Does others' health count for peanuts? Health, market returns, and pro-sociality*

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Abstract

Individuals often make decisions with both private returns and impacts on the welfare of others. Food safety decisions by agricultural producers exemplify this choice, particularly in low-income countries: farmers often consume some of what they produce and sell the rest. We examine this issue using a sample of smallholder groundnut farmers in Senegal, where contamination by *aflatoxins* poses a significant health threat to consumers and impacts economic outcomes for producers. Through a lab-in-the-field experiment, we explore willingness to pay (WTP) for aflatoxin detection in groundnut powder designated for personal consumption (i.e., private health returns), resale at a premium (private monetary returns) and donation to local children (no private returns). We find farmers are willing to pay real money for aflatoxin detection even absent the potential for private returns, but WTP increases as the potential for private returns increases. A randomized information treatment significantly increases WTP in all scenarios. Our results shed light on the complex interplay between altruism and economic decisions in the presence of externalities, and point to the potential of timely and targeted information to address food safety issues in particular.

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Introduction

Foodborne disease-related deaths are estimated to be the highest per capita in Africa, causing 137,000 deaths and 91 million illnesses annually (Jaffe and Grace, 2020). Many food safety problems are visually undetectable, among which aflatoxins are a cause of particular concern in Africa. Aflatoxins are produced by the *aspergillus flavus* fungus present in soils, which infects crops on farm and proliferates during storage with poor conditions. Aflatoxins affect crops that are important for both rural incomes and consumption in the region, including maize and groundnuts. Chronic exposure to aflatoxins increases liver cancer risk (particularly when Hepatitis B incidence is high) and stunts the growth of children, and acute exposure to aflatoxin can be deadly. Many Sub-Saharan countries have limited or no domestic regulations on aflatoxins, weak enforcement of regulations that do exist, and fragmented value chains with limited prospects for traceability, posing significant challenges to ensuring the safety of locally available food products.

Food production in many low-income countries relies on smallholder farmers in rural areas, endowing them with a pivotal role in determining food risk levels in local markets. However, ensuring food safety and assessing regulatory compliance represent potentially significant costs for farmers and intermediaries. Additionally, there is often a lack of information on the consumer side regarding food quality, resulting in limited scope for product differentiation based on safety certification or signaling of quality investments by producers. Consequently, farmers may face limited economic incentives to address hazards, leading to a lack of investment in food safety and potentially explaining the prevalence of food hazards in products available for local consumption (Grace et al., 2020; Hoffmann et al., 2019; World Health Organization, 2015).

In this paper, we explore whether alternative motivations for food safety can play complementary roles alongside economic incentives. Within a context lacking enforced regulations and economic incentives, the tendency of farmers to undervalue the provision of safe food seemingly results in limited investments in quality, perpetuating pervasive food safety issues. We ask whether farmers value access to information on food safety when the information is most relevant for their own health, for the health of others in the community, or for receiving an economic benefit.

We develop a lab-in-the-field experiment in Senegal designed to capture the multifaceted nature of a farmer's decision-making process regarding investments in food safety. Such decisions are influenced by various motivations, including the desire to preserve one's health, the pursuit of premium returns from quality-contingent export markets, and ensuring that one's products pose no harm to local consumers.

First, we investigate whether farmers are willing to pay real money for food safety information when there are no private returns, either monetary or health-wise, and when there are private monetary and or health returns. We find that farmers are willing to pay relatively more when there are private returns, but are nevertheless willing to pay real money even absent the possibility of private returns. The median farmer is willing to pay about 550 CFA to reveal food safety information when there are no private returns, or about 2.3% of average monthly gross income (DAPSA, 2022). When the potential for private monetary or health returns increases by 25 percent, farmers are willing to pay seven percent more for information about food safety.

Second, we test whether self-reported altruism and baseline awareness of aflatoxins are potential mechanisms for willingness to pay for food safety information, in situations with and without private returns. We find that farmers with higher self-reported altruism appear willing to pay slightly more in situations both with and without private returns relative to farmers with lower altruism, although this result is only marginally statistically significant. Individuals with greater baseline awareness of aflatoxins are willing to pay relatively more in situations with lower private returns, in some cases entirely offsetting an average lower willingness to pay in these situations.

Third, we test the causal effect of providing detailed information about aflatoxin on farmers' willingness to pay. Before the experiment, all participating farmers are given a brief description of aflatoxin and its prevalence. After the first half of the experiment, farmers are then randomized to watch either an informative video about aflatoxins or a placebo video. The informative video provides detailed information about aflatoxins and harm to the human body resulting from exposure. We find that additional information about aflatoxins increases willingness to pay by 8% on average and increases the probability of being willing to pay for guaranteed information by 24%. This increase is relatively consistent regardless of the level of private returns in a given round.

A potential limitation of our design is that one's decision to pay to ensure the quality of one's output applies simultaneously to all usages. In some contexts, farmers can at least partially differentiate along food safety dimensions between production that they keep for their consumption and the production that they sell (Arslan and Taylor (2009), Hoffmann and Gatobu (2014), Kadjo et al. (2020)). However, in the case of aflatoxin contamination which is visually undetectable and costly to test for, sorting of this kind is infeasible for a smallholder farmer.

To our knowledge, this paper is the first to introduce altruism as a mechanism influencing food safety within the local markets of low-income countries. The findings contribute to the literature on the willingness to pay (WTP) to mitigate health issues among rural African consumers. This contribution furnishes evidence of pro-social motivation in the realm of public health issues.

Previous studies conducted in African countries have highlighted that smallholder farmers, acting as consumers, demonstrate a willingness to pay for access to high-quality food (Chowdhury et al., 2011; De Groote et al., 2011, 2016; Meenakshi et al., 2012). Beyond financial and health motivations, our study recognizes pro-sociality as a factor that might drive farmers to value information about aflatoxin levels in their production. The experimental design allows us to explore the interactions between financial incentives, health concerns, and pro-social motivations, recognizing that these mechanisms are often interlinked in practice.

Farmers propelled by pro-social or altruistic motivations may invest in enhancing their groundnuts' quality despite the absence of direct financial gain. Their motivation lies in a desire to provide food that does not harm others. This aligns with observations in other domains, where farmers engage in pro-social activities related to their occupation, such as disseminating agricultural information (Behaghel et al., 2020) or endorsing sustainable agricultural practices (Bopp et al., 2019), even in the absence of financial incentives. Our results suggest that providing information serves as a means to encourage farmers to internalize the positive externality associated with supplying safe food. This, in turn, could lead to increased investments in technology and a safer food supply within the local markets of low-income countries.

1 Institutional context and data

1.1 Aflatoxins in Senegalese groundnut production

Senegal ranks among the top ten groundnut exporters, with groundnut crops covering approximately 39.7% of cultivated land (and 81% of cash crops) in the country in 2022 (DAPSA, 2022). Consumed in various forms such as whole, powdered, and paste, groundnuts are integral to the country's dietary habits, particularly in zones dedicated to groundnut cultivation. Essential in Senegal's agricultural landscape, groundnut production is predominantly carried out by smallholder farmers organized within cooperative structures overseen and supported by state authorities. But aflatoxin contamination is a significant issue in Senegalese groundnut production.[1] While not observable to the naked eye, a study by PACA (2017) reveals that approximately 36% of Senegalese groundnut production fails to meet European Union contamination standards, varying by region. This alarming statistic highlights that about one-third of groundnut production poses a significant health risk to consumers. Existing research indicates that adults in Senegal's high per capita consumption areas of aflatoxin-contaminated foods (such as groundnuts and maize) exhibit elevated aflatoxin biomarkers in their blood (Watson et al., 2015).

[1] The effects of aflatoxins on human health, particularly on the liver, are severe, potentially leading to cancer, especially when compounded with hepatitis. These effects have been extensively documented and is acknowledged by the International Agency for Research on Cancer (Liu and Wu, 2010; Marrone et al., 2016).

Aflatoxin contamination can occur at several stages, as crops are susceptible to aflatoxin during both growth and storage. Environmental conditions also significantly influence the likelihood of aflatoxin contamination. Farmers can invest in technologies to upgrade the safety of their groundnuts, ensuring low levels of aflatoxin in their produce. Post-harvest, proper drying and storage are essential measures. Groundnuts must be adequately dried to reduce moisture content, and storage conditions must prevent moisture absorption and mold exposure. Another effective post-harvest technology is the use of hermetic bags. A recent study among Senegalese farmers demonstrated that better storage practices with quality bags can reduce the likelihood of high aflatoxin levels in groundnuts by 30% (Bauchet et al., 2021).[2] Since aflatoxin initially develop in the field, recent technologies have been developed to address this issue at pre-harvest stages. Accordingly, farmers can treat their soil to limit fungal proliferation. Agronomists have developed biocontrol technology aimed at suppressing aflatoxin growth in agricultural fields. It is applied during the sowing period, within a specific timeframe after seeds are sown.fter extensive development and testing, a product named Aflasafe has been recently introduced in several African countries to mitigate aflatoxin contamination. In Senegal, Aflasafe was approved for commercial sale in 2019, and is now readily available to Senegalese farmers as a pivotal technology in the fight against aflatoxin contamination. The cost of Aflasafe for one hectare is 10,000 CFA ($16) [3]. Aflasafe has been proven effective in reducing aflatoxin levels (Bandyopadhyay et al., 2019; Deutschmann et al., 2022; Senghor et al., 2020) .

Hence, implementing good agricultural practices during cultivation, coupled with appropriate post-harvest handling techniques and storage procedures, plays a pivotal role in mitigating aflatoxin contamination. Farmers play a crucial role in the value chain by providing consumers with high-quality food. These technologies also benefit farmers in several ways. Firstly, reducing aflatoxin-levels (through imporved practices and investments in inputs such as Aflsafe) could benefit farmers through better market prices. But except for exporters, who face stringent aflatoxin standards in international markets necessitating certification, buyers generally show limited concern for aflatoxin content. While some countries have implemented regulations to curb aflatoxin in food available to domestic consumers (Meneely et al., 2022), Senegal, like many low-income nations, lacks enforced standards for food crops. Only agro-industrial producers are regulated concerning aflatoxin levels, specifically for crude groundnut oil and groundnut paste. However, food control enforcement is notably deficient. Agro-industrial producers supply only a minority of groundnut products consumed by families, who often obtain them through less-regulated channels [4].

[2] The cost of purchasing enough hermetic bags for one hectare is approximately 24,000 CFA ($40).

[3] To contextualize these figures, the average yield of groundnut production in Senegal was reported to be 2,149 kg per hectare in 2021, with an average plot size of 2.4 hectares (DAPSA, 2021). This translates to an average yield of 895 kg per hectare, generating an average revenue of 223,750 CFA ($373.5) per hectare at the state's minimum price of 250 CFA ($0.42) per kilogram.

[4] PACA (2017)

Secondly, improved health outcomes result from consuming higher-quality groundnuts. In 2021, 21.6% of groundnut production was consumed by farmers. But the decision to invest in technologies to combat aflatoxin is contingent on farmers' awareness of aflatoxin-erlated issues. While national-level awareness figures are unavailable, various studies in Senegal have addressed this issue. For instance, Arias-Granada et al. (2021) found that 20% of farmers in their sample were aware of aflatoxin, compared to 28% in the study by Bauchet et al. (2021). In our sample, 23% of farmers had heard of aflatoxin as a disease affecting groundnut crops, with 12% citing health problems as its impact (See Table A2). Thirdly, providing higher-quality groundnuts in the local market reduces others' exposure to aflatoxins, addressing public health concerns. Pro-social farmers may find motivation in altruistic actions, as indicated by 5.5% of groundnut production being distributed to other households (DAPSA, 2021). Here also, however, farmers' behavior will crucially depend on their awareness of the health hazard associated with aflatoxins in human consumption.

1.2 A sample of groundnut producers in Senegal

We study these issues in a sample of groundnut farmers in the Thies region, specifically within the Mbour department. Farmers in this department engage in the cultivation of various crops, including groundnuts, although the intensity of groundnut cultivation is lower compared to farmers located more inland in regions like Fatick or Kaolack. In partnership with a local agricultural cooperative we 439 local groundnut farmers to be surveyed, of which 302 were cooperative members actively involved in groundnut cultivation and 147 other farmers residing in the same villages who were also engaged in groundnut cultivation but not part of the cooperative.

Most of the surveyed farmers are men, constituting approximately 82%, with an average age of 54. The literacy rate is relatively low (about 38%), and their average education level is approximately three years. The year 2021 presented challenges for groundnut farmers in the Thies region due to a delayed rainy season and a prolonged break between the first and second rain [5], leading to varying harvest outcomes. Additionally, some farmers experienced minimal harvest quantities relative to the seeds sown, as evident in the wide standard variation for the quantity harvested in 2021. In 2022 however, all farmers were growing groundnuts and X% had a positive harvest.

Among those who obtained some quantities of groundnuts, nearly all farmers kept a portion for personal consumption (99%), only about 12% of farmers sold a portion of their production, and approximately half donated a portion to other households or individuals. The donation accounted for approximately 20% of their production. Regarding awareness about aflatoxin, our sample shows a relatively low level of awareness, consistent with existing

[5] ANACIM (2021)

literature. Approximately 22% of the respondents have heard about aflatoxin, and merely 10% could identify health impacts as one of the effects of aflatoxin in groundnuts.

At the bottom of the table, we present descriptive statistics of stated altruistic preferences, which were inferred from the survey by asking questions related to prosociality and altruism preferences. Some of these questions were adapted from the questionnaire used in Behaghel et al. (2020). Specifically, farmers were asked to report how many days during the last week they experienced happiness from providing help or advice to someone else and how many days they felt unhappy because they could not offer assistance to others. Additionally, we use a measure of altruism from the Global Preferences Survey: farmers were presented with a scenario where they found themselves in an unfamiliar area and were lost, a stranger comes to their aid, incurring a cost of 600 CFA for the assistance but refuses any compensation or reward. The farmers were then asked two questions: whether they would be willing to give one of their gifts to the stranger and, if so, what the value of the gift would be.

2 Health, Information and Pro-social behavior

As farmers become more knowledgeable about the health risks associated with aflatoxin, their motivations to invest in safety measures are likely to be influenced. In addition to the financial motivation, health and pro-sociality also play significant roles in farmers' decisions. In this section we review current evidence on related issues in low-income countries, and use it to inform a simplified framework from which we derive a set of testable hypotheses.

2.1 Review of evidence

Preserving their own health is a significant motivation for farmers. Recent research has shed light on the divergent approaches farmers adopt toward the crops they sell compared to those they consume. Hoffmann et al. (2023) investigates the effect of a modest premium on farmers' investment in Aflasafe. The premium offered increase the adoption of Aflasafe with a result driven by farmers consuming their own maize. In the absence of premium, some farmers still purchase Aflasafe, indicating a desire to ensure safe maize for their own consumption. These results highlights the significant role of private health returns in motivating investment. Another study by Hoffmann and Jones (2021) with maize farmers in Kenya reveals that farmers make more substantial investments in food safety practices when the produce is assigned for their own consumption rather than for sale. In Benin, working with maize farmers, Kadjo et al. (2020) show that when farmers perceive a risk to food safety, they are less inclined to treat maize intended for personal consumption with insecticide, as opposed to maize intended for sale. Several studies also show that farmers, as consumers themselves, value the safety of food. An experiment conducted by De Groote et al. (2016) with Kenyan maize growers demonstrates their willingness to pay extra for maize without aflatoxin. The same results are derived from similar experiment made with rural consumers who most of the time are also producers, concerning maize in Zambia (Meenakshi et al., 2012), and staple crops in Uganda (Chowdhury et al., 2011). Together, these findings underscore that farmers indeed place a high value on access to safe food. Farmers are ready to invest in the safety of their production for personal consumption, underlining their acknowledgement of the importance of food safety. This is further emphasized by their willingness to incur additional costs to access safer food options they do not produce. These findings indicate that farmers prioritize their health and well-being when it comes to the food they consume.

As another motivation, we seek to underscore the role of pro-sociality in driving the value farmers place on access to food safety information. Some individuals are intrinsically motivated to act pro-socially, engaging in behaviors that benefit others. Pro-social individuals harbor an inherent desire to create positive externalities through their actions, propelled by altruistic motives without necessitating external incentives (Bénabou and Tirole, 2006). These individuals willingly invest resources to enhance the well-being of others, even in the absence of extrinsic rewards.

The concept of altruism and its connection to the value individuals place on the safety of others have further been emirically examined by Jones-Lee (1991). This work emphasizes that people demonstrate altruistic behavior by valuing the well-being and security of others, even at a personal cost. Several studies have empirically explored whether individuals are willing to pay more to reduce risks for themselves and others (Araña and León, 2002; Gyrd-Hansen et al., 2016; Simonsen et al., 2021). In the field of agriculture, studies have investigated whether farmers' altruistic motivations and their influence on technology adoption decisions. In higher income countries, Sheeder and Lynne (2011) proposes that farmers integrate both self-interest and concern for others when deciding to adopt new technologies. Chouinard et al. (2008) find that farmers are even willing to forgo their own profits in some settings. Evidence further suggest these behavior also exist in poorer settings. In rural Mozambique, a qualitative survey-based study of farmers by Crudeli et al. (2022) shows that pro-sociality is a crucial quality to qualify a producer as a good farmer. Furthermore, the study reveals a positive correlation between pro-sociality and the adoption of innovations, suggesting that pro-sociality can play a role in the issue of investment in technology.

Our study aims to identify the predominant motivation driving farmers to place value on information concerning food safety. We identify 3 reasons: monetary, personal health, and others' health. Moreover, we seek to measure the influence of information provision on the variations in valuation attributed to these motivations. We propose below a simple conceptual framework to study these issues in the context of aflatoxins in Senegal.

2.2 Conceptual framework

Consider a groundnut producing farmer who derives her utility from a portfolio of additively separable components associated with the use of her production for her home consumption (u_c), for donation to others (u_d) or to obtain income from market sales (u_m):

$$U(u_c, u_d, u_m) = u_c(g_c) + u_d(g_d) + u_m(g_m)$$

where g_c is the part of her production she consumes, g_d the part she donates, and g_m the part she sales. We consider these shares to be fixed (as for instance driven by consumption needs, local social norms and liquidity needs). Aflatoxins exist in the area and can contaminate the farmer's entire production production with a probability π. Whether her production is affected cannot be assessed from the naked eye, and her only response to this issue is to choose whether to acquire information through an appropriate test applied to a representative sample of her production. Let $I(v)$ capture this information, with $I = 0$ if she does not have the information, $I = 1$ if she does, and v the cost of the test which is fixed for the farmer's entire production. Each component of her utility is defined as follows:

Home Consumption: $u_c(g_c) = \alpha(g_c - \pi A(1-I)g_c)$ – The utility she derives from the consumption of her production depends on her marginal utility of consumption (α), and is depreciated by the probability π that it is contaminated by aflatoxins. This depreciation however depends on her degree of awareness regarding the health hazard of aflatoxin A, with $0 \geq A \geq 1$ and $A = 0$ if the farmer is not at all aware of the health consequences of aflatoxin, in which case she incurs no dis-utility from consuming aflatoxin contaminated groundnut. This is true whether the farmer decides to acquire information ($I = 1$) or not. The depreciation of her utility is however maximized if she is fully aware of the negative consequences of aflatoxins, knows that there is probability π that her production is affected, but did not acquire the necessary information I to find whether she should effectively be concerned.

Donation: $u_c(g_d) = \beta(g_d - \gamma\pi A(1-I)g_d) -$ The utility she derives from donating her production depends on her marginal utility of donation (β) and follows the same pattern as that of consuming it, albeit with one difference: the disutility component is also mediated by the extent to which cares for others' health captured by an altruism parameter γ, with $0 \geq \gamma \geq 1$ and $\gamma = 0$ if she is not at all concerned by the health of others.

Market sales: $u_c(g_m) = \delta(g_m \cdot p + (1-\pi)Ik \cdot g_m - \pi Ip \cdot g_m) -$ The utility she derives from selling her production depends on her marginal utility (δ), and on the per-unit price-premium that she may get if she acquires the quality information ($I = 1$) which shows no-contamination with probability $(1-\pi)$ or whether she incurs a loss in her overall sales if her production is shown to be contaminated with probability π.

Thus, the farmer's decision to invest v in acquiring information I depends on the comparison of her overall utility with and without this information. If she does not invest in obtaining information regarding the contamination of her production by aflatoxin, her overall Utility is given by:

$$U(g_m, g_c, g_d | I=0) = \alpha(g_c - \pi A g_c) + \beta(g_d - \gamma\pi A g_d) + \delta g_m \cdot p \tag{1}$$

In turn, if shed decides to acquire the information regarding whether her production is contaminated or not, her overall utility is given by:

$$U(g_m, g_c, g_d | I=1) = \alpha g_c + \beta g_d + \delta g_m \cdot p + \delta(1-\pi)k \cdot g_m - \delta\pi p \cdot g_m - v \tag{2}$$

Combining Equations 1 and 2, the farmer's maximum willingness to pay for obtaining information regarding the quality of her groundnut is given by:

$$v* = \alpha\pi A \cdot g_c + \beta\gamma\pi A \cdot g_d + \delta((1-\pi)k - \pi p) \cdot g_m \tag{3}$$

This simplified framework leads to a series of testable predictions. First, the farmer's willingness to pay $v*$ to test for the quality of her production increases with the share of her production that she dedicates to home consumption: $\frac{\partial v*}{\partial g_c} = \alpha\pi A > 0$. The strength of this relationship positively depends on the marginal utility that she derives from consuming groundnuts (α), the probability that her production is contaminated with aflatoxins (π), and her her level of awareness of the health hazard associated with the consumption of aflatoxin-contaminated groundnuts (A).

Second, the farmer willingness to pay for the test also increases with the part of her production that she donates: $\frac{\partial v*}{\partial g_d} = \beta\gamma\pi A > 0$. As for home consumption, this relationship is strengthen by the probability that her production is contaminated and by her awareness of the negative consequences associated with consumption of aflatoxin-contaminated products. Comparing the farmer's willingness to pay in relation to home-consumption and to donation further yields to $\frac{\partial v*}{\partial g_c} - \frac{\partial v*}{\partial g_d} = \alpha - \beta\gamma$. Assuming that one's marginal utility for home consumption is at least equal to that of donation ($\alpha \geq \beta$), and with one's valuation of others' health (γ) is at most equal to one, the farmer's willingness to pay for the test of production should more strongly respond to increases with the part she dedicates to home consumption (g_c) than with the part she intends to donate (g_d).

Third, with respect to the groundnuts she sells on the market, the farmer's willingness to pay for the test of her production no-longer depends on her awareness of heath hazard

(A): $\frac{\partial v*}{\partial g_m} = \delta((1-\pi)k - \pi p)$. Instead, it is driven by the combined effects of the probability that her production is contaminated, and the price she can expect from selling non-tested groundnuts (p) or selling groundnuts that have been tested to be free of aflatoxins ($p + k$). Accordingly, her willingness to pay increases with the part she dedicates to market sales only if the price premium associated with safe groundnuts is greater that likelihood that her groundnut is contaminated valued at the market price for non-tested groundnuts: $\frac{\partial v*}{\partial g_m} > 0$ if $k > \frac{\pi p}{1-\pi}$.

3 Awareness of aflatoxins and prosocial behavior in Senegal

Building on the above conceptual framework we designed and implemented a willingness to pay experiment to study the extent to which awareness of aflatoxins and/or pro-social behavior affect groundnut farmers' investments in information regarding the contamination of their product. Our experiment further differentiates these behaviors across the different possible usages of groundnuts: consumption, donation, and sales. We first describe below the experiment and its implementation, then briefly discuss our estimation strategy, and finally present the results of the experiment.

3.1 Lab-in-the-field experiment

Baseline characteristics and enrollment in the experiment – We conducted a survey with each farmer in our sample to collect socio-demographic information, details on their crops, information about the last commercialization and current growing seasons for groundnuts, and their awareness of aflatoxin. We asked whether respondents have ever heard of aflatoxins and, if they did, what they knew about them. Additionally, we elicited preferences and behaviors related to risk aversion and pro-sociality.

We then gave a brief presentation about aflatoxins and their effects, along with information regarding their prevalence in Senegalese groundnut production, based on a recent study (indicating one-third of the Senegalese production has a high level of aflatoxins)[6]. This presentation aimed to help farmers better understand the potential benefits and risks associated with paying to reveal the level of aflatoxins in the groundnuts presented.

Table A2 below presents a balance check of observable characteristics for both the control and treatment groups in our sample, which comprises 439 farmers – 214 in the control group and 225 in the treatment group. Both groups appear balanced regarding observable characteristics, except for the probability of cultivating groundnuts in 2021 and the likelihood of a positive harvest in 2021. Although all farmers are growing groundnuts in the current season (2022), 87% in the control group grew groundnuts the previous year,

[6] See detail of the script in Appendix B.1

compared to 95% in the treatment group. Among those who grew groundnuts, 79% in the control group had a positive harvest, compared to 71% in the treatment group.

As compensation for survey participation, farmers were offered 1,000 CFA (approximately $1.5), presented as a token of appreciation for their time. Farmers were then given the option to participate in a decision game involving groundnut powder. Beyond compensating farmers for their participation in the survey, this show-up fee provided the initial endowments needed for participants to engage some of their own resources in the following sequence of experiments, and further mitigating potential house money effect (Corrigan and Rousu, 2006) distortions resulting from this endowment, we present it as a show-up fee distributed at the end of the survey prior to the experiment.

Willingness to pay (WTP) – Our experiment combines different methods to see how much farmers are willing to pay to access information about food quality, considering if they are using the food for themselves, donating to others, or selling it. We aim to create an incentive-compatible environment that aligns responses with farmers' accurate valuations. While revealed preferences are effective in established markets, they fall short for goods yet to be available. Similarly, stated preferences, applicable to hypothetical scenarios, often yield unreliable responses (Lusk and Shogren, 2007).

To reconcile these challenges, we integrate revealed and stated preference methods through an experimental auction.Specifically we rely on a Becker-Degroot-Marschak (BDM) auction mechanism (Becker et al., 1964) wherein players submit bids, which are compared to a randomly generated number according to a specified distribution. This mechanism introduces real economic consequences to stated preferences, thereby enhancing the reliability of responses.

Consumption, donation and sales portfolio: g_c, g_d, g_m, p – We aim to explore whether there are differences in WTP to access information about the quality of a product, depending on its intended use. More specifically, we study whether farmers differentiate the value of information on food safety based on whether the food is for their consumption, consumption by others, or for sale. In our experiment, farmers faced different distribution choices of groundnut products and were required to state their WTP to obtain information about the quality of groundnuts for the given distribution scenario.

Specifically, we presented farmers with four bags of groundnut powder, each containing 125 grams, totalling 500 grams. We explained that we will propose different allocations of these groundnut bags for three purposes: personal consumption, donation to Talibes (young boys studying at a Koranic school who typically beg for food and money) or sale at the local market price (1000 CFA or $1.5 per kilo) with a potential quality premium. The distribution of the bags for these purposes was randomly determined among 15 possible allocations using visual representation cards[7]. Each card represented one allocation of four groundnut bags between consumption, donation and sale.

Farmers' investment behavior: $v*, I, k -$ For a chosen card, farmers were asked to state their willingness to pay, with a maximum of 1000 CFA, to know if the aflatoxin content of the groundnut bags was high or low.

Through a repeated game design, we aimed to capture changes in WTP depending on the use of the groundnut. Farmers went through 12 rounds of the game, with different allocations each time, stating their willingness to pay (WTP) for aflatoxin information. We focus on the first six rounds of the game first, before any participants were given additional information about aflatoxins. Prior to the real experiment, two initial rounds were conducted using biscuits instead of groundnuts to familiarize them with the game's mechanics. Farmers were also informed that only 1 out of their 12 decisions would be randomly chosen to have actual consequences at the end. For this decision, the comparison of their WTP and a random price (P) determines whether the groundnuts will be tested or not.

In the first case, the farmer chooses not to pay ($WTP = 0$): The farmer receives the allocated bags without knowing the aflatoxin content. He keeps the bag for personal consumption, donates the bag intended for donation, and sell the bags intended for sale to us at the market price, unaware of the aflatoxin level.[8]

In the second case, the farmer chooses to pay, but the proposed amount is lower than the applied price ($WTP < P$): the farmer is not willing to pay a price as high as the one randomly chosen, and the same outcomes as the first case apply.

In the third case, the farmer chooses to pay, and the proposed amount is equal to or higher than the applied price ($WTP \geq P$): The farmer pays, receives aflatoxin information, and, if the aflatoxin content is low, keeps the bag for personal consumption, donates the bag intended for donation, and sells the bags intended for sale to us at a market premium of 1600 CFA ($2.4) per kilo instead of the usual 1000 CFA ($1.5). If the aflatoxin content is high, the research team keeps all bags to destroy them[9].

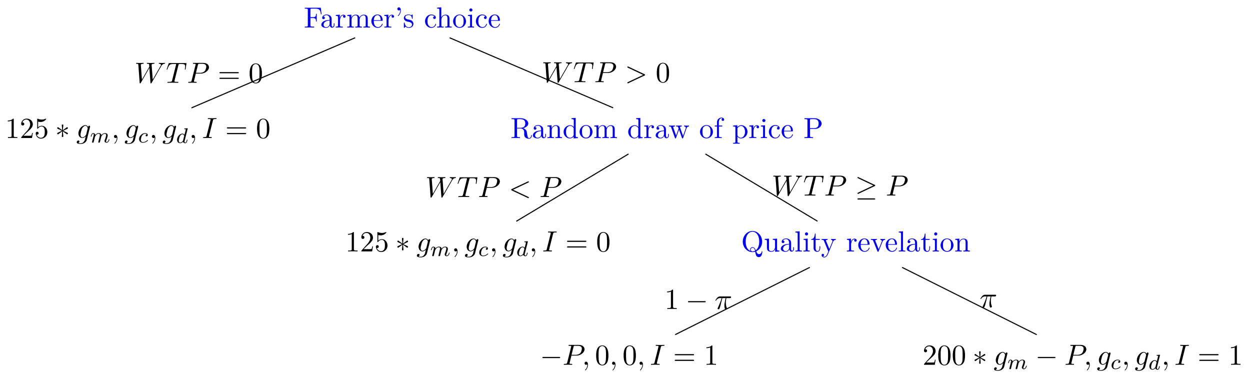
Three cases can occur, with the corresponding payoffs are depicted in Figure 1 below.

[7] See card in Figure A1

[8] The research team makes the donation to children and farmers sell the groundnut to the research team as well

[9] In practice, only groundnuts fit for consumption were offered, though the farmers were unaware of this

Figure 1: Payoff tree



3.2 Estimation Strategy

Each individual participates in a first series of 6 rounds, resulting in panel data with 6 observations per individual. In each round J, the individual indicated his willingness to pay to access information about aflatoxin for the allocation of the presented card. We use the following empirical strategy to test the predictions of our conceptual framework.

$$WTP_{ij} = \alpha + \beta Don_{ij} + Round_j + \tau i + \theta ij \tag{1}$$

The variable of interest is the value of the WTP. We estimate the within-effects of donation using a Poisson Pseudo Maximum Likelihood (PPML) estimator with individual fixed effects. This approach allows us to have a non-linear specification and to handle WTP equal to zero. It also helps mitigate potential biases that can result from the combination of log-linearization and heteroscedasticity (Chen and Roth, 2023; Silva and Tenreyro, 2006).

Don_{ij} represents a variable related to the allocation of groundnuts to donation for the card presented to individual i in round j. We choose to present two similar alternative variables to account for the donation component of the card: the number of bags allocated to donation and a dummy variable for having at least one bag donated during the round. Figure 2 shows us a slight learning effect; therefore, we control for the round with the categorical variable $Round_j$ to account for non-independence between periods for each individual. We include individual fixed effects τ_i. To better account for non-independence between rounds within each individual, we cluster standard errors at the individual level.

Next, we introduce an additional variable that accounts for the presence of a bag allocated to consumption during the round in our regression. This inclusion enables us to assess whether the willingness to pay for donation changes when consumption is taken into account. By incorporating the consumption variable, we can explore how the willingness to pay for donation is influenced by the interplay between altruism (measured by the allocation to donation) and individual consumption decisions. This extension helps us gain deeper insights into the relationship between altruistic behavior and utility components related to safety and well-being. We incorporate this variable into equation 1 as follows:

$$WTP_{ij} = \alpha + \beta_1 Consumption_{ij} + \beta_2 Don_{ij} + Round_j + \tau i + \theta ij \tag{2}$$

This specification enables us to evaluate how the allocation affects the willingness to pay for information about aflatoxin levels.

Next, we seek to evaluate how the obtained estimates vary with participants' initial characteristics, including the extent to which they value other's health γ (which we approximate through the altruism index Alt described in Section 2).

$$\begin{aligned} WTP_{ij} = \alpha + \beta_1 Consumption_{ij} + \beta_1' Consumption_{ij} \times Alt_i + \\ \beta_2 Don_{ij} + \beta_2' Don_{ij} \times Alt_i + Round_j + \tau i + \theta ij \end{aligned} \tag{3}$$

Last, we run similar estimates this time to assess how baseline awareness of the health hazard of aflatoxins A measured through farmers' initial knowledge of these issues help explain our initial estimates.

$$\begin{aligned} WTP_{ij} = \alpha + \beta_1 Consumption_{ij} + \beta_1' Consumption_{ij} \times A_i + \\ \beta_2 Don_{ij} + \beta_2' Don_{ij} \times A_i + Round_j + \tau i + \theta ij \end{aligned} \tag{4}$$

3.3 Results: Willingness to pay for others' health

The results of Equations 1, 2, 3 and 4 are presented in Tables 1 and 2. In columns (1) and (5), we examine the impact of a decrease in private returns, represented by an increase in the donation component of the allocation. The results in column (1) reveal that increasing the share of donation from 0 to 100% leads to a statistically significant decrease of 4.2% (about 22 CFA) in the WTP for aflatoxin information, significant at the 5% level. Additionally, in column (5), we observe a similar decrease in WTP when at least one bag is donated during the round, showing a reduction of 4.1 percentage points, significant at the 1% level. These findings suggest that farmers pay less when they have fewer private returns, as represented by the decrease in bags for their consumption or sale, hinting that farmers are not fully altruistic. This decrease in WTP may indicate that farmers prioritize their own needs and benefits over the benefits of others when it comes to accessing information about food quality.

We differentiate the relative weight put on two different types of private returns in our experiment: private health returns (consumption) and private monetary return (sale). We run Equation 2, which allows us to control for bags allocated for consumption. Columns

(2) and (6) in Table 1 provide the results. Column (6) indicates a statistically significant decrease of 4% (about 21 CFA) in the WTP when at least one bag is donated compared to one bag for sale. We also find in column (2) a decrease in the WTP when there is an increase in the share of groundnuts allocated to donation compared to an increase in bags allocated for sale; however, this decrease is not statistically significant. This implies that farmers' WTP is negatively affected when they have fewer private returns, regardless of the type of private return. These findings support the implication that, on average, farmers may not exhibit strong altruistic tendencies, as they appear to be willing to pay less for the benefit of others. However, we still do not dismiss the existence of altruism as they are still willing to pay for others; their WTP is not null in any case. These results suggest that the composition of the bundle plays a role in determining the WTP and underscores the interdependence of the choices made by farmers.

To explore in greater detail farmers' altruistic preferences, we assess whether the experimental results align with survey-based measures of pro-sociality. We build an altruism index using four questions related to the elicitation of altruism as outlined in Section **??** and in line with Anderson (2008). The index is built as a weighted index of multiple variables standardized with respect to the full sample. We include an interaction term with this index in our set of equations and present the results in columns (3), (4), (7), and (8) of Table 1. The results suggest that when an individual is more altruistic, they do not exhibit a significantly higher WTP when an additional bag is allocated for donation compared to consumption or sale, or when at least one bag is donated during the round. However, when controlling for consumption, we observe a significant effect of increased altruism on WTP in response to increased donation. Table 1 shows a significant additional increase of 4.3% (about 18 CFA) in WTP for more altruistic individuals when there is an increase in the share of bags donated and a significant increase of 2.9% (about 15 CFA) when at least one bag is donated when we control for consumption. In both cases, the increase in WTP among more altruistic farmers does not compensate for the decrease associated with donating more groundnuts. Altruistic farmers are willing to pay more than non-altruistic farmers to reveal information when groundnuts are allocated for others but not as much as for themselves. These findings suggest that our experiment effectively elicits pro-social behavior, indicating that altruistic individuals place greater importance on the health and well-being of others compared to non-altruistic individuals.

Altogether, the results indicate that farmers place different values on access to quality information for the benefit of others (donation) compared to themselves (consumption) or for financial gain (sale). Farmers seem to value the disclosure of groundnut quality less when it does not directly benefit them, as evidenced by the lower WTP when groundnuts are allocated for donation. The results also highlight the interdependence of the choices made by farmers regarding groundnut allocation. This suggests that farmers' preferences for information are influenced by their overall allocation decisions. The findings support the implication that, on average, farmers may not exhibit strong altruistic tendencies. The lower WTP for information when groundnuts are allocated for donation indicates that farmers may prioritize their self-interest over altruistic motivations. The findings also support the notion that farmers' altruistic tendencies influence their WTP for aflatoxin information. Altruistic individuals are more willing to invest in information and place greater importance on the well-being of others compared to their non-altruistic counterparts.

Table 1: Willingness to pay to access quality information

	Poisson **Share of bags**				Poisson **At least one bag**			
	(1) WTP	(2) WTP	(3) WTP	(4) WTP	(5) WTP	(6) WTP	(7) WTP	(8) WTP
Donation	-0.042**	-0.026	-0.043**	-0.027	-0.041***	-0.040***	-0.042***	-0.042***
	(0.021)	(0.024)	(0.021)	(0.024)	(0.014)	(0.014)	(0.014)	(0.014)
Consumption		0.031		0.032		0.003		0.001
		(0.023)		(0.023)		(0.013)		(0.013)
Donation x Index altruism			0.030	0.043*			0.023	0.029*
			(0.024)	(0.025)			(0.015)	(0.015)
Consumption x Index altruism				0.024				0.023*
				(0.024)				(0.013)
Mean WTP	543	543	543	543	543	543	543	543
D.=C.		0.02				0.01		
D+ D x I.A=0			0.65	0.59			0.32	0.52
C+ C x I.A=0				0.08				0.18
D+ D. x I.A+C+ C x I.A				0.27				0.12
FE	Id. & Rd.	Id. & Rd.	Id. & Rd.	Id. & Rd.	Id. & Rd.	Id. & Rd.	Id. & Rd.	Id. & Rd.
Clustered SE	Id.	Id.	Id.	Id.	Id.	Id.	Id.	Id.
Observations	2634	2634	2634	2634	2634	2634	2634	2634

Notes: Panel restricted to the first 6 rounds. All results are obtained from Poisson regressions of the WTP with round and individual fixed effects, and standard errors are clustered at the individual level. In columns (1) to (4), *Donation* represents the share of groundnut bags allocated to donation, and *Consumption* represents the share allocated to consumption. In columns (5) to (8), *Donation* represents the presence of at least one bag for donation, and *Consumption* represents the presence of at least one bag for consumption. *Index altruism* is a standardized weighted index of 4 indicator variables on the elicitation of altruism, following a GLS weighting procedure as described in Anderson (2008).

Second part of the table: The first row presents the mean willingness-to-pay (WTP) for the first 6 rounds. The second, third, fourth, and fifth rows present the p-value for the F-test of significance. The sixth row presents the level of fixed effects (*Id* for individual and *Rd* for round). The seventh row presents the level of the clustered standard errors, and the eighth row presents the number of observations.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

To investigate another aspect of farmers' willingness to pay for aflatoxin-free products, we consider their prior knowledge of aflatoxin. We distinguish between farmers who are genuinely knowledgeable about the harmful effects of aflatoxin and those who are less aware by incorporating their survey responses regarding their awareness of aflatoxin and specific awareness of its health effects.

Table 2 shows that farmers who are aware of or understand the effects of aflatoxin exhibit a significantly higher WTP when there is an increase in the share of bags for donation. This increase in WTP surpasses the decrease observed when the share of bags for donation increases. These results suggest that awareness of aflatoxin's effects mitigates the disparity between self-consumption and others' consumption. In other words, farmers who are more knowledgeable about aflatoxin's health impacts seem to value both private returns and returns to others equally. Interestingly, they do not have a significantly higher WTP when there is an increase in consumption. We acknowledge that our variables may not purely capture knowledge and might be influenced by other confounding factors. Therefore, this specification does not allow us to provide causal evidence. However, in the following section, through our design, we provide causal evidence of the impact of knowledge and awareness on the valuation of food safety.

Table 2: Willingness to pay to access quality information

	Poisson		Poisson	
	Share of bags		**At least one bag**	
	(1)	(2)	(3)	(4)
	WTP	WTP	WTP	WTP
Donation	-0.052*	-0.049*	-0.046***	-0.045***
	(0.028)	(0.026)	(0.017)	(0.015)
Consumption	0.013	0.031	0.001	0.008
	(0.026)	(0.025)	(0.015)	(0.014)
Donation x Heard of aflatoxin	0.114**		0.023	
	(0.052)		(0.029)	
Consumption x Heard of aflatoxin	0.082		0.008	
	(0.055)		(0.032)	
Donation x Knows of aflatoxin		0.188***		0.027
		(0.053)		(0.037)
Consumption x Knows of aflatoxin		0.025		-0.054
		(0.067)		(0.043)
Mean WTP	523	523	523	523
Mean aflatoxin knowledge	0.22	0.22	0.22	0.22
D+ D x A=0	0.15	0.00	0.35	0.60
C+ C x A=0	0.05	0.37	0.74	0.27
D+ D. x A=C+ C x A	0.52	0.24	0.33	0.52
FE	Indiv. & Round	Indiv. & Round	Indiv. & Round	Indiv. & Round
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.
Observations	2634	2634	2634	2634

Notes: Panel restricted to the first 6 rounds. All results are obtained from Poisson regressions of the WTP with round and individual fixed effects, and standard errors are clustered at the individual level. In columns (1) & (2), *Donation* represents the share of groundnut bags allocated to donation, and *Consumption* represents the share allocated to consumption. In columns (3) & (4), *Donation* represents the presence of at least one bag for donation, and *Consumption* represents the presence of at least one bag for consumption. *Heard of aflatoxin* is a dummy variable equal to 1 if the farmer has heard of aflatoxin prior to the experiment. *Knows of aflatoxin* a dummy variable equal to 1 if they knew before the start of the experiment that aflatoxin has a negative effect on health.

Second part of the table: The first row presents the mean willingness-to-pay (WTP) for the first 6 rounds. The second row presents the mean knowledge for the chosen variable related to aflatoxin awareness among the sample. The third, fourth, fifth and sixth rows present the p-value for the F-test of significance. The seventh row presents the level of fixed effects (*Id* for individual and *Rd* for round). The eighth row presents the level of the clustered standard errors, and the eighth row presents the number of observations.

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

4 The effect of information

In the second part of the experiment, we randomized the provision of comprehensive information on aflatoxins, as a means to avoid potential selection biases related to the value of A_i in the previous section, simulate the effect of an information campaign, and explore possible interacted effects between altruism and awareness ($A \times \gamma$).

4.1 Experimental design

Previous research has demonstrated the positive impact of information on WTP for enhanced food quality. Magnan et al. (2021) find that information provision significantly increased food safety practices, with inputs and market incentives reinforcing this effect to a smaller extent. Using BDM mechanisms and hedonic testing, Oparinde et al. (2016) show that information provision increased the WTP of rural Nigerian consumers for bio-fortified cassava. Similarly, Banerji et al. (2016) use the same method to investigate the impact of information on high-iron pearl millet in rural India and conclude that it results in an increase in WTP. Meenakshi et al. (2012), combine stated and revealed preference methods with an initial endowment and show that an information campaign on the nutritional value of bio-fortified maize significantly increases farmers' WTP.

We introduce the information treatment midway through the experiment. The assignment to the treatment is randomized at the individual level, and the treatment is administered between the 6^{th} and the 7^{th} round. After six rounds, farmers are informed of a short break during which they have to watch an 8-minute video. The control group watches a comedy video unrelated to aflatoxins, while the treatment group watches an informative video on aflatoxins in Wolof, presented by a Senegalese scientist from IITA with over 30 years of experience working on aflatoxins in Senegal and Sub-Saharan Africa. The aflatoxins video provides comprehensive information on the health effects, causes, and reasons for prevalence in Senegalese groundnut production [10]. This treatment helps us distinguish WTP when awareness is moderate from WTP when awareness is high.

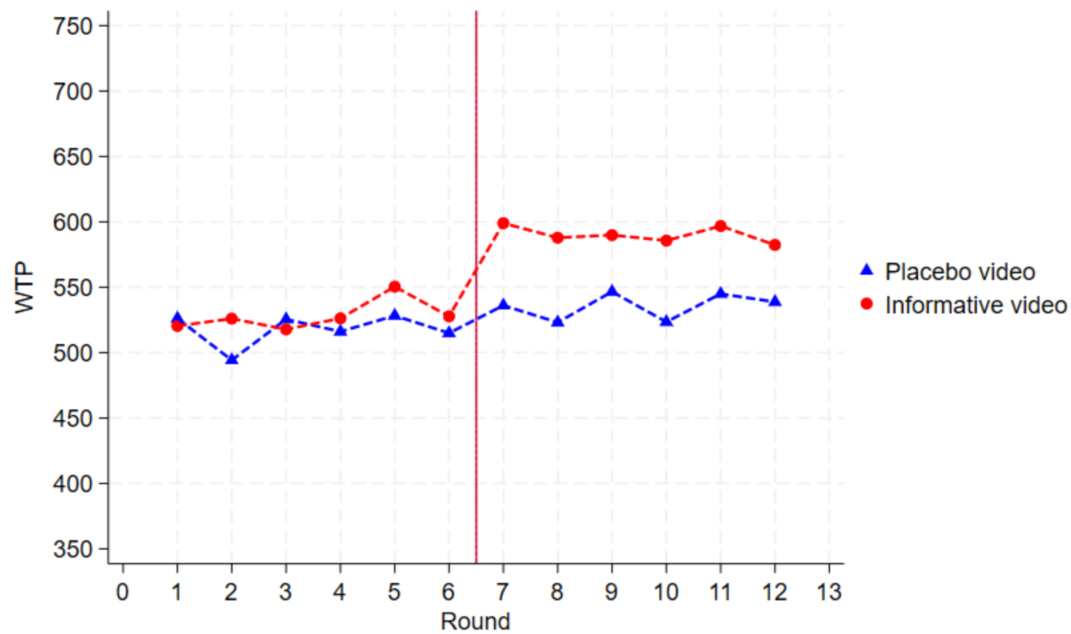
We present several graphics depicting the variations in the WTP. Figure 2 displays the average WTP for each round. Each farmer participated in 12 rounds during the experiment, with the treatment introduced after the sixth round. Before the treatment, the control and treatment groups exhibited similar average WTP. However, we observe a disruption in the average WTP between the two groups after the treatment. Figure 2 also reveals a potential learning effect, as the WTP exhibits a slight increase over the rounds. To further explore the changes in WTP, we present the kernel distribution of WTP before and after the video in Figure 1. While the distributions appear similar before the video in both groups, there is a discernible shift in the distribution after the video, with more individuals

[10] See the complete script in Appendix B.3

in the treatment group willing to pay the maximum amount. In Figure 3, we provide a more detailed breakdown of WTP by treatment status. The largest share of propositions for accessing information on groundnut quality falls within the 900-1000 CFA range in all groups.

Table A3 presents statistics related to the outcome of interest, namely the willingness to pay. Remarkably, nearly all farmers in both the control and treatment groups chose to pay a positive amount in all rounds (98%) of the game, and approximately 15% of farmers consistently offering the maximum amount. The average amount paid by farmers in the control group is around 526 CFA, while those in the treatment group pay about 559 CFA. The median amount paid is about 474 CFA in the control group and about 517 in the treatment group, representing about half of the provided endowment.

Figure 2: Average WTP in each round



4.2 Estimation Strategy

We first evaluate the effect of the treatment and use all rounds to estimate the effect of providing thorough information about aflatoxin on individuals' willingness to pay. First, we estimate the overall average impact of the information campaign on willingness to pay, regardless of allocation. We introduce two dummy variables: $Treatment_i$, which equals 1 if individual i is in the treatment group (watching the video), and $Post_{ij}$, which equals 1 if individual i is in round j played after watching the video (after round 6).

$$WTP_{ij} = \alpha_i + \delta_1 Treatment_i * Post_{ij} + +Round_j + \tau_i + \epsilon_{ij} \quad (5)$$

Next, we modify Equation 1 to similarly estimate changes in willingness to pay due to the information treatment accounting for allocations to donation:

$$\begin{aligned} WTP_{ij} = \alpha_i + \beta_1 Don_{ij} + \delta_1 Treatment_i * Post_{ij} + \\ \delta_2 Don_{ij} * Treatment_i * Post_{ij} + Round_j + \tau_i + \epsilon_{ij} \end{aligned} \tag{6}$$

In Equation 7, we modify 2 along the same lines, to estimate changes in willingness to pay due to the information treatment accounting for allocations to donation and consumption:

$$\begin{aligned} WTP_{ij} = \alpha_i + \beta_1 Consumption_{ij} + \beta_2 Don_{ij} + \delta_1 Treatment_i * Post_{ij} + \\ \delta_2 Consumption_{ij} * Treatment_i * Post_{ij} + \\ \delta_3 Don_{ij} * Treatment_i * Post_{ij} + Round_j + \tau_i + \epsilon_{ij} \end{aligned} \tag{7}$$

Equations 5, 6, and 7 all include round fixed effects, which means we do not include a non-interacted $Post_{ij}$ dummy. Both equations also include individual fixed effects, which means we do not include a non-interacted $Treatment_i$ dummy. We again cluster standard errors at the individual level.

4.3 Results

The results from estimating Equations 5, 6, and 7 are presented in Table 3, providing insights into the impact of the treatment. The findings reveal in column (1) a significant 7.7% increase (about 41 CFA) in willingness to pay when farmers are provided with information about aflatoxins. To further assess the impact of information provision, we conducted a conditional logistic regression analysis using a dummy variable set to 1 when farmers were willing to pay the maximum amount of 1000 CFA, ensuring that (if that round were randomly chosen as binding), they would be sure to learn about the aflatoxin content in the groundnuts. As shown in Table A5, there is a significant 24.1% rise in the probability of farmers opting to pay the maximum amount after being provided with information. This finding supports the idea that well-informed farmers are more inclined to prioritize and secure access to uncontaminated food.

We also explore whether the increase in willingness to pay is influenced by the allocation of groundnuts during the round. Using the specification from Equation 6 in columns (2) and (4), we observe a significant positive effect of the treatment (8.4%) that offsets the decrease in WTP when the share allocated to donation increases. For rounds where at least one bag is donated, the 7.7% increase caused by the treatment exceeds the decrease in WTP caused by the presence of a donated bag. However, no significant additional effect was observed when examining the impact of an increase in donation or when at least one bag is donated. After the treatment, farmers pay 1% more [11] when there is an increase in the share of groundnuts

[11] $e^{0.084-0.053-0.021} - 1$

assigned to donation compared to an increase in sale or consumption before the treatment. Moreover, they pay 3.9% more [12] when at least one bag is donated compared to when no bags are donated before the treatment.

Next, controlling for the full composition of the bundle (Equation 7), we find that an increase in the share of groundnuts allocated to donation raises WTP by 2.4% [13] for treated farmers after the treatment, compared to an increase in sale before the treatment. There is a 2.8% [14] increase in willingness to pay among treated farmers after the treatment when at least one bag is for donation, compared to no bags for donation and at least one bag for consumption before the treatment. We observe no significant additional effect of the treatment depending on the allocation. These results suggest that information provision increases willingness to pay regardless of resource distribution.

Our results indicate that when farmers are better informed about the harmful effects of aflatoxins, they demonstrate a greater willingness to access information about food quality. Informed farmers are more inclined to prioritize and secure access to uncontaminated food. The provision of information positively influences the willingness to pay and donation behavior among farmers, irrespective of how resources are allocated. Specifically, informed farmers tend to display more pronounced altruistic tendencies, which can be attributed to their heightened awareness of food safety concerns. These findings highlight the significant impact of information dissemination on farmers' attitudes and behavior towards food quality and safety, indicating that informed individuals are more inclined to contribute to the well-being of others by supporting initiatives that ensure uncontaminated food access.

The evidence presented highlights the role of individuals' concern for the well-being of others in influencing their contributions towards safety measures. Our study further revealed that altruistic farmers exhibited a greater willingness to support the health of others, though no significant additional effect was observed upon introducing the treatment. Notably, farmers generally valued consumption by others less than their own, particularly when awareness about the harm of aflatoxin was low. Only altruistic farmers valued both equally, thus displaying a form of pure altruism. However, with the introduction of the treatment, which increased awareness about the health impact of aflatoxin, farmers developed a better understanding of its harmful effects. They began to place greater value on ensuring safety for both themselves and others. Such results suggest that what we observe is not pure altruism, where individuals exhibit unconditional concern for the well-being of others. This implication resonates with the work of Jones-Lee (1991), who observed that individuals strike a balance between their own well-being and the well-being of others when making safety-related decisions, expressing altruism in the context of safety concerns. Overall, our research emphasizes the complementary relationship between information provision and

[12] $e^{0.077-0.039-0.000} - 1$

[13] $e^{0.074-0.039-0.011}$

[14] $e^{0.067-0.042+0.003}$

altruistic behavior, underscoring the importance of well-informed individuals contributing to safety initiatives for the greater good.

This highlights the critical role of awareness and education in influencing farmers' economic decisions and suggests that increasing awareness about aflatoxin could enhance the effectiveness of interventions in promoting safer agricultural practices.

Table 3: Effect of information on willingness to pay to access information about quality

	Poisson	Poisson		Poisson	
		Share of bags		**At least one bag**	
	(1)	(2)	(3)	(4)	(5)
	WTP	WTP	WTP	WTP	WTP
Post video	0.034	0.034	0.034	0.035	0.035
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Treatment x Post	0.077***	0.084***	0.074**	0.077**	0.067*
	(0.030)	(0.031)	(0.035)	(0.032)	(0.035)
Donation		-0.053***	-0.039*	-0.039***	-0.042***
		(0.018)	(0.020)	(0.012)	(0.012)
Donation x Treatment x Post		-0.021	-0.011	0.000	0.003
		(0.027)	(0.032)	(0.019)	(0.019)
Consumption			0.028		-0.016
			(0.020)		(0.011)
Consumption. x Treatment x Post			0.021		0.012
			(0.038)		(0.020)
Mean WTP Control group		527	527	527	527
C + P + T x P+ C x T x P=0			0.00		0.00
D+ P + T x P+ D x T x P=0		0.09	0.04	0.00	0.02
C+ P + T x P+ C x T x P=D + P + T x P+ D T x P			0.00		0.07
FE	Id.	Id.	Id.	Id.	Id.
Clustered SE	Id.	Id.	Id.	Id.	Id.
Observations	5268	5268	5268	5268	5268

Notes: All results are obtained from Poisson regressions of the WTP with round and individual fixed effects, and standard errors are clustered at the individual level. *Post video* is a dummy variable equal to 1 if the round is played after having watched the video. *Treatment* is a dummy variable equal to one if the farmer is in the treatment group and 0 otherwise. In columns (2) to (3), *Donation* represents the share of groundnut bags allocated to donation, and *Consumption* represents the share allocated to consumption. In columns (4) to (5), *Donation* represents the presence of at least one bag for donation, and *Consumption* represents the presence of at least one bag for consumption.

Second part of the table: The first row presents the mean willingness-to-pay (WTP) for the individuals in the control group. The second, third and fourth rows present the p-value for the F-test of significance. The fifth row presents the level of fixed effects (*Id* for individual and *Rd* for round). The sixth row presents the level of the clustered standard errors, and the seventh row presents the number of observations.

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

5 Robustness

We highlight altruism as the mechanism driving the observed increase in willingness to pay when groundnuts are allocated to others. Our experimental design and definition of altruistic preferences provide a robust framework to examine this phenomenon. To ensure the reliability of our findings, we also investigate whether non-altruistic preferences, such as risk aversion, impact willingness to pay for donation. To assess this, we create an index of risk aversion based on survey data, specifically drawn from questions on risk perception in life and agriculture from the GPS survey. We replicate Table 1 using the risk aversion index instead of the altruism index. Table A4 demonstrate that being risk averse does not significantly influence willingness to pay when groundnuts are allocated for donation. This outcome supports the conclusion that the observed increase in willingness to pay for donation is independent of forms of risk aversion or related preferences.

As part of our robustness checks, we implemented two different specifications. In the first one, we employ a linear estimation using individual fixed effects, and in the second one, we use random effects in the regression analysis. The results from these specifications are quite similar and point in the same direction as our results using a Poisson regression, with only changes in magnitude. Overall, the results of these various robustness checks consistently support our main findings, providing further confidence in the reliability of our conclusions regarding the impacts of information and altruism on the willingness to pay for donation of groundnuts.

6 Conclusion

Health risks associated with aflatoxins have long been documented in scientific literature, yet the awareness of these dangers remains inadequate among consumers in low-income countries. Local authorities and governments have implemented limited and ineffective policies to address this issue.

In light of this context, the main objective of our research is to explore strategies that could incentivize producers to invest in higher safety standards for their products, particularly in local markets where regulatory and enforcement capacities may be lacking. We interpret a producer's willingness to enhance the safety of their production as an expression of altruism driven by the desire to protect consumers without immediate monetary expectations from the local market. Our findings provide evidence that farmers are willing to pay a premium for groundnuts with low levels of aflatoxin when they are fully aware of its harmful effects. Altruistic farmers display relatively more equal regard for all uses of groundnuts, while non-altruistic farmers prioritize their own consumption or financial gain over the well-being of others. Providing comprehensive information about aflatoxins significantly increases farmers' willingness to pay for safer groundnuts, regardless of whether they are intended for personal use or sale.

Additionally, our study reveals that once informed, both altruistic and non-altruistic farmers demonstrate similar levels of willingness to pay for information about food safety. This suggests that altruistic farmers consistently prioritize the well-being of others, while non-altruistic farmers may become more considerate of others' health when they recognize the harmful effects of aflatoxin.

One potential limitation of our research design is that the decision to invest in information about food safety applies jointly to all uses. In some contexts, farmers may be able to sort based on observable signals of food safety, meaning decisions are not fully joint. However, in contexts like the case of aflatoxins, sorting on observable signals is relatively infeasible. Our findings provide valuable insights into food safety and quality upgrading in the context of missing markets. Senegalese farmers may hesitate to invest in quality upgrading due to the lack of financial incentives in the local market. However, when considering aflatoxin contamination as not merely an economic concern but a public health problem, farmers may find additional motivation to take action. Informing farmers about the adverse effects of aflatoxin could serve as a catalyst for investment in quality upgrading, driven by farmers' concern for their own health and the well-being of consumers, some of whom may be their neighbors.

In light of these research findings, policymakers should capitalize on this knowledge to develop interventions that promote food safety and encourage producers to adopt higher safety standards for the greater good of society. Ensuring access to comprehensive information can be a crucial step towards fostering a culture of safety-based altruism, where producers prioritize consumer welfare and actively contribute to safer food production practices.

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A Appendix

A.1 Theoretical framework

We unfold the maximization solving program as follow :

$$\max_{WTP} \{\Pr(p > WTP)U(Card_j; I = 0) + \Pr(p < WTP)U(Card; I = 1)\}$$

$$\max_{WTP}(1 - \Pr(p < WTP))(U(Card_j; I = 0) + \Pr(p < WTP)U(Card; I = 1)$$

$$\max_{WTP} U(Card_j; I = 0) + \Pr(p < WTP)(U(Card; I = 1) - U(Card_j; I = 0)$$

$$\max_{WTP} U(Card_j; I = 0) + \Pr(p < WTP)(U(Card; I = 1) - U(Card_j; I = 0)$$

$$\begin{aligned}\max_{WTP} & U(Card_j; I = 0) + \Pr(p < WTP)(\pi(B_s(g_{jc}) + \gamma B_o(g_{jd}) + \lambda(200 \cdot g_{js})) \\ & - \lambda E(P|P \leq WTP) - (\pi(B_s(g_{jc}) + \gamma B_o(g_{jd})) \\ & + (1 - \pi)(-L_s((g_{jc}|T) - \alpha L_o(g_{jd}|T) + \lambda(125 \cdot g_{js})))\end{aligned}$$

$$\begin{aligned}\max_{WTP} & U(Card_j; I = 0) + \Pr(p < WTP)(\pi\lambda(200 \cdot g_{js}) - \lambda(125 \cdot g_{js}) \\ & + \pi(B_s(g_{jc}) + \gamma B_o(g_{jd})) - (\pi(B_s(g_{jc}) + \gamma B_o(g_{jd})) \\ & - \lambda E(P|P \leq WTP) - ((1 - \pi)(-L_s((g_{jc}|T) - \alpha L_o(g_{jd}|T)+))\end{aligned}$$

$$\begin{aligned}\max_{WTP} & U(Card_j; I = 0) + \Pr(p < WTP)(\lambda(200\pi - \lambda(125)) \cdot g_{js}) \\ & - \lambda E(P|P \leq WTP) - ((1 - \pi)(-L_s((g_{jc}|T) - \alpha L_o(g_{jd}|T)+))\end{aligned}$$

Knowing that $4 = n_{jc} + n_{jd} + n_{js}$ and that p follows a continuous uniform distribution from 0 to 1000 , we have :

$$\begin{aligned}\max_{WTP} & U(Card_j; I = 0) + \frac{WTP}{1000}(\lambda(200\pi - (125)) \cdot (4 - n_{jc} - n_{jd})) \\ & - \lambda\frac{WTP}{2} - ((1 - \pi)(-L_s((g_{jc}|T) - \alpha L_o(g_{jd}|T)+))\end{aligned}$$

$$\begin{aligned}\max_{WTP} & U(Card_j; I = 0) + \frac{WTP}{1000}(\lambda(200\pi - (125)) \cdot (4 - n_{jc} - n_{jd})) \\ & - ((1 - \pi)(-L_s((g_{jc}|T) - \alpha L_o(g_{jd}|T)+)) - \lambda\frac{WTP^2}{2000}\end{aligned}$$

We maximize the utility function and have :

$$0 = \frac{1}{1000}(\lambda(200\pi - 125)(4 - n_{jc} - n_{jd}) + (1-\pi)(L_s(n_{jc}|T) + \gamma L_o(n_{jd}|T))) - \lambda\frac{WTP}{1000}$$

$$\lambda\frac{WTP}{1000}WTP = \frac{1}{1000}(\lambda(200\pi - 125)(4 - n_{jc} - n_{jd}) + (1-\pi)(L_s(n_{jc}|T) + \gamma L_o(n_{jd}|T)))$$

$$WTP = (200\pi - 125)(4 - n_{jc} - n_{jd}) + \frac{1}{\lambda}(1-\pi)(L_s(n_{jc}|T) + \gamma L_o(n_{jd}|T))$$

A.2 Figures

Table A1: Blank card

	Répartition
Consommation 	○ ○ ○ ○
Don 	○ ○ ○ ○
Vente 	○ ○ ○ ○

Figure 1: Average WTP

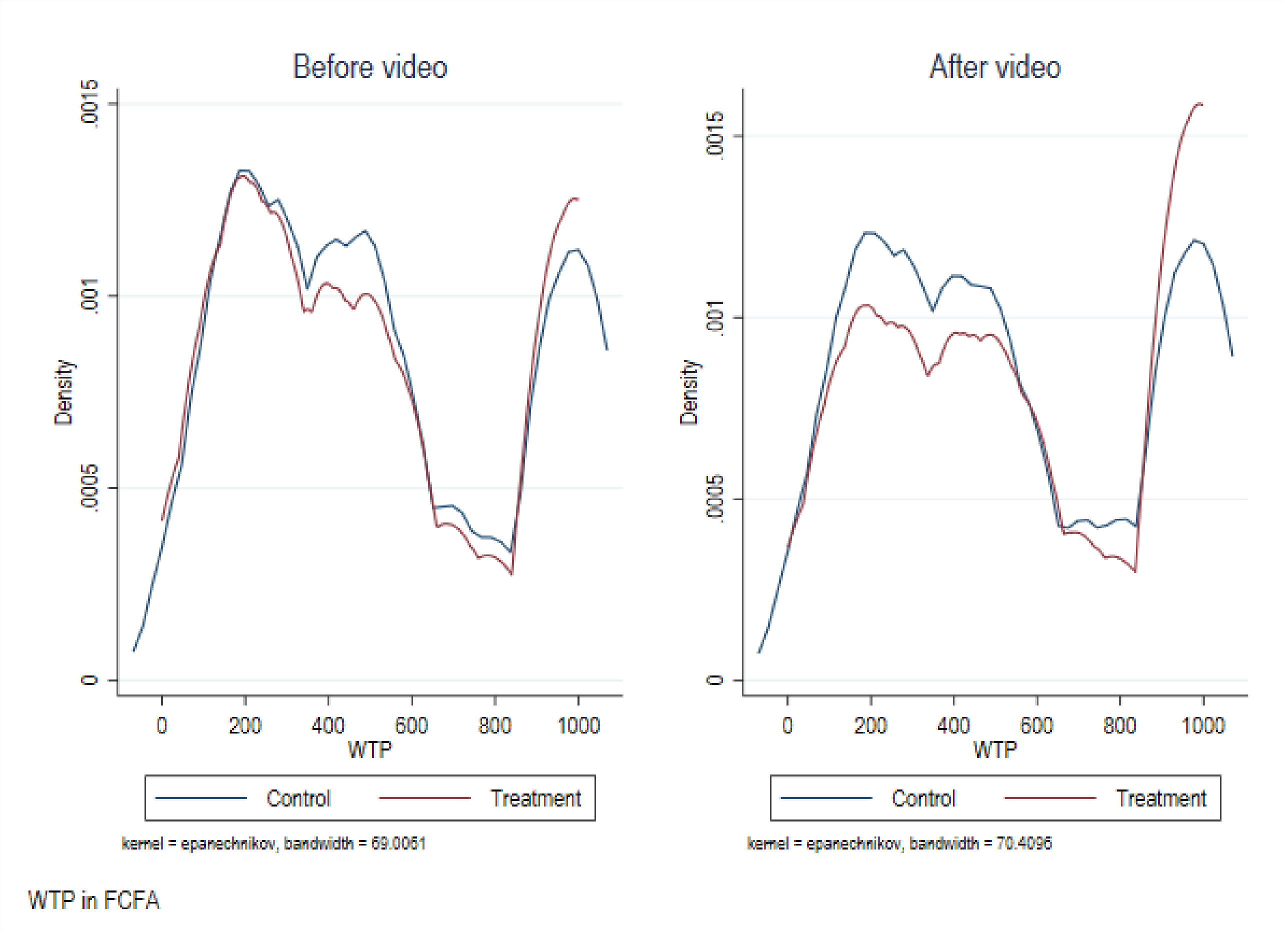
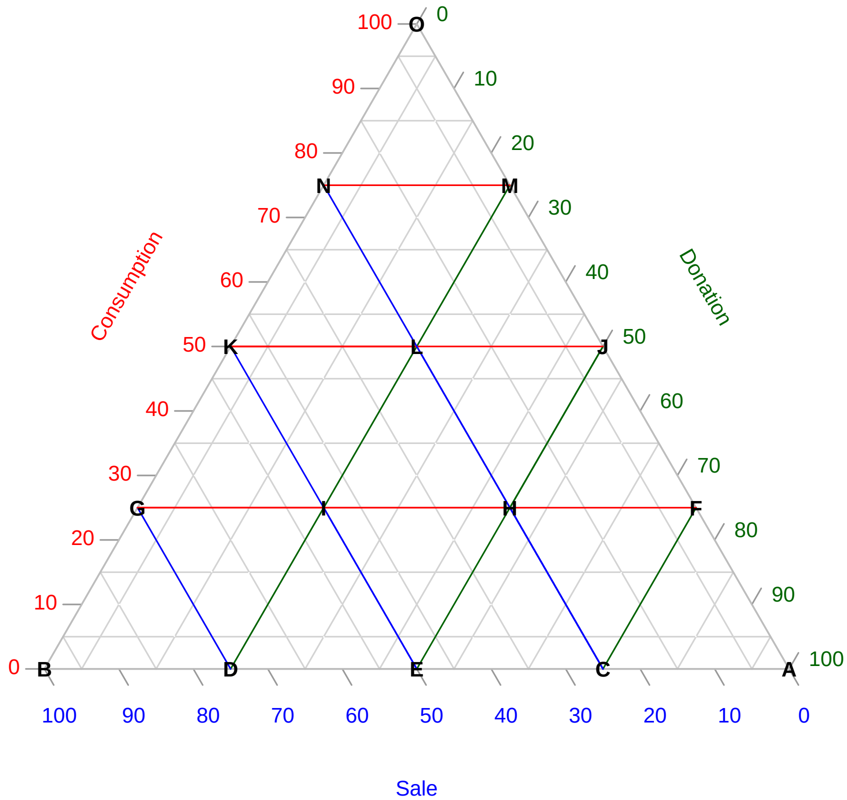


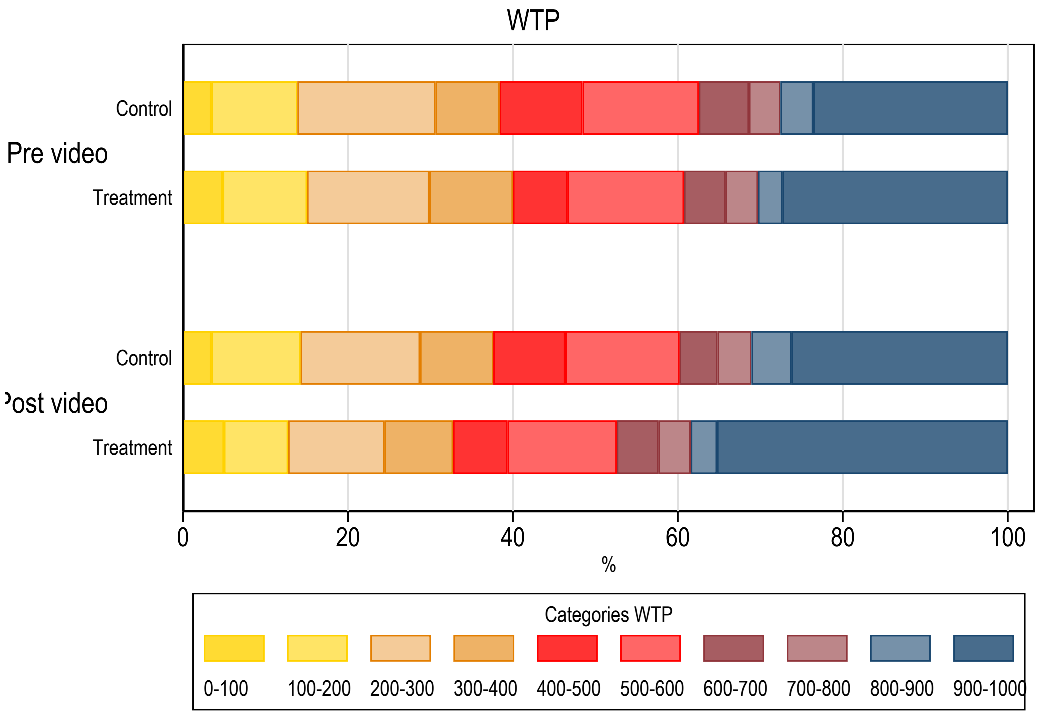
Figure 2: Available bundles



Each side of the triangle represents the share in percent of the groundnuts allocated to the a usage: consumption in red, donation in green and sale in blue. Each letter represents a distribution in the experiment [15]

[15] To obtain a distribution: read the number of the color of the lines connecting the letter. For example, H is on the blue line of 25, green line of 50, and red line of 25; therefore, in this bundle, 25% is allocated to sale, 50% is allocated to donation, and 25% is allocated to consumption. The exceptions are points A, B, and O, which represent bundles with only one allocation (respectively, full donation, full sale, and full consumption).

Figure 3: Distribution WTP by treatment status



A.3 Tables

Table A2: Descriptive statistics

	Control			Treatment			
	Mean	Sd	N	Mean	Sd	N	Diff
Age	54.54	13.65	214	54.70	13.30	225	0.16
Sex	0.80	0.40	214	0.85	0.35	225	0.05
Years Educ.	3.15	4.96	214	3.31	4.82	225	0.15
Can read	0.36	0.48	214	0.40	0.49	225	0.04
Can write	0.33	0.47	214	0.37	0.48	225	0.04
Qty Seeds 2022 (kg)	92.41	64.46	196	83.17	57.67	201	-9.24
Size groundnut plot (ha)	1.20	0.98	214	1.08	0.89	225	-0.11
Harvest 2021	0.87	0.34	206	0.95	0.22	215	0.08***
Qty harvested 2021 (kg)	233.04	305.19	179	185.83	275.67	204	-47.21
Sold in 2021	0.11	0.31	179	0.08	0.27	204	-0.03
Positive Harvest	0.79	0.41	179	0.71	0.45	204	-0.08*
Consumed part of production 2021	0.99	0.12	142	0.98	0.14	145	-0.01
Donated part of production 2021	0.45	0.50	142	0.54	0.50	145	0.09
Sold part of production 2021	0.13	0.34	142	0.11	0.31	145	-0.02
Share groundnuts donated	0.09	0.14	142	0.11	0.13	145	0.02
Heard of aflatoxin	0.23	0.42	214	0.21	0.41	225	-0.02
Knows health impact of aflatoxin	0.12	0.33	214	0.09	0.29	225	-0.03
Share groundnuts sold	0.07	0.20	142	0.05	0.18	145	-0.02
Share groundnuts consumed	0.75	0.29	142	0.75	0.26	145	-0.00
Share groundnuts donated	0.09	0.14	142	0.11	0.13	145	0.02
Days happy provided advice (0 to 7)	3.80	2.36	214	3.61	2.30	225	-0.19
Days happy provided help (0 to 7)	2.98	2.22	214	3.01	2.25	225	0.03
Days sad didn't give advice (0 to 7)	0.57	1.11	214	0.45	0.87	225	-0.12
Gives gift	0.97	0.18	214	0.96	0.21	225	-0.01
Level cost gift (1 to 7)	5.34	1.24	207	5.17	1.38	215	-0.18

Table A3: Descriptive statistics on the WTP

	Control				**Treatment**			
	Mean	Med	Min	Max	Mean	Med	Min	Max
Always WTP > 0	0.98	1.00	0.00	1	0.98	1.00	0.00	1
	(0.14)				(0.13)			
Always WTP=1 000 FCFA	0.12	0.00	0.00	1	0.17	0.00	0.00	1
	(0.33)				(0.38)			
Average WTP	526.53	473.96	33.33	1000	559.19	516.67	37.50	1000
	(282.08)				(299.10)			
Average WTP pre-video	517.55	470.83	25.00	1000	528.11	483.33	25.00	1000
	(290.52)				(303.85)			
Average WTP post-video	535.51	491.67	33.33	1000	590.26	558.33	50.00	1000
	(297.38)				(318.91)			
Observations	214				225			

Table A4: Valuation of health and altruism relatively to financial gain for the first 6 rounds

	Poisson **Share of bags**		Poisson **At least one bag**	
	(1)	(2)	(3)	(4)
	WTP	WTP	WTP	WTP
Donation	-0.042**	-0.026	-0.041***	-0.040***
	(0.021)	(0.024)	(0.014)	(0.014)
Donation x Index risk	0.003	-0.001	-0.009	-0.012
	(0.022)	(0.023)	(0.014)	(0.014)
Consumption		0.032		0.002
		(0.023)		(0.013)
Consumption x Index risk		-0.009		-0.011
		(0.022)		(0.014)
Mean WTP	543	543	543	543
D+ D x I.A=0	0.17	0.37	0.01	0.01
C+ C x I.A=0		0.48		0.62
C+ C x I.A=D+ D. x I.A		0.15		0.09
FE	Indiv. & Round	Indiv. & Round	Indiv & Round	Indiv. & Round
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.
Observations	2634	2634	2634	2634

Notes: Panel restricted to the first 6 rounds played. Columns 1 & 2 present the results from a Poisson regression of the WTP with round and individual fixed effects and standard errors clustered at the individual level. We create a risk preference variable as a standardized weighted index of 5 indicator variables on risk perception in life and agriculture, following a GLS weighting procedure as described in Anderson (2008). We build a dummy equal to one if the index score is above the median and zero otherwise. Column 1 presents the results of the regression on the number of groundnut bags allocated to donation and the interaction with the measure of risk aversion. Column 2 presents the results of the regression on at least one bag being donated and the interaction with the measure of risk aversion.

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

Table A5: Average treatment effect on willingness to pay the maximum

	Logit
	(1)
	WTP=1000 FCFA
Post video	0.053
	(0.065)
Treat.x Post	0.241***
	(0.088)
FE	Indiv.
Clustered SE	Indiv.
Observations	1716

Notes: This table presents the results from a regression of a conditional logistic regression on a dummy equal to one if the farmer paid the maximum amount (1000 CFA) with round and individual fixed effects and standard errors clustered at the individual level.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A6: Effect of information on willingness to pay to access information about quality : Observations restricted to the rounds after the video

	Poisson **Share of bags**		Poisson **At least one bag**	
	(1) WTP	(2) WTP	(3) WTP	(4) WTP
Donation	-0.066***	-0.059***	-0.059***	-0.048***
	(0.024)	(0.022)	(0.013)	(0.012)
Consumption	0.039	0.038	-0.010	-0.011
	(0.025)	(0.024)	(0.014)	(0.014)
Don. x Heard of aflatoxin	0.064		0.073*	
	(0.077)		(0.038)	
Cons. x Heard of aflatoxin	0.054		-0.021	
	(0.089)		(0.051)	
Don. x Heard of aflatoxin x Treat.	-0.047		-0.026	
	(0.085)		(0.043)	
Cons. x Heard of aflatoxin x Treat.	-0.119		0.019	
	(0.105)		(0.057)	
Don. x Knows of aflatoxin		0.085		0.030
		(0.092)		(0.047)
Cons. x Knows of aflatoxin		0.041		-0.033
		(0.060)		(0.041)
Don. x Knows of aflatoxin x Treat.		-0.128		-0.020
		(0.118)		(0.061)
Cons. x Knows of aflatoxin x Treat.		-0.116		0.044
		(0.129)		(0.068)
Mean WTP	536	536	536	536
Mean aflatoxin knowledge	0.23	0.12	0.23	0.12
D+ D x A+D x A x T=0	0.26	0.19	0.62	0.36
C+ C x A+ C x A x T=0	0.67	0.75	0.65	1.00
D+ D x A + D x A x T=C+ C x A + Cx A x T	0.59	0.06	0.97	0.54
FE	Indiv. & Round	Indiv. & Round	Indiv. & Round	Indiv. & Round
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.
Observations	2634	2634	2634	2634

Notes: All results are obtained from Poisson regressions of the WTP with round and individual fixed effects, and standard errors are clustered at the individual level.Observations restricted to the rounds after the treatment *Post video* is a dummy variable equal to 1 if the round is played after having watched the video. *Treatment* is a dummy variable equal to one if the farmer is in the treatment group and 0 otherwise. In columns (2) to (3), *Donation* represents the share of groundnut bags allocated to donation, and *Consumption* represents the share allocated to consumption. In columns (4) to (5), *Donation* represents the presence of at least one bag for donation, and *Consumption* represents the presence of at least one bag for consumption. *Heard of aflatoxin* is a dummy variable equal to 1 if the farmer has heard of aflatoxin prior to the experiment. *Knows of aflatoxin* a dummy variable equal to 1 if they knew before the start of the experiment that aflatoxin has a negative effect on health.

Second part of the table: The first row presents the mean willingness-to-pay (WTP) for the first 6 rounds. The second row presents the mean knowledge for the chosen variable related to aflatoxin awareness among the sample. The third, fourth, fifth and sixth rows present the p-value for the F-test of significance. The seventh row presents the level of fixed effects (*Id* for individual and *Rd* for round). The eighth row presents the level of the clustered standard errors, and the eighth row presents the number of observations.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A7: Altruism and the effect of information on willingness to pay to access information about quality : Observations restricted to the rounds after the video

	Poisson		Poisson	
	Share of bags		**At least one bag**	
	(1)	(2)	(3)	(4)
	WTP	WTP	WTP	WTP
Donation	-0.075***	-0.057***	-0.044***	-0.047***
	(0.018)	(0.021)	(0.011)	(0.011)
Donation x Index altruism	0.029	0.035	0.016	0.018
	(0.025)	(0.028)	(0.015)	(0.015)
Don. x Index altruism x Treat.	-0.011	-0.032	-0.011	-0.020
	(0.036)	(0.042)	(0.022)	(0.022)
Consumption		0.036		-0.014
		(0.023)		(0.013)
Consumption x Index altruism		0.018		0.019
		(0.026)		(0.018)
Cons. x Index altruism x Treat		-0.046		-0.047*
		(0.041)		(0.024)
Mean WTP	536	536	536	536
Mean aflatoxin knowledge	0.23	0.23	0.23	0.23
D+ D x I.A+D x I.A x T=0	0.08	0.17	0.05	0.01
C+ C x I.A+ C x I.A x T=0		0.86		0.05
D+ D x I.A + D x I.A x T=C+ C x I.A + Cx I.A x T		0.09		0.78
FE	Indiv. & Round	Indiv. & Round	Indiv. & Round	Indiv. & Round
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.
Observations	2634	2634	2634	2634

Notes: All results are obtained from Poisson regressions of the WTP with round and individual fixed effects, and standard errors are clustered at the individual level.Observations restricted to the rounds after the treatment *Post video* is a dummy variable equal to 1 if the round is played after having watched the video. *Treatment* is a dummy variable equal to one if the farmer is in the treatment group and 0 otherwise. In columns (2) to (3), *Donation* represents the share of groundnut bags allocated to donation, and *Consumption* represents the share allocated to consumption. In columns (4) to (5), *Donation* represents the presence of at least one bag for donation, and *Consumption* represents the presence of at least one bag for consumption.*Index altruism* is a standardized weighted index of 4 indicator variables on the elicitation of altruism, following a GLS weighting procedure as described in Anderson (2008).

Second part of the table: The first row presents the mean willingness-to-pay (WTP) for the first 6 rounds. The second, third, fourth, and fifth rows present the p-value for the F-test of significance. The sixth row presents the level of fixed effects (*Id* for individual and *Rd* for round). The seventh row presents the level of the clustered standard errors, and the eighth row presents the number of observations.

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

Table A8: Effect of information on willingness to pay to access information about quality : Random effect

	Poisson **Share of bags**				Poisson **At least one bag**			
	(1) WTP	(2) WTP	(3) WTP	(4) WTP	(5) WTP	(6) WTP	(7) WTP	(8) WTP
Donation	-0.042**	-0.042**	-0.026	-0.026	-0.041***	-0.041***	-0.040***	-0.040***
	(0.019)	(0.021)	(0.021)	(0.024)	(0.012)	(0.014)	(0.012)	(0.014)
Consumption			0.031	0.031			0.003	0.003
			(0.021)	(0.023)			(0.012)	(0.013)
Cons.=Don.			0.01	0.02			0.00	0.01
FE	Indiv. & Round	Rand & Rd	Id. & Rd	Rand & Rd	Id. & Rd	Rand & Rd	Id. & Rd	Rand & Rd
RE	No	Yes	No	Yes	No	Yes	No	Yes
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.	Indiv.	Indiv.	Indiv.	Indiv.
Observations	2634	2634	2634	2634	2634	2634	2634	2634

Notes: Columns 1 & 3 present the results from a Poisson regression of the WTP with round and individual fixed effects and standard errors clustered at the individual level. Columns 2 & 4 present the results from a Poisson regression of the WTP with random effects and standard errors clustered at the individual level. Column 1 & 2 present the results of the regression on the number of groundnut bags allocated to donation or consumption. Column 3 & 4 present the results of the regression on at least one bag being donated or consumed in the round.
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A9: Effect of information on willingness to pay to access information about quality : Random Effect

	OLS			
	(1)	(2)	(3)	(4)
	WTP	WTP	WTP	WTP
No. bags for donation	-19.763*	-19.504*		
	(10.340)	(10.346)		
No. bags for consumption	15.507	15.231		
	(10.881)	(10.870)		
Treatment x Post	61.035***	60.784***	40.617**	41.240**
	(15.684)	(15.624)	(19.184)	(18.969)
No. bags for don. x Treatment x Post	-9.583	-9.450		
	(18.271)	(18.290)		
No. bags for cons. x Treatment x Post	13.495	14.240		
	(21.637)	(21.604)		
At least one donation			-22.479***	-22.050***
			(6.269)	(6.277)
At least one consumption			-8.451	-8.605
			(5.971)	(5.965)
At least one don. x Treatment x Post			-1.537	-2.290
			(10.915)	(10.885)
At least one cons. x Treatment x Post			7.349	8.030
			(11.371)	(11.380)
FE	Indiv. & Round	Round	Indiv. & Round	Round
RE	No	Yes	No	Yes
Clustered SE	Indiv.	Indiv.	Indiv.	Indiv.
Observations	5268	5268	5268	5268

Notes: Columns 1 & 3 present the results from an OLS regression of the inverse hyperbolic sine of the WTP with round and individual fixed effects and standard errors clustered at the individual level. Columns 2 & 4 present the results from an OLS regression of the inverse hyperbolic sine of the WTP with random effects and standard errors clustered at the individual level. Column 1 & 2 presents the results of the regression on the number of groundnut bags allocated to donation in the round and the interaction with the treatment. Column 3 & 4 presents the results of the regression on at least one bag being donated in the round and the interaction with the treatment .

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

B Baseline details

B.1 Experiment script

Thank you for participating in this survey. You will now receive a fee of 2,000 FCFA for your participation in this survey, and we would like to point out that the participation fee is yours regardless of the results of the next part.

At this point, we give 1,000 FCFA to the respondent and then proceed to ask about participation in the experiment.

We would like to propose that you participate in a game where you are offered a series of choices to obtain a quantity of peanut powder (Noflay). Are you willing to participate in this experiment?

If the farmer wants to end, the survey stops here. Otherwise, the script continues as follows:

I will present you successively with several cards like this one [SHOW EXAMPLE CARD], each having a different distribution of 500g of Noflay.

The distribution of the 500g of Noflay is between 3 different purposes: we can give it to you for your own consumption, you can let us keep it to give it as a donation to a Talibe, and you can sell it to us. The price is the market price of 1,000 FCFA per kg, therefore 125 FCFA for one bag. For each card, you will be asked whether you want to pay to know if the level of aflatoxin contained in the groundnut is high or low.

We present a brief description of aflatoxin and its prevalence in Senegalese groundnut.

Aflatoxin is a toxin present in some groundnuts and has a long-term impact on health. It can cause liver cancer if consumed over a long period. Aflatoxin is present in 1/3 of the groundnut production in Senegal according to a recent study.

If you choose to pay to know the level of aflatoxin contained in the groundnut, we will reveal it. If the level of aflatoxin is revealed to be high, we will keep it as it is not safe for consumption. If the level is low, we will give it to you, to the Talibe, or buy it from you at 1,600 FCFA per kg, so 200 FCFA per bag. To determine the price, you will be asked to propose the maximum price you are ready to pay to have the information on the aflatoxin level.

We will then randomly draw a multiple of 50 between 0 and 600; if the price you chose is above, the price randomly chosen will be applied. If it is under, you cannot test the groundnut. We will draw 6 cards, then have a break and show you a video, then draw 6 other cards. After the experiment is completed, one of the choices you make will be selected randomly, and you will be rewarded according to the choice you made. We will do practice rounds with bags of biscuits for you to familiarize yourself and better understand how the main experiment with the groundnuts will occur.

Do you have any questions? Is everything clear?

We will now illustrate what will be done with the groundnut using bags of cookies. [SHOW THE COOKIES]

The enumerator proceeds to example rounds with the cookies.

This is how the peanut experiment that we are now going to start will proceed.

The experiment begins.

B.2 Behavioral Variable Measurement

Risk

Following Deutschmann et al. (2022), we elicited risk aversion using an 11-point scale:

- Please tell me, in general, how willing or unwilling you are to take risks, using a scale from 0 to 10, where 0 means you are "completely unwilling to take risks" and 10 means you are "very willing to take risks." You can also use any number between 0 and 10 to indicate where you fall on the scale, using 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

Altruism

To define altruism, we build an index using answers to four questions related to the elicitation of altruism, 3 drawn from Behaghel et al. (2020) and 1 from the Global Preference Survey:

- In the last 7 days, how many days have you been happy because you could provide somebody with advice?
- In the last 7 days, how many days did you feel good because you were able to help another person?
- In the last 7 days, how many days were you annoyed because you had to do something for somebody else?
- Please think about what you would do in the following situation. You are in an area you are not familiar with, and you realize that you lost your way. You ask a stranger for directions. The stranger offers to take you to your destination. Helping you costs the stranger about 5,000 FCFA in total. However, the stranger says he or she does not want any money from you. You have six presents with you. The cheapest present costs 1,000 FCFA, the most expensive one costs 6,000 FCFA. Do you give one of the presents to the stranger as a "thank you" gift? Which present do you give to the stranger? The present worth 1,000 / 2,000 / 3,000 / 4,000 / 5,000 / 6,000 FCFA / Don't know.

B.3 Informative video script

Added voice to rhythm the video: Asalamu Aleikum, dear farmers and consumers. Today, we will discuss aflatoxin with Mr.Senghor, an expert in plant-related issues.

Dr. Senghor: My name is Amadou Lamine Senghor; I am being called Dr. Senghor. I work in the field of plant diseases at the International Institute of Tropical Agriculture (IITA) in Ibadan. I also work at Bamtaare, a subsidiary of Sodefitex, a company known in Senegal, which is a company that helps farmers with agricultural inputs and services they need in agriculture. I started working in agriculture in 1989, so it has been a long time. I am specialized in the diseases of cultivated plants in order to help the development of agriculture. I work to eradicate everything harmful to humans and animals in crops, especially aflatoxin in peanuts and corn.

Added voice to rhythm the video: What is aflatoxin, and what causes it?

Dr. Senghor: Aflatoxin was known to be present in peanuts, but it turns out that it is also present in corn. The subject of aflatoxin has been discussed for a long time in Senegal. Some people know about it, others do not. What gives aflatoxin is what is called "Guerté Sabou" [*Soap Peanuts*], peanut seeds that are rotten and full of holes. These "Guerté Sabou" should not be eaten. In the past, when peanuts were sorted, they were used to make soap. Today, this peanut is consumed.

What gives aflatoxin is a disease that is found in the soil. Because peanuts are in the soil until they mature, it is possible to find aflatoxin in peanuts. For farmers, many factors promote aflatoxin in peanuts or corn. When cultivating, a break in the rainfall can lead to the proliferation of aflatoxin in peanuts and maize. During sowing or threshing, small scratches can be made in the peanuts, and the aflatoxin-giving disease passes through these doors to enter the peanut, develops by feeding on the peanut and creates aflatoxin. It is visible in the form of a mold that is unhealthy to eat. This mold can also develop when the storage is not good because of heat and humidity. It is essential to know that we are in a region that is hot and humid, so when peanuts or corn are stored, if rot or mold appears, it will increase a lot even if there was not much of it at the time of harvest. If we keep this production for a few months, the mold develops greatly.

Added voice to rythm the video: What is the effect of aflatoxin on human health ?

Dr. Senghor: If we talk about the effects of aflatoxin on humans and food, aflatoxin is very bad because it attacks the liver, and we all know the importance of liver function for health. If we eat, it is thanks to the liver that we digest. If we can no longer digest what we eat, death follows. If what we eat contains a lot of aflatoxins and have the hepatitis B virus - and nobody knows that he has it unless he goes to the doctor, otherwise we can have it without knowing it- if, for example, it took 20, 10 or 5 years to have liver cancer, the alliance hepatitis B and aflatoxin shortened this delay because the cancer develops more quickly. This cancer that develops kills the liver, and death follows.

I can give you an example from Kenya. In 2004, many people ended up in hospital. What brought them there was that they had eaten maize from a stockpile with a very high level of aflatoxin. 125 people who ate this corn died. When their blood was analyzed, we saw that the aflatoxin level was very high. This is proof that aflatoxin can kill a person quickly when the quantity ingested is high. So far, there have been no such cases in Senegal. However, eating it over the years, since childhood, can cause problems in the long term, damaging the liver and leading to death.

In the case of Senegal, the existence of aflatoxin is known. It is a problem that has been studied since independence, but no solution has been found to solve this problem. This was highlighted by the accident that took place in Dakar years ago at the SONACOS factory. Ammonia, also called "Moniaque", caused an explosion and the death of several people; ammonia was used to reduce aflatoxin in peanuts. Following this accident, its use was stopped. Since then, the European Union no longer buys Senegalese peanuts because they want to protect their population from ingesting peanuts with high aflatoxin levels. Indeed, the aflatoxin level in peanuts is very high in Senegal. In 2012 and 2015, peanuts from the groundnut basin in Kaolack, Diourbel, Fatick and surrounding regions were so contaminated that even the Chinese did not come to buy them. Today, they are the largest buyers of groundnuts in Senegal. The contaminated production has, therefore, remained in Senegal, and we are the ones who eat it. In Senegal, doctors have seen that out of 100,000 people, 10 to 14 people die of liver cancer each year, and this is partly due to ingested aflatoxin.

Farmers tend to say that peanuts have been grown and consumed for a long time, and this has not impacted people. In fact, in the past, aflatoxin did not affect people much because the peanuts were sorted. Now, it is no longer the case; today, we do not know what is sold in the markets. We see economic operators who "bess"[*sort and try to make prettier*] the peanut at the market and sell it. It is not a peanut that should be eaten or sold for consumption. Peanut paste, peanut powder, and filtered oil are the forms of peanuts that lead to problems that have been stated and that have been denounced by doctors. In the conclusion of this discussion, I remind you that aflatoxin is dangerous to health; this was not the case before because peanuts were sorted, which is no longer done today. This peanut is sold when it should not be because it is unfit for human consumption. It is time to join forces to fight aflatoxin in peanuts and corn. We must also be careful with animals. When animals eat grains or peanuts with high levels of aflatoxin, it comes back to us through milk or eggs. Thank you for listening.