corrective and sunglasses alike. All participants were asked for their informed consent to participate in the bidding experiment and the survey. Authorization from the Ministry of Health of Burkina Faso had been obtained prior to the undertaking of the study.

3.3 | Sample selection and composition

In all 21 villages we promoted the vision screening intensively and then villagers selected themselves into the screening. This procedure worked well and could serve as a blueprint to roll out vision screening at large. Below we compare the characteristics of those who showed up and were enrolled in the experiment and the general population (see Section 4). In total, we had 412

participants aged 16 and older, which we randomly assigned to one of the four groups. These 412 participants correspond to 30% of the population attending the screening. Given that a large number of the participants who were tested (47%) suffered from cataracts we prescribed two types of glasses, depending on the diagnosis: corrective ones (217 participants) and sunglasses (195 participants). We offered patients with cataracts glasses with tinted lenses (sunglasses), in very few cases combined with dioptric adjustments. Sunglasses do not improve vision–this can only be done through an operation–but they increase comfort, because they reduce glare and strain imposed on the eye.

With a sample of 400 participants we have a power of 0.99 to detect a 15% difference in the WTP. With the reduced samples of 217 and 195 participants, we have a power of 0.9 and 0.87 for corrective glasses and for sunglasses respectively. Since the two products cater for different populations, we present the results for each type of glasses separately. While the layaway scheme might fulfill the same function for people with refractive error and for cataract patients, the video might not speak to them in the same way. The video was targeted at people regaining full sight by wearing glasses. It was not aimed at cataract patients, and did not make any reference to sunglasses or the pathology of cataracts. Therefore, we did not expect the video intervention to have any influence on the cataract patients. This circumstance can later be used as a placebo treatment to check the robustness and plausibility of the treatment effects estimated in association with the video treatment.

3.4 | Follow-up survey and measuring use

Six months after the experiment, we made an attempt to re-interview all participants who had received corrective glasses following the BDM bidding game (171 participants). We managed to re-interview 76% of them.[9] We discuss a potential bias due to attrition in Section 5. We conducted this follow-up in order to get a better understanding of people's experiences with glasses. More precisely, we were interested whether and how participants used the glasses and how they evaluated them after having had time to test them extensively. The follow-up was unannounced, which is one reason why attrition is high. We did so to measure whether participants were typically wearing their glasses. In addition to that, we also asked participants how many days during the past week they had worn their glasses. Obviously, this is an imperfect measure because it does not inform about the intensity of use. We tested a range of questions and combinations. This one still turned out to be most adequate. We also recorded information on the current condition of the glasses, the level of satisfaction with them, and on ways in which the product could be improved. Furthermore, we asked a brief set of questions on the perceived benefits and the impact of the glasses vis-à-vis their day-to-day lives.

Obviously, given the reduced sample size, this subsample has less power. Under standard assumptions ($\alpha = 0.05$, power = 0.8), with a sample of 130 participants we are able to detect differences in use of only 0.6. This represents 18% of mean use (sample mean was 3.5).

4 | DATA

Table 1 below shows balance tests and summary statistics for each group. We test for equality of means between the control (Group 1) and all three treatment groups (Groups 2–4). The respective *p*-values are reported in Column 5. Overall, the randomization was successful. There is just one significant difference: participants in the control group are more likely to require more than two diopters correction.

We have more males than females in our sample (60% vs. 40%). The average participant is 58 years old. Eighty-four percent of the participants are married and live in rather large households of 12 or more persons. Literacy levels are low. Less than 20% can read and write. They are predominantly subsistence farmers (70%). The average monthly income (not shown in Table 1) of those who even have a wage income (81%) amounts to USD 47.86 (XOF 28,000). Households have little to no access to banking services. We proxy household wealth with vehicle ownership–an indicator which has been found to be a reasonable proxy of household wealth and which allows to differentiate at least rich from poor households. Thirty-two percent of our participants do not own any vehicle, 30% own a bicycle, and the remaining 38% own at least a motorcycle.[10] Most of our respondents that were diagnosed with a vision impairment were aware that they had a vision problem (87%). None of the study participants, especially those with refractive error, owned corrective glasses before. Other eye-related problems are also common. Almost every second participant has already suffered from an eye infection at least once. About 12 percent repeatedly suffer from other eye problems, such as trachoma, dry, or watery eyes. We also asked our participants how much they think the glasses would cost if they were to buy them on the market. Even though we made no reference to the actual price, people have, at least on average, a good idea of the market price. The mean estimate is USD 10.15 (XOF 5940), which is not far from the actual market price.

TABLE 1 Summary statistics and test of balance

Variable	Group 1	Group 2	Group 3	Group 4	*p*-value[a]
Sex (Male = 1)	0.64	0.58	0.59	0.57	0.33
Age (years)	57.62	57.27	58.27	56.88	0.93
Married (=1)	0.86	0.84	0.80	0.84	0.38
Mossi (=1)	0.95	0.94	0.95	0.96	0.86
Moslem (=1)	0.65	0.67	0.66	0.65	0.88
Literate (=1)	0.19	0.16	0.16	0.17	0.49
Chronic illness (=1)	0.34	0.30	0.23	0.27	0.16
Subsistence farmer (=1)	0.68	0.69	0.73	0.77	0.32
# of hh members	12.12	12.96	12.18	12.77	0.54
No bank account (=1)	0.78	0.72	0.70	0.79	0.37
Has at least a motorcycle (=1)	0.41	0.36	0.39	0.36	0.44
Has only a bicycle (=1)	0.26	0.33	0.29	0.35	0.26
Has no vehicle (=1)	0.33	0.32	0.33	0.29	0.76
Aware of vision problem (=1)	0.87	0.83	0.88	0.89	0.89
High correction (≥+/−2 diopters)	0.25	0.13	0.14	0.14	0.01***
Had eye infection (=1)	0.45	0.47	0.42	0.45	0.97
Other eye problem (=1)	0.10	0.12	0.16	0.10	0.47
Estimated market price (in USD)	8.05	10.28	10.94	7.71	0.40
No market price estimate (=1)	0.18	0.08	0.16	0.14	0.15
Expected durability of glasses (months)	25.73	24.56	24.14	20.83	0.30
N	110	101	101	100	

[a]Mean in Group 1 versus Mean over Groups 2, 3 and 4.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

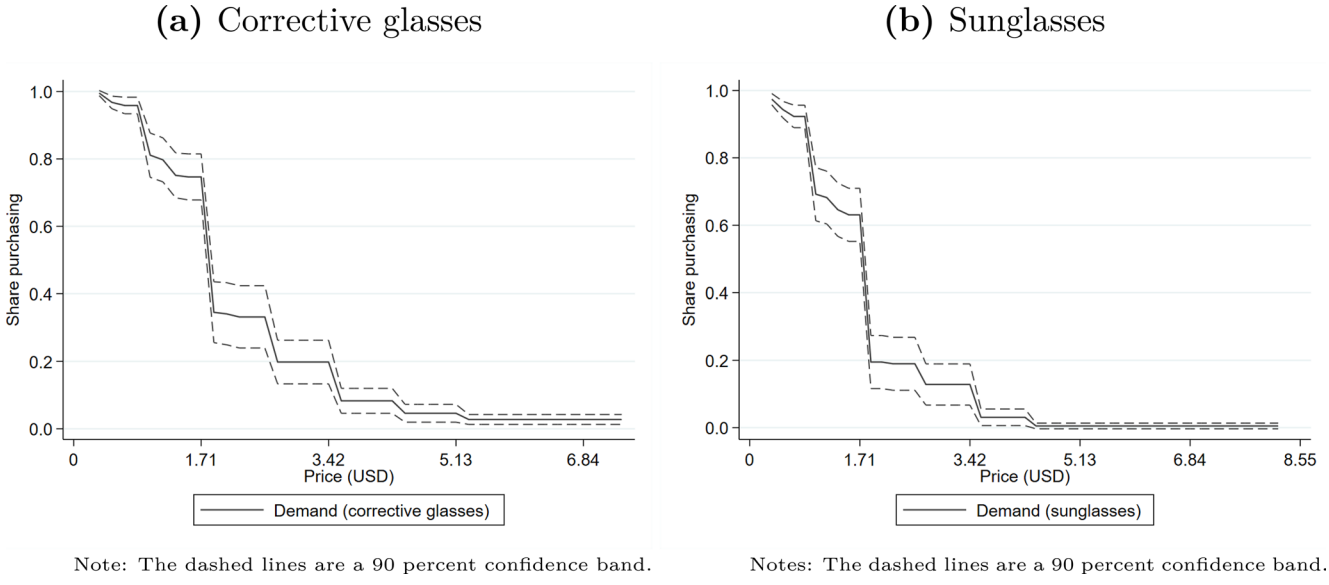
There is, though, substantial dispersion around the mean, and 14% were unable or refused to provide an estimate. Participants expected that the glasses will last for about 2 years.

Since we collected characteristics only of those enrolled in the experiment, that is those which were diagnosed with a vision impairment following the screening, the results refer to 30% of those attending the screening. Hence, there are two selections, first the selection into the screening and, second, the selection into the group with a vision impairment. Ideally, our sample would be representative for the group with a vision impairment in the general population. Yet, this cannot be verified as no representative data exists. Nevertheless, we compared our sample to the general adult population in the Sanmatenga Province (the province in which the municipality of Kaya is located) sampled in the 2014 *Enquête Multisectorelle Continue*, which is a nationally representative survey (Table A2 in the Appendix). This comparison shows that in contrast to the average population, our sample has a higher share of men, our participants are about 20 years older than the regional average, suffer more frequently from chronic illnesses and are more often in polygamous unions with a larger household size. Economically, they also appear poorer as they have for instance a lower level of vehicle ownership. Taken together, our results may be considered a conservative lower-bound estimate of the WTP.

5 | RESULTS

5.1 | The willingness-to-pay for eyeglasses

Figure 2 below shows the inverse demand curves by type of glasses. The average bid is USD 2.16 (XOF 1263) for corrective glasses and USD 1.7 (XOF 995) for sunglasses.[11] The means are statistically different at the 11% level. The average over the full sample is USD 1.94 (XOF 1136). Figures 3 and 4 show in addition the average WTP for each treatment group and by type of glasses. Three-hundred and ten participants (75.2%) made bids at or above the randomly drawn transaction price. Of the 310, 171 needed corrective glasses; the remaining 139 suffered from a cataract. All participants who made a bid at or above the



Note: The dashed lines are a 90 percent confidence band.

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FIGURE 2 Demand for corrective glasses and for sunglasses [Colour figure can be viewed at wileyonlinelibrary.com]

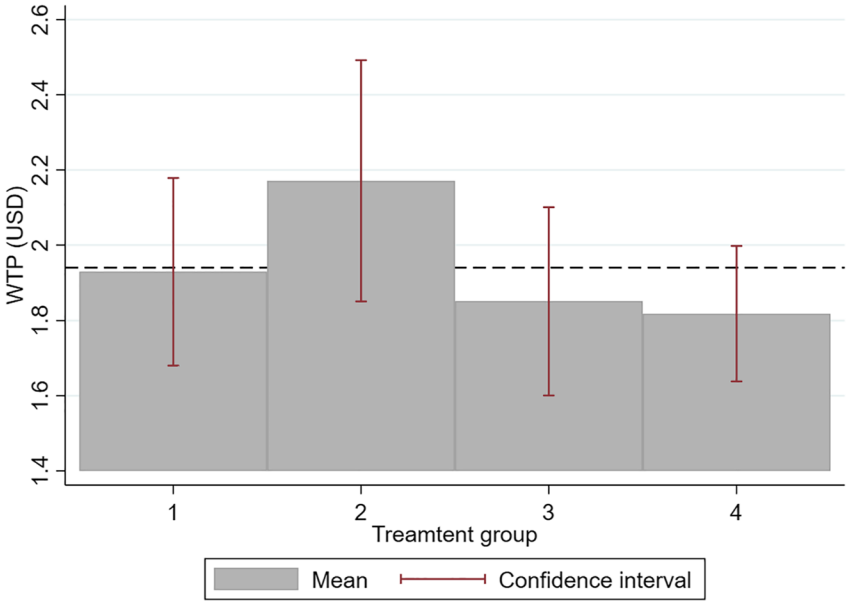

FIGURE 3 WTP by treatment group [Colour figure can be viewed at wileyonlinelibrary.com]

drawn price complied with the rules of the auction and bought the glasses at the drawn price. Therefore, we have no reason to believe that there was strategic bidding and that the bids did not represent the actual WTP.

There are several features of the inverse demand curves worth mentioning. First, the demand for corrective glasses is higher than that for sunglasses. Both demand curves are universally positive. In total 99% of participants bid at least USD 0.17 (XOF 100). The WTP is large relative to the direct costs of production. Our results suggest that about three quarters of our study population in need of vision correction would take up eyeglasses at a price of USD 1.71 (XOF 1000), which corresponds to about 80% of the production costs. The curves show that there is a bunching of the bids with high frequencies at USD 0.85 (XOF 500) and USD 1.71 (XOF 1000) in particular, but also at multiples of XOF 500. The XOF 500 and 1000 bank notes are dominantly used, which might explain the high frequency of bids at these values.

5.2 | The effect of information and the layaway option

To assess the effect of our information and layaway treatments, we use the following regression framework. We use this framework also to explore the correlation between individual characteristics and perceptions and the WTP:

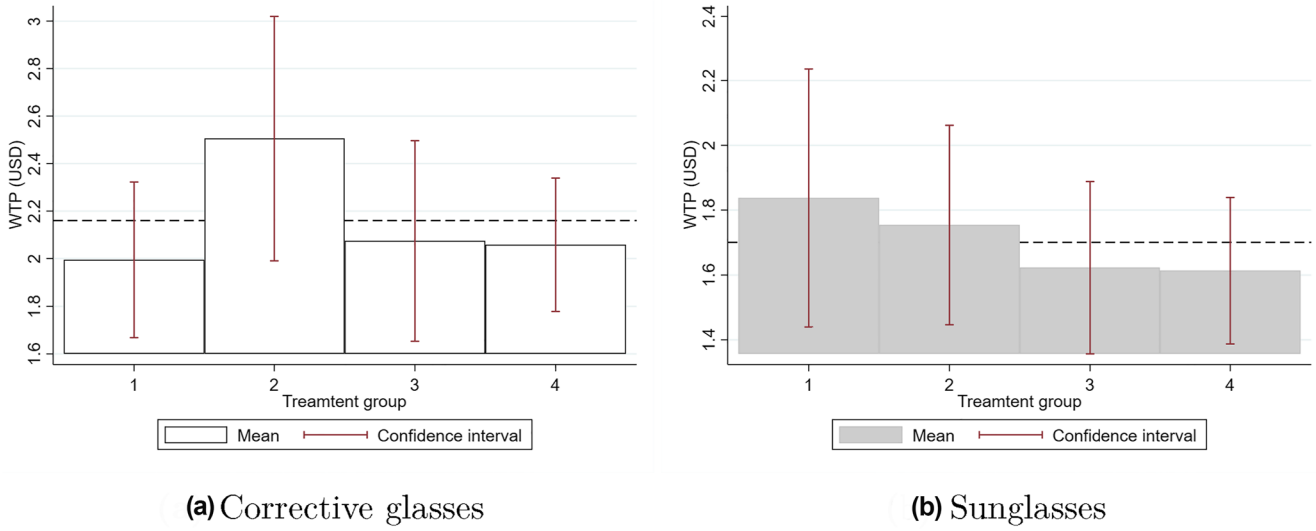

FIGURE 4 WTP by group and type of glasses [Colour figure can be viewed at wileyonlinelibrary.com]

$$WTP_{ij} = \alpha_0 + \alpha_1 V_{ij} + \alpha_2 S_{ij} + \alpha_3 V_{ij} \times S_{ij} + X'_{ij}\beta + \epsilon_{ij} \quad (1)$$

The dependent variable is the bid of individual i in village j. Since the bids are positively skewed, we estimate Equation (1) in levels and, alternatively, in logs. V is a binary variable indicating whether the participant was exposed to the information video. S indicates if the participant was offered the layaway option. We also include the interaction term to assess possible complementarities, yet given that we are limited in power, we might not be able to precisely estimate this effect. Yet, following Muralidharan et al. (2020) we report the interaction effect for completeness. The vector X'_{ij} includes socioeconomic background characteristics of the participant and covers gender, age, marital status, literacy, chronic illness prevalence, occupation, household size, access to formal finance, and vehicle ownership. Furthermore, we include a binary variable indicating whether the participant was aware of his or her vision impairment, the degree (in case of refractive error), and whether he or she suffered from eye infections or other eye problems in the past. Finally, we also include two variables measuring perceptions: one with respect to the actual price of the product and one with respect to the durability of the glasses.[12] ϵ_{ij} is the error term.

We estimate Equation (1) using OLS, and perform estimations for corrective glasses and sunglasses separately. In all regressions, we cluster standard errors at the village level. Table 2 below presents the results for corrective glasses. We focus in our discussion on corrective glasses. The results for sunglasses are presented in Table A4 in the Appendix. We first focus on the treatment effects. Column 1 reports the results in levels, Columns 2 and 3 in logs. The results suggest that the video has a positive effect on the WTP for corrective glasses. The video increases the WTP by USD 0.32. This result is statistically significant at the 10 percent level. In light of the small sample size we also calculate randomization inference-based p-values which still lead to a coefficient that is statistically significant at the 10 percent level (p-value of 0.1015). Using the log transformation on the bids, we find that the video raises the WTP for corrective glasses by 16%. This result is statistically significant at the five percent level. This also holds when applying randomization inference-based p-values (p-value of 0.0445). The video in turn has no effect on the WTP of participants who were diagnosed with a cataract (Table A4). Since the video was targeted at people with refractive error and does not make any reference to people suffering from cataracts, it does not come as a surprise that no effect is observed in this case. To the contrary, we interpret this like a placebo test. It shows that information content really matters and explains the positive effect in the case of corrective glasses.

The layaway option does not alter the WTP, neither for corrective glasses (Table 2) nor for sunglasses (Table A4). All coefficients are statistically insignificant. And indeed, none of the participants who were offered the option made use of it. Only four participants did seriously consider this option, but finally relied rather on a family member or neighbor who stepped in and payed for the glasses on the day of the auction. We conducted in-depth interviews ex-post to better understand what led participants to forgo the layaway. From the qualitative information, it is evident that participants were not willing to wait another week to get the product but preferred to have it immediately. This applied to both, participants with refractive error and with cataracts.

TABLE 2 Correlates of the WTP for corrective glasses

	WTP	ln(WTP)	
	(1)	(2)	(3)
Video (=1)	0.320*	0.163**	0.132
	(0.176)	(0.066)	(0.089)
Layaway (=1)	−0.234	−0.079	−0.112
	(0.151)	(0.078)	(0.112)
Video × layaway			0.072
			(0.152)
Sex (Male = 1)	0.232	0.086	0.080
	(0.236)	(0.095)	(0.092)
Age (years)	0.002	0.000	0.001
	(0.011)	(0.004)	(0.004)
Literate (=1)	0.502*	0.156	0.156
	(0.282)	(0.103)	(0.103)
Chronic illness (=1)	−0.180	−0.148	−0.149
	(0.186)	(0.089)	(0.091)
Subsistence farmer (=1)	−0.261	−0.066	−0.066
	(0.271)	(0.119)	(0.120)
No bank account (=1)	−0.639**	−0.294**	−0.296**
	(0.278)	(0.115)	(0.116)
Has at least a motorcycle (=1)	−0.183	0.035	0.037
	(0.211)	(0.092)	(0.095)
Has only a bicycle (=1)	−0.472**	−0.082	−0.079
	(0.201)	(0.091)	(0.095)
Aware of vision problem (=1)	−0.080	−0.045	−0.047
	(0.304)	(0.117)	(0.116)
Had eye infection (=1)	0.139	0.086	0.088
	(0.185)	(0.079)	(0.080)
Other eye problem (=1)	−0.040	−0.017	−0.019
	(0.281)	(0.106)	(0.106)
High correction (≥+/−2 diopters)	−0.211	−0.056	−0.0606
	(0.186)	(0.076)	(0.073)
Estimated market price (USD)	0.030***	0.010***	0.010***
	(0.010)	(0.003)	(0.003)
No market price estimate (=1)	0.351	0.104	0.102
	(0.329)	(0.123)	(0.124)
Durability (months)	0.001	0.001	0.001
	(0.004)	(0.001)	(0.001)
N	217	217	217
Adj. R-sq	0.250	0.188	0.185
Sample mean	2.16	0.58	0.58

Notes: Other covariates are marital status, ethnicity, religion and the number of household members. Wealth is captured through vehicle ownership. Households without a vehicle are the reference category. Standard errors (in parentheses) are clustered at the village level.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

When we include the interaction term (Column 3), the treatment effects keep their expected sign and do also not change much in terms of magnitude, yet they are individually no longer significant, including the interaction effect. We clearly lack power to identify precisely these effects. Yet, the positive sign of the interaction term suggests that the treatments may have complementary effects.

5.3 | Correlations between socio-economic characteristics, perceptions and the WTP

Now we explore the correlation between respondents' characteristics, perceptions and the WTP. Since this is based just on observational data, we are not able to make any causal claims. Yet, we think such an analysis can provide useful insights for the design of pricing policies (Berry et al., 2020). We limit this analysis to the WTP for corrective glasses. As one would expect from the literature on consumer choice, standard socio-economic characteristics explain very little of the variance in bids (Nevo, 2011). We do not find significant differences in bidding by gender, age, literacy, having a chronic disease, wealth, or occupation. Although many of the estimated coefficients have the sign one would plausibly expect, the standard errors are large. Having a bank account or not is the only variable that matters. Respondents without a bank account show a WTP which is USD 0.64 lower than the WTP of those with a bank account (or, based on the log specification, lower by 29%). This effect is statistically significant at the five percent level. We interpret this as an effect of financial wealth and financial literacy. Aspects related to eye-health such as whether the respondent was aware of his or her vision impairment, the degree of correction and past experiences of eye infections do not seem to matter for the WTP. We also include in our regression the respondent's estimate of the actual market price for the glasses and how many months they expect the glasses to last. Interestingly, the expected market price is strongly correlated with the WTP. A one dollar higher market price guess is associated with a WTP that is higher by USD 0.03. Interpreting the coefficient associated with the guess of the market price is not trivial. We think two interpretations are plausible. It could be that participants who have a clearer idea of the market price show a higher WTP, because they have a "better" reference point, similar to the idea of "reference dependence" in prospect theory and Behavioral Economics more generally (Kahneman & Tversky, 1979). Alternatively, it could also just be another reflection of their valuation of the product. Finally, the estimated durability is positively associated with the WTP, although this effect is not statistically significant. We repeated the analysis also with a machine learning algorithm to have less arbitrariness in the variable selection without running into problems of limited degrees of freedom. Detailed results are presented in the Online Appendix accompanying this paper. They are very similar to the ones above.

5.4 | Usage behavior and experience

Six months after the BDM experiment, we revisited the participants who had received corrective glasses. Out of the 171 who bought corrective glasses, we were able to re-interview 130. Tables A1, A5 and A6 in the Appendix provide details on the tracking, a balance test, and an analysis of attrition. It can be seen that attrition was not random. Tracked participants differ in literacy, holding a bank account, and wealth.

Our visit was unannounced. The objective of this endeavor was to get some insights on usage behavior, that is whether participants were wearing their glasses during the encounter. It turned out that only 16% of the participants were wearing their glasses when we met them. However, we did not expect participants to wear their glasses at all times, for example, if their impairment was not severe or if they needed their glasses mainly for reading. To our positive surprise, except for one case, all glasses were still in good condition, only 12 had some scratches on the lenses. Probing further into how participants used the glasses, it became evident that they wore them very selectively. Most commonly they wore them for reading, when going to church, when they had visitors, or when they traveled. Only a few wore them throughout the day and also for their work. All respondents who engaged in subsistence farming (except one) reported explicitly that they were not using them for work because they were afraid of breaking them.

To analyze the determinants of use more systematically, we estimate the following model:

$$U_{ij} = \alpha_0 + \alpha_1 WTP_{ij} + \alpha_2 P_j + X'_{ij}\beta + \epsilon_{ij}, \tag{2}$$

where U represents the usage measure of individual i in village j. Table 3 below shows the results. We consider two measures of use. One is a binary variable equal to one if the participant was wearing the glasses during our encounter and 0 otherwise (columns 1 and 2). The other is a self-reported measure indicating on how many days during the past week the participant had

worn his or her glasses (columns 3–6). For the former we use a linear probability model (LPM) and alternatively a probit model. For the latter we perform OLS and tobit estimations. Tobit estimations can account for the fact that the dependent variable is censored at zero and seven. *WTP* is the participant's bid at baseline. We also control for the price *P* that participants paid for

TABLE 3 Correlates of use

	Wearing LPM (1)	Wearing LPM (2)	Use OLS (3)	Use OLS (4)	Use Tobit (5)	Use Tobit (6)
Bid (USD)	0.035	0.039	−0.144	−0.237	−0.294	−0.471
	(0.028)	(0.033)	(0.140)	(0.162)	(0.262)	(0.287)
Transaction price (USD)	−0.021	0.027	−0.172	0.255	−0.458	0.361
	(0.087)	(0.096)	(0.857)	(0.789)	(1.439)	(1.172)
Video (=1)		0.003		0.547		0.890
		(0.044)		(0.416)		(0.691)
Sex (Male = 1)		0.125		0.998		1.579*
		(0.088)		(0.580)		(0.901)
Age (years)		−0.003		−0.065***		−0.106***
		(0.003)		(0.019)		(0.032)
Married (=1)		0.219*		1.905*		3.429**
		(0.110)		(1.002)		(1.646)
Literate (=1)		0.034		0.845		1.503
		(0.079)		(0.651)		(0.989)
Subsistence farmer (=1)		−0.085		−1.185*		−2.154**
		(0.057)		(0.628)		(1.057)
No bank account (=1)		−0.066		−0.193		−0.456
		(0.083)		(0.558)		(0.877)
Has at least a motorcycle (=1)		−0.288**		−2.330***		−3.804***
		(0.116)		(0.780)		(1.225)
Has only a bicycle (=1)		−0.197		−1.421*		−2.319**
		(0.116)		(0.700)		(1.128)
Aware of vision problem (=1)		0.254**		1.533**		2.630**
		(0.110)		(0.678)		(1.029)
Had eye infection (=1)		−0.124**		−0.645		−1.058
		(0.048)		(0.537)		(0.893)
Other eye problem (=1)		0.228*		0.772		1.355
		(0.127)		(0.615)		(0.992)
High correction (≥+/−2 diopters)		0.355***		1.881***		3.322***
		(0.097)		(0.348)		(0.554)
Constant	0.102	0.083	4.119***	5.989***	5.139***	8.389***
	(0.109)	(0.323)	(1.141)	(1.721)	(1.956)	(2.794)
Sigma					16.99***	12.51***
					(2.281)	(1.960)
N	130	130	130	130	130	130
Adj. R-sq	0.004	0.134	−0.006	0.113		

Notes: All regressions also include covariates for ethnicity (Mossi), religion, chronic illness and the number of household members. In light of considerations of space, we do not report on them here. Wealth is captured through vehicle ownership. Households without a vehicle are the reference category. Standard errors (in parentheses) are clustered at the village level.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

their glasses. The vector X'_{ij} captures a number of socioeconomic characteristics as well as eye-health-related aspects that might influence usage.

The BDM mechanism and the random price draw allow, in principle, to separately identify screening and sunk-cost effects. Sunk-costs effects are based on the idea that people appreciate a product more and consequently use it more when they had paid a higher price for it (Bagwell & Riordan, 1991; Thaler, 1980). Screening effects refer to a situation where participants with a higher WTP (indepdendent of price paid) use their glasses more frequently than those with a lower WTP. Unfortunately we do not have enough power to asses rigorously sunk-cost effects. However, holding the transaction price constant our results suggest that there are no screening effects. These results are in contrast to the findings by Ashraf et al. (2010) and Okeke et al. (2013) who probed into the screening effects of preventive health measures, namely, water disinfection and cervical cancer screening. Berry et al. (2020) do also not find differences in use in the short run depending on the elicited WTP. Yet, they find evidence for screening a year after their intervention.

The results in columns 4 and 6, suggest that age, marital status, and occupation matter. Subsistence farmers use their glasses on average one to two days less. This effect is statistically significant at the five percent level. Another strong predictor of use is wealth (proxied by vehicle ownership). Participants who are wealthier are significantly less likely to use their glasses. It can also be noted that those who were aware of their vision deficiency and those who require higher degrees of correction are more likely to wear the glasses. These estimates are statistically significant at least at the 5% level. If we look at the distribution of use by the degree of correction, we find that those with an adjustment of more than two diopters were indeed more often wearing their glasses every day during the past week (Figure A2 in the Appendix). The video treatment did not have any effect on usage. This is somewhat surprising, first, because it affected the WTP and, second, the video explicitly showed different scenarios in which glasses could be used. Hence, the video treatment may have only short-term salience. Finally, we do not find evidence of screening effects. The initial WTP is uncorrelated with use. The results are robust to the use of alternative outcomes measures, such as usage behavior reported by other family members and neighbors and a binary variable indicating whether the participant used the glasses at all or not in the past week. Detailed results of this can be found in the Online Appendix.

6 | CONCLUSION

Our results suggest that about three quarters of our study population in need of vision correction would take up eyeglasses at a price of USD 1.71 (XOF 1000), which corresponds to about 80% of the production costs. Overall, our results are consistent with those for preventive healthcare items and health screening services (Ahuja et al., 2010; Berry et al., 2020; Cohen & Dupas, 2010; Okeke et al., 2013). The remaining gap to the full production costs of USD 2.05 (XOF 1200) and other costs for marketing and distribution would have to be subsidized to serve this group. Such subsidies could come from the Government or International Health Aid. We believe such a subsidy could be justified on two grounds. First, the overheads, that is the costs above pure production costs are due to high costs for logistics, the reach out to 'customers' and the costs for screening. Providing basic infrastructure and basic health services are a duty of the public sector. Second, as we argued above, but did not show, as this is beyond the scope of this paper, vision correction has, as many other health investments too, potentially important externalities, for example, through increased labor productivity (Reddy et al., 2018), increased road safety and better educational outcomes (Glewwe et al., 2016, 2018; Hannum & Zhang, 2012; Nie et al., 2018). This latter point, however, has to be qualified in light of the low rates of use observed in our study. If use remains low, gains in income and productivity might only materialize to some extent. Furthermore, benefits and gains are not uniformly distributed and might be higher in some occupations than in others and might also be higher for people suffering from severe rather than mild vision impairment. Yet, there is still not much rigorous evidence on productivity and income gains from eyeglasses.

Moreover, we think further cost savings could be achieved if the distribution system is rolled out at a larger scale and market size increases. Uptake may increase as people see more people wearing glasses and if they learn about the benefits. Uptake could further be boosted by raising awareness for the benefits of eyeglasses. Our short video alone was able to raise the WTP by 16% or USD 0.32, which is close to the gap between the median bid and the cost covering price of USD 2.05. Although our layaway scheme did not have a positive effect on uptake, our descriptive analysis suggests that monetary constraints do matter. Hence, it would be worth to explore in future research whether more sophisticated credit schemes could increase uptake. Another instrument could be trial periods. Revisiting after 6 months those who had taken up eyeglasses revealed not just a high level of satisfaction among the users but also an increased WTP of up to USD 3.42 (XOF 2000). Yet, this was self-reported and not rigorously measured and hence is somewhat speculative. It is not implausible, though, given that for most people in our study population eyeglasses were something they had never tried before and hence were a rather 'new' technology. Furthermore, people had also not started to sell their glasses. In such a context trial periods might indeed be a suitable instrument.

One may have doubts regarding the scalability of our findings, as our sample of people in need of eyeglasses was not drawn from the general adult population, but was based on a sample of adults who responded to the offered free vision screening in the villages we targeted. Yet, we can't think of a more pro-active screening campaign. Obviously, no one can be forced to participate in a vision screening, so even if the screening and the offering of eyeglasses became a national policy, the Ministry of Health could hardly do better. Providing vision screening just at primary health care centers would certainly end up with a much lower show-up rate. Hence, we believe that our results are absolutely policy relevant. This is exactly the population one would have to target first. Other targeting procedures would be either less effective or much more expensive. Hence, we also see the larger number of people we could screen as a 'proof of concept'.

Our findings might be context specific and also suffer from low statistical power. Hence, replication and extension of our work in other contexts and with larger samples would be desirable. Also, a rigorous assessment of alternative interventions such as microloans and trial periods could be insightful. Our work has shown that use of glasses is low. Hence, more work on understanding of usage would be welcome. Another important field of research would be to rigorously quantify the productivity effects in various sectors and activities that follow from vision correction. Finally, and closely related to this latter point, analyzing parental demand for children's vision correction would be particularly valuable. The lifetime benefits of vision correction at least for children that suffer from severe vision impairments are likely to be sizable given the shown huge (short-run) effects on children's ability to perform in school (Glewwe et al., 2016).

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CONFLICT OF INTEREST

The authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

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

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ENDNOTES

[1] Holden et al. (2016) estimates that 1.4 billion people worldwide are affected by myopia. Estimates on presbyopia range between 1.1 billion (Bourne et al., 2017) and 1.8 billion (Fricke et al., 2018) people globally. Other refractive errors are hyperopia (farsightedness) and astigmatism.

[2] This refers to the loss from uncorrected myopia and presbyopia only, and is equivalent to 0.35 percent of the world's gross domestic product in 2015. Earlier estimates provided by Smith et al. (2009) are in a similar range, though they do not take presbyopia into account.

[3] Anecdotal evidence indicates that eyeglasses, even without correction, are particularly popular among university students. People also wear them as an accessory particularly at public events, at church or when traveling–something that is also echoed in the data that we gathered.

[4] If the consumer overestimates the potential benefits as a consequence of the information constraint, γ should be bigger than 1. This could be the case if, for example, the consumer expects that glasses cure illnesses other than refractive error, such as cataracts or blindness. If this is the case, the WTP will be above the efficient price p^* and the higher price will increase the producer surplus. In our setting, this scenario is unlikely to apply. The opticians in our experiment clearly communicated that in the case of cataracts, glasses cannot cure the illness but only increase comfort for the user.

[5] Monetary values are converted using the official exchange rate: USD 1 = XOF 585.

[6] For this study, we only considered adults aged 16 and older. Four children aged between 10 and 15 received the free eye exam regardless, but were not included in the study.

[7] The video is in Mooré, the main local language, and available from the authors upon request.

[8] For further discussion of the BDM approach and how it fares compared to other approaches, see Berry et al. (2020) and Burchardi et al. (2021).

[9] See Table A1 in the Appendix for details on the respective participants' status in the follow-up.

[10] Of the 38 percent that own a motorcycle, about half (75 participants) own both a motorcycle and a bicycle. Cars are not common in our context. Only three participants report owning a car.

[11] Using the PPP conversion factor for Burkina Faso in 2018, this is equivalent to I$6.13 and I$4.83 respectively.

[12] Detailed estimation results excluding the estimated market price can be found in Table A3 in the Appendix

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX

FIGURE A1 GVG glasses (basic model) [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE A2 Use by degree of correction

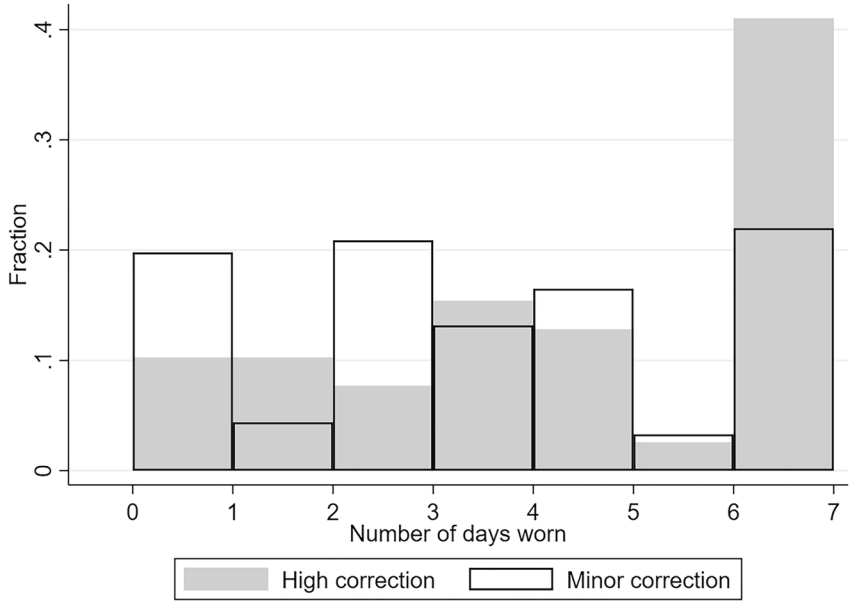

TABLE A1 Breakdown of participant status in follow-up survey

Status	*N*	%
Participants interviewed	130	76.02
Participants not visited because of accessibility	3	1.75
Deceased	1	0.58
Moved	3	1.75
Unavailable (due to work/travel)	11	6.43
Unidentifiable/unknown	15	8.77
Other	8	4.68
Total participants	171	100

TABLE A2 Socio-economic characteristics of the sample

	Sample (Ages 16+)		Sanmatenga (rural) (Ages 16+)	
	Mean	SD	Mean	SD
Sex (Male = 1)	0.60		0.42	
Age (years)	57.51	14.96	36.91	17.93
Married monogamous (=1)	0.33		0.37	
Married polygamous (=1)	0.50		0.36	
Single/widowed (=1)	0.16		0.27	
Mossi (=1)	0.95		0.92	
Moslem (=1)	0.66		0.53	
Illiterate (=1)	0.83		0.77	
Chronic illness (=1)	0.28		0.05	
Agropastoralist (=1)	0.72		0.83	
Has a vehicle (=1)	0.68		0.83	

(Continues)

TABLE A2 (Continued)

	Sample (Ages 16+)		Sanmatenga (rural) (Ages 16+)	
	Mean	SD	Mean	SD
… of which a car	0.01		0.01	
… of which a motorcycle	0.55		0.43	
… of which a bicycle	0.71		0.95	
# of hh members	12.50	7.59	7.90	5.42
N	412		959	

Notes: The first two columns use data from our survey. The last two columns use data on residents in the rural areas of the Sanmatenga Province (the province in which Kaya is located) from the 2014 *Enquête Multisectorielle Continue*, a nationally representative survey. Note, that in the latter are individuals with and without vision impairment, whereas in our sample are only individuals with vision impairment.

TABLE A3 Correlates of the WTP for corrective glasses (w/o market price estimate)

	WTP	ln(WTP)	
	(1)	(2)	(3)
Video (=1)	0.268	0.147**	0.149
	(0.171)	(0.068)	(0.090)
Layaway (=1)	−0.182	−0.062	−0.061
	(0.138)	(0.076)	(0.119)
Video × layaway			−0.003
			(0.154)
Sex (Male = 1)	0.145	0.058	0.059
	(0.250)	(0.097)	(0.097)
Age (years)	−0.006	−0.002	−0.002
	(0.013)	(0.005)	(0.005)
Literate (=1)	0.518	0.162	0.162
	(0.318)	(0.113)	(0.113)
Chronic illness (=1)	−0.151	−0.136	−0.136
	(0.188)	(0.082)	(0.082)
Subsistence farmer (=1)	−0.479	−0.135	−0.135
	(0.299)	(0.126)	(0.125)
No bank account (=1)	−0.678**	−0.308**	−0.308**
	(0.273)	(0.120)	(0.122)
Has at least a motorcycle (=1)	−0.076	0.070	0.069
	(0.196)	(0.089)	(0.091)
Has only a bicycle (=1)	−0.433*	−0.070	−0.070
	(0.225)	(0.103)	(0.105)
Aware of vision problem (=1)	−0.032	−0.030	−0.030
	(0.296)	(0.115)	(0.114)
Had eye infection (=1)	0.169	0.096	0.095
	(0.208)	(0.086)	(0.085)
Other eye problem (=1)	0.064	0.016	0.016
	(0.368)	(0.134)	(0.135)

TABLE A3 (Continued)

	WTP	ln(WTP)	
	(1)	(2)	(3)
High correction (≥+/−2 diopter)	−0.220	−0.058	−0.058
	(0.205)	(0.083)	(0.081)
Durability (mos)	0.002	0.001	0.001
	(0.004)	(0.002)	−0.002
N	217	217	217
Adj. R-sq	0.151	0.133	0.128
Sample mean	2.16	0.58	0.58

Notes: Other covariates are marital status, ethnicity, religion and the number of household members. Wealth is captured through vehicle ownership. Households without a vehicle are the reference category. Standard errors (in parentheses) are clustered at the village level.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

TABLE A4 Correlates of the WTP for sunglasses

	WTP	ln(WTP)	
	(1)	(2)	(3)
Video (=1)	−0.107	−0.050	−0.096
	(0.156)	(0.109)	(0.153)
Layaway (=1)	−0.148	−0.018	−0.063
	(0.126)	(0.085)	(0.121)
Video × layaway			0.088
			(0.160)
Sex (Male = 1)	0.041	0.094	0.102
	(0.310)	(0.154)	(0.157)
Age (years)	0.001	0.000	0.000
	(0.005)	(0.002)	(0.002)
Literate (=1)	0.442	0.112	0.101
	(0.415)	(0.154)	(0.158)
Chronic illness (=1)	−0.263*	−0.129	−0.134
	(0.141)	(0.089)	(0.088)
Subsistence farmer (=1)	−0.004	−0.073	−0.073
	(0.129)	(0.072)	(0.072)
No bank account (=1)	−0.244	−0.150	−0.162
	(0.199)	(0.127)	(0.128)
Has at least a motorcycle (=1)	0.696*	0.367*	0.360*
	(0.364)	(0.205)	(0.206)
Has only a bicycle (=1)	0.327	0.221	0.218
	(0.235)	(0.160)	(0.163)
Aware of vision problem (=1)	−0.036	−0.121	−0.126
	(0.179)	(0.118)	(0.117)
Had eye infection (=1)	0.246	0.163*	0.161*
	(0.165)	(0.081)	(0.082)
Other eye problem (=1)	−0.295	−0.124	−0.114
	(0.219)	(0.126)	(0.123)

(Continues)

TABLE A4 (Continued)

	WTP	ln(WTP)	
	(1)	(2)	(3)
Estimated market price (USD)	0.020***	0.012***	0.012***
	(0.007)	(0.004)	(0.004)
No market price estimate (=1)	0.104	0.080	0.079
	(0.178)	(0.164)	(0.164)
Durability (months)	0.004	0.004**	0.004**
	(0.004)	(0.002)	(0.002)
N	195	195	195
Adj. R-sq	0.129	0.096	0.092
Sample mean	1.70	0.352	0.352

Notes: Other covariates are marital status, ethnicity, religion and the number of household members. Wealth is captured through vehicle ownership. Households without a vehicle are the reference category. Standard errors (in parentheses) are clustered at the village level.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

TABLE A5 Socio-economic characteristics of the follow-up sample

	Eligible	Follow-up	Attrition	
Variable	Mean	Mean	Mean	*p*-value
Sex (Male = 1)	0.70	0.71	0.66	0.55
Age (years)	54.23	54.12	54.59	0.85
Married (=1)	0.90	0.92	0.85	0.25
Mossi (=1)	0.97	0.97	0.98	0.83
Moslem (=1)	0.65	0.63	0.71	0.37
Literate (=1)	0.28	0.32	0.17	0.07*
Chronic illness (=1)	0.23	0.22	0.27	0.55
Subsistence farmer (=1)	0.70	0.69	0.71	0.86
# of hh members	12.89	12.53	14.05	0.27
No bank account (=1)	0.65	0.60	0.81	0.02**
Has at least as motorcycle (=1)	0.49	0.48	0.54	0.51
Has only a bicycle (=1)	0.30	0.31	0.27	0.63
Has no vehicle (=1)	0.22	0.22	0.20	0.78
Aware of vision problem (=1)	0.89	0.89	0.90	0.85
Had eye infection (=1)	0.42	0.43	0.37	0.47
Other eye problem (=1)	0.13	0.14	0.12	0.79
High correction (≥+/−2 diopters)	0.31	0.30	0.34	0.62
Estimated market price (in XOF)	12.88	11.33	17.78	0.10*
No market price estimate (=1)	0.16	0.16	0.17	0.89
Expected durability of glasses (months)	27.28	27.54	26.43	0.79
N	171	130	41	

Notes: *p*-value compares differences in means between those traced and those not traced.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

TABLE A6 Sample selection probit: Probability of being included in the follow-up

	Coef.
Sex (Male = 1)	−0.207
	(0.375)
Age (years)	−0.007
	(0.009)
Married (=1)	−0.462
	(0.317)
Mossi (=1)	0.111
	(0.564)
Moslem (=1)	0.161
	(0.289)
Literate (=1)	−0.450*
	(0.262)
Chronic illness (=1)	0.217
	(0.217)
Subsistence farmer (=1)	−0.053
	(0.265)
# of members	0.011
	(0.014)
No bank account (=1)	0.730**
	(0.326)
Has at least a motorcycle (=1)	0.834*
	(0.448)
Has only a bicycle (=1)	0.324
	(0.388)
Has no vehicle (=1)	Ref.
Aware of vision problem (=1)	0.048
	(0.367)
Had eye infection (=1)	−0.071
	(0.263)
Other eye problem (=1)	0.001
	(0.345)
High correction (≥+/−2 diopters)	0.245
	(0.285)
Interviewer ID	0.064
	(0.112)
Group 1 (=1)	−0.219
	(0.258)
Group 2 (=1)	0.275
	(0.409)
Group 3 (=1)	0.014
	(0.422)
Group 4 (=1)	Ref.
Constant	−1.365
	(1.268)
N	171
Pseudo R-sq	0.102