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Measuring and Mitigating HIV Stigma: A Framed Field Experiment*

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Stigma against those living with HIV can undermine efforts to prevent the spread of the disease, but has traditionally been hard to measure or to assess the efficacy of anti-stigma educational efforts. Using a framed field experiment involving adult participants in rural Kenya, this research quantifies this stigma as the amount of compensation a participant is willing to forgo to avoid tasks with an object handled by an HIV positive person. By varying educational messages, we show that both perceived transmission risk and negative judgment of those with the disease underlie this stigma. Messages that overcome fear of transmission, and that disassociate people living with HIV/AIDS from behaviors considered immoral are both effective, reducing avoidance behavior by up to two thirds, and may be most effective when used together.

Key words: HIV/AIDS, field experiment, stigma

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1. Introduction

Certain medical conditions, among them HIV/AIDS, can elicit a level of avoidance that is unwarranted given the risks involved. While such avoidance may be an adaptive behavioral heuristic in the face of potential danger, it can negatively impact the lives of the stigmatized, and is considered a major barrier to effective responses to the epidemic (Mahajan et al. 2008). Stigma is reported to reduce demand for HIV testing, as well as the demand for treatment and care among those who are infected (Bond et al. 2002, Chesney et al. 1999, Kalichman et al. 2003), and to inhibit use of condoms due to their association with the virus (Leclerc-Madlala, 1997; Hlabana, 2007). Given these challenges, combating HIV stigma is widely recognized as a public health priority.

Economists have studied how stigma relates to a variety of social phenomena, including crime (Furuya, 2002), race (O'Flaherty, B. Sethi 2008), unemployment (Vishwanath, 1989), welfare (Moffit, 1983), nonmarital fertility (Akerlof, Yellen and Katz 1996) and divorce (Ishida, 2003). This literature has generally characterized stigma as a process through which stigmatized attributes are used to infer the risk posed by, or behavior exhibited by, the stigmatized, and to avoid risk or uphold a social norm. This literature has been criticized as imprecise in its treatment of stigma, invoking the term to describe generic social interactions from which discrimination result (Durlauf and Blume, 2008). A separate body of work applies a much more precise conceptualization of stigma as avoidance behavior, and applies this to individual decisions. This literature emphasizes the binary nature of responses in which stigma is a factor, with subjects either shunning a potentially stigmatized good regardless of the financial consequences, or unhesitatingly willing to consume it (Kanter et al. 2009; Messer, et al 2006).

We combine these two approaches to develop an incentive-compatible methodology for measuring stigma, defined, following Walker (2001) as “an unwarranted level of avoidance behavior”. Stigma is quantified as the payment a subject is willing to forgo to avoid coming into contact with an object handled by an HIV positive person. Applying this methodology to a randomly selected group of adult participants in rural Kenya using a double-blind design, we show that HIV stigma has an economically significant impact on decision-making in this context. By experimentally varying two messages, one designed to ease fear of transmission through casual contact, and the other to reduce the association between people living with HIV/AIDS and behaviors considered immoral, we show that HIV stigma is rooted both in fear of contagion and

in norms of sexual behavior. Both messages significantly reduce avoidance behavior, and are most effective when the type of contact is perceived as low risk.

2. HIV stigma

The consequences of HIV stigma for those living with HIV/AIDS have been well documented. These include physical and social isolation, verbal and physical violence, lack of access to medical care, and loss of livelihood (Brown et al., 2003; ICRW, 2006). Even after accounting for welfare loss due to disease symptoms and psychological wellbeing, experienced stigma significantly decreases quality of life for those affected by the disease (Holzemer, et al. 2009). In addition to its negative impact on the quality of life of those already infected, HIV stigma is believed to be a barrier to preventing the spread of the disease. It has been suggested by several authors that stigma undermines HIV prevention efforts by making people afraid to use condoms (Leclerc-Madlala, 1997; Hlabana, 2007) or seek testing (Kalichman and Simbayi, 2003; Yoder et al., 2006) as these acts may raise suspicion in the minds of others about one's HIV status. A recent study in rural Kenya shows a strong negative correlation between anticipated stigma and willingness to be tested for HIV by pregnant women, despite the availability of medicine to prevent transmission of the virus to the child, given a positive test result (Turan et al., 2011).

Measures of stigma in this context typically involve a series of attitudinal and hypothetical questions posed to survey respondents. Such measures of stigma may be subject to bias, since survey responses carry no consequence, and what respondents believe to be the "correct", socially desirable answer may conflict with actual beliefs and behaviors. This may be especially true in the presence of anti-stigma campaigns. Without effective tools for measuring stigma, it is impossible to understand the extent to which stigma prevents public health objectives from being met, to track progress against it, or to evaluate which type of anti-stigma campaigns are most successful. We follow Walker (2001) in defining stigma broadly as "an unwarranted level of avoidance behavior". In a 2008 report on HIV stigma in Kenya, four of seven definitions of stigma given by community members related to avoidance of those infected with the virus (AAIK, 2009).

Avoidance of those carrying an infectious disease can, of course, be rational. However, misconceptions about the possibility of HIV transmission through casual contact are widespread.

A nationally representative 2003 survey in Kenya found that 29.7% of female and 19.5% of male respondents believed HIV could be transmitted by sharing food (Mishra et al., 2003, 31). Incorrect beliefs about transmission risk may lead to a higher than warranted level of avoidance, to which we refer as "medical stigma". Even given subjective perceptions of risk, fear of contagion does not fully explain the degree of social and economic exclusion experienced by people living with HIV/AIDS. In the same Kenyan survey, 39.9% of women and 26.5% of men said they would not feel comfortable purchasing vegetables from an HIV positive vendor (ibid, 45), implying that roughly 8.5% of people are uncomfortable with casual contact despite the knowledge that such contact carries no transmission risk.

This additional layer of aversion may be thought of as "social stigma". Social stigma in the context of HIV infection arises through a combination of stigma as a tool for social control (Blume 2002), and the use of a stigmatized attribute as a signal of norm-violating behavior. Under this conceptualization of stigma, individuals are punished for deviance from a social norm. Examples of social norms enforced by stigma include heterosexual monogamy, paying one's taxes, and working to earn an income. As shown by Blume (*ibid.*), conditional on a large enough number of people adhering to the norm, the existence of stigma can support an equilibrium in which deviant behavior is rare or nonexistent, though stigma that persists over time (as is likely to be the case for an incurable condition such as HIV infection) may have the opposite effect. In conservative rural Kenyan society, sex outside of marriage is a stigmatized behavior. The assumption that a person who is HIV positive must have engaged in such behavior leads to the stigmatization of those suffering from HIV. It is generally believed that the stigma associated with HIV/AIDS stems from, among others, its association with behavior considered socially deviant or immoral (Alonzo and Reynolds, 1995). Indeed, the Kenyan report cited above found that 74 percent of people believed that HIV is a punishment for bad behavior, and 63 percent believed that most people with AIDS deserve what they get (AAIK, 2009).

3. Conceptual framework

To fix ideas, we develop a simple model, in which an HIV negative agent faces the choice of whether to engage in an economic transaction with an individual known to be HIV positive. This transaction offers a monetary benefit, but may, depending upon the agent's stigma-related beliefs and preferences, also come at a cost to utility.

In the first period, the agent may choose either to engage in the transaction t and earn payoff p, or to forgo the transaction and earn nothing. The objective risk of infection associated with the transaction is zero, but *i*'s subjective risk, denoted by π_i, $\ni [0,1]$. Utility in this period is a function of earned income and the direct utility effect of casual contact with an HIV-positive person or associated object. This utility effect is the product of two parameters: $\lambda_i \ni [-1,0]$, which represents the disutility of associating with an individual thought to have transgressed a social norm, and $\gamma_i \ni [0,1]$, *i*'s subjective belief that a person who is HIV positive has violated such a norm. Note that because the probabilities of all the possible ways this person might have contracted HIV must sum to one, the association of HIV with norm violation must be negatively related to the subjective probability of contracting the virus through casual contact, π_i.

Utility in the second period depends only on the agent's HIV status, $\ni \{0,1\}$. Abstracting from other potential sources of infection, we assume that the expected risk of becoming HIV positive is zero in the absence of transaction *t*. For simplicity, assume also that utility in the absence of conducting the transaction is zero in both periods. The maximization problem faced by the individual can then be described as:

$$Max_{\{t\}}\, EU = t \cdot \left(u_1(p, \lambda_i \cdot \gamma_i) + \pi_i \cdot u_2(1)\right) \qquad (1)$$

where $t \ni \{0,1\}$,

and the decision of whether to conduct the transaction is determined by the following rule:

$$t = \begin{cases} 1 \; if \; u_1(p, \lambda_i \cdot \gamma_i) + \pi_i \cdot u_2(1) > 0 \\ 0 \; otherwise \end{cases}. \qquad (2)$$

Through the experiment described below, we use an incentive-compatible mechanism to elicit values of *p* for which subjects in rural eastern Kenya are indifferent between engaging in a series of tasks. The level of payment, *p*, required to complete a task that involves consuming or touching an item handled by an HIV positive individual is compared with the payment required to complete the same task using an item produced by an HIV negative person. We use two information treatments to alter the subjective probability $\pi_i$of HIV infection via casual contact, and the probability γ_i that an HIV positive individual has engaged in stigmatized behavior. The extent to which modifying these parameters affects the observed level of stigma reveals the extent to which HIV stigma is social versus medical, and suggests ways in which the overall level of stigma may be reduced.

4. Experimental Design

Three hundred participants from 10 villages in Meru Central District, Kenya were recruited to participate in the experiment. A random walk methodology was used to select 30 households in each community, and the first individual aged 18 or older in each selected household was invited to attend an experimental session on economic decision-making to be held at a specified time (the time to which recruits were assigned was alternated chronologically) within the following three days. Neither HIV nor HIV stigma were mentioned during recruitment. Invitees were promised a cash payment worth approximately $3.70 USD in compensation for their time, to be paid at the end of the session.

Three experimental sessions were conducted on the same day in each village, and each session lasted approximately ninety minutes. To avoid potential cross-treatment contamination within a village, the first two sessions were held simultaneously and the third session was scheduled to overlap with the first two so that that the third session started prior to the end of the first set. Participants were randomly assigned to concurrent sessions based on a random draw of a slip of paper.

As shown in Table 1, each session consisted of two parts. The first part was designed to give participants experience with the procedures of a second-price WTA auction. The second part was designed to measure HIV stigma. Sessions were held in a community building in the village, such as a church or school. All sessions were conducted in Kimeru, the local language, and instructions were read directly from a script (see Appendix).

After the instructions were read aloud, four hypothetical second-price auction examples were discussed. Participants then submitted WTA offers using this mechanism for two tasks not related to stigma (eating a piece of candy and drawing a picture). After each example and task, participants received feedback regarding the outcome of the auction and were encouraged to ask questions. The two practice auctions were incentivized with cash payments (to be paid later) in the same way as the stigma measurement auctions described below.

For the portion of the session focused on measuring stigma, participants submitted their confidential bids for six tasks without feedback. Before describing the stigma-related tasks, the administrator read one of three statements designed to affect beliefs related to stigma. The messages were:

1. No information. (Baseline)

2. “HIV is transmitted only by unprotected sex with an infected person, contact of infected blood with your own blood, and from mother to child during childbirth and breastfeeding. It is not possible to obtain HIV from the saliva or skin of an infected person, and the virus does not live long outside the body. It is therefore not possible to get HIV by eating food that someone with HIV has touched.” (Transmission)

3. “Approximately 40,000 Kenyans have gotten HIV not through practicing unsafe sex, but rather through unsafe medical procedures, for example re-use of needles for injections, and transfusions of infected blood.” (Disassociation)

The administrator then described each of the six tasks, in random order, as follows:

1. “Eat this bag of groundnuts, which has been packed by someone in Kenya who has been tested by a doctor and determined not to have HIV or AIDS.” (Peanuts-)

2. “Eat this bag of groundnuts, which has been packed by someone in Kenya who been tested by a doctor and determined to have HIV or AIDS.” (Peanuts+)

3. “Use this detergent, which was produced by someone in Kenya who has been tested by a doctor and determined not to have HIV or AIDS, to wash a dish using purified water, and then eat lentil stew from the dish. You may take the detergent home with you.” (Detergent-)

4. “Use this detergent, which was produced by someone in Kenya who has been tested by a doctor and determined to have HIV or AIDS, to wash a dish using

purified water, and then eat lentil stew from the dish. You may take the detergent home with you." (Detergent+)

5. "Use this broom, which was produced by someone in Kenya who has been tested by a doctor and determined not to have HIV or AIDS, to sweep the floor. You may take the broom home with you." (Broom-)

6. "Use this broom, which was produced by someone in Kenya who has been tested by a doctor and determined to have HIV or AIDS, to sweep the floor. You may take the broom home with you." (Broom+)

Since consumption of contaminated foods is a common pathway of transmission for other illnesses (though not a risk for HIV transmission), we expect that consuming peanuts packaged by an HIV positive individual would be perceived as relatively high risk, whereas using a broom made by someone with HIV would be perceived as low risk. Cleaning a bowl with detergent made by an HIV positive person, and then using that bowl, is expected to be perceived as carrying an intermediate level of risk. The perceived relative riskiness of the three tasks was confirmed in a pilot study in which subjects were asked to state their hypothetical willingness to complete each of the tasks. [2]

After each task was described, participants were asked to submit a WTA offer that represented the "minimum amount [the participant] would require to be paid, in order to do the task." Participants were informed that their offers could be any amount equal to or greater than zero. Since the level of literacy varied across the participant pool, all decisions were recorded by research assistants. Double-blind procedures were used such that none of the experimental administrators were aware of participants' offers for any particular task.[3] Participants were told

[2] Results from the pilot study are available from the authors upon request.

[3] For each session, there were two research assistants and one primary research administrator. To achieve anonymity, research assistants were positioned in a separate area to record offers. The primary administrator asked a volunteer participant to draw one slip of paper from a bag containing three slips, labeled one through three, and corresponding to each of the main tasks. A second slip of paper was then drawn to determine whether the positive or negative task would be performed first. After a task was selected, it was described to the participants who then, one at a time, went to one of the separate recording areas where an assistant recorded their offer for that task. Each participant knew on which task they were making an offer, but the assistants did not. Once all the offers were collected, a research assistant randomly selected the task to be implemented, again by drawing a slip of paper denoting on which was written the number n, between one and six, indicating that the n^{th} task for which offers were

that only one of the six tasks would be selected at the end of the experimental session. This task would be the only one the winner would be asked to complete, and the only one for which compensation would be paid.

Once all of the offers were submitted and the task to be implemented was chosen through a random draw, the WTA offers for the selected task were ranked from lowest to highest. The participant who had submitted the lowest WTA offer would be asked to perform the task during the private exit interview. Upon completion of the task, the participant would be compensated with cash equal to the second-lowest offer. If multiple participants offered the same lowest offer amount, the winner was determined randomly by having a volunteer participant draw from a bag containing slips of paper labeled with the identification numbers for all participants with the lowest offers. In this case, the selected winner would receive compensation equal to her own offer upon completion of the task. To avoid the possibility that all subjects submitted very high offers, thus exhausting the research budget, participants were informed that there was a reserve price for each of the auctions.[4]

After the bids were ranked, participants, one at a time, were administered a survey eliciting basic demographic information, as well as knowledge, beliefs, and attitudes regarding HIV/AIDS and people living with HIV/AIDS and were given their cash compensation for participation. At this time the person who had submitted the lowest offer for the implemented task was told that he or she had won the auction, asked to perform it, and given the corresponding compensation. In no case did the winning participant refuse to perform the selected task.

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submitted would be implemented . To ensure the confidentiality of the participant doing the task, this draw was done in private. The two assistants conferred to determine the identity of this participant, and one of them observed while the participant completed the task. This procedure ensured that the assistants were aware of which task type was selected (peanuts, detergent, or broom), but did not know whether the task involved an item produced by an HIV-positive or HIV-negative person. Neither the primary administrator nor the other participants knew which task was performed nor who performed it. Thus, the only person who knew which task was performed was the participant performing it.

[4] Participants were informed this reserve price had been randomly determined prior to the session and that it was written on a piece of paper that was in a sealed envelope at the front of the room. Participants were not told the mean value, but were told that the maximum reserve price would be less than 700,000 KSH (~$8,641 USD) or approximately 10 times Kenya's per capita GDP. It was explained to participants that they could be certain to avoid completing the task if they submitted an offer of 700,000 KSH or more. In the case where all of the offers were above the reserve price no participant would be declared the winner and have to do the task. In the case where one offer was below the reserve price and all of the rest of the offers were above the reserve price, then the winning participant would still need to complete the task (in this case, eat the candy) and would receive compensation equal to the reserve price. During the administration of these experiments, the reserve price was never needed as at least two participants always submitted offers lower than the reserve price.

5. Results

5.1 Balance across treatment groups

Table 2 presents summary statistics for the characteristics of participants in each message treatment, and tests for significant differences between each of these and the baseline message. Participants' age, gender, and likelihood of knowing someone who had HIV are balanced across treatments, with no differences significant at the ten percent level.[5] Treatment assignment was assigned upon arrival at the experimental session, so participation, at 92 percent on average, was similar across treatments.

5.2 Measurement of HIV Stigma

We propose that the difference between the compensation a participant demands to perform a task involving a good produced by an HIV negative individual (negative task) and the compensation demanded to perform the same task but using a good produced by an HIV positive individual (positive task), is a measure of the intensity of HIV stigma, and refer to this as the stigma premium. As shown in Figure 1, a large stigma premium is evident across tasks in the baseline message treatment, with unwillingness to complete tasks considerably higher for the positive tasks. The average difference for the three tasks is $3,797 US,[6] while the differences for the groundnuts, detergent, and broom tasks are $3,717, $4,121, and $3,553, respectively. All of these values are several times the annual average Kenyan per capita income of $760. Figure 1 also shows evidence that some participants shun even the negative tasks. This avoidance behavior could be due to misunderstanding of the auction procedures, to a general uneasiness at to the mention of HIV, or to concern that the experiment administrators may have inadvertently confused the items made by the HIV positive and HIV negative persons. Increasing avoidance of the negative tasks with the expected level of perceived riskiness suggests that this is at least partially driven by the latter two explanations, which would bias our estimates of stigma toward zero. The behavioral response to the positive tasks tends to be binary, with participants either willing to complete the task without any compensation or refusing to complete the task

[5] Because the questionnaire was administered after the experiment, and participating in the experiment could have influenced attitudes toward HIV positive persons, we limit our balance check to these fixed characteristics.
[6] The exchange rate at the time of the experiment was 81 Kenyan shillings to the US dollar.

regardless of the compensation offered. This complete shunning response is striking, especially given the amount of compensation potentially at stake. As shown in Figure 2, both message treatments bring down the average compensation demanded to perform the positive, and to some extent, also the negative tasks. The greatest reduction in the stigma premium is seen for the broom task, whereas the compensation demanded to perform the positive groundnuts task remains relatively high across message treatments.

To test for the existence of a stigma premium, test hypotheses about its relative size across tasks, and to quantify the effect of the information treatments, we regress WTA offers (in US dollars) on task attributes and message treatments. We use a tobit model truncated above at the maximum reserve price of $8,641, with task order and village fixed effects and participant random effects.[7] Marginal effects on the latent variable are shown in Table 3, and are similar whether or not participant controls for age, gender and acquaintance with an HIV positive person are included. We focus our discussion and hypothesis tests on the specification with controls (Table 4).

The regression results confirm what is apparent in the graphical analysis. Hypothesis tasks reported in Table 4, rows 1 through 4, indicate that both jointly and individually, the tasks using objects handled by an HIV positive person command an economically important and statistically significant stigma premium. Comparing the coefficients on the positive tasks indicates that the stigma premium is indeed higher for those tasks expected to be perceived as higher risk (groundnuts and detergent), though the significance level hovers around p=0.1, and only falls below this for the detergent+ versus broom+ tasks (row 7).

5.3 Effect of message treatments

The message that HIV cannot be transmitted through casual contact reduces the average bid for all three positive tasks. The expected relative impact of this message across tasks is not clear: on one hand, medical stigma is expected to be greatest for the tasks perceived as high risk, so the potential for reduction through this message is greatest. On the other hand, aversion to completing tasks perceived as risky may be most difficult to change. The results suggest that the

[7] Since the market value of each of the tasks is essentially zero, we do not censor from below. A logit model in which participants' behavior is coded as one if willing to complete the task for some level compensation below the maximum, and zero otherwise, yields result consistent with those presented in Table 2 and is available upon request from the authors.

difficulty of overcoming stigma for tasks seen as more risky outweighs the greater potential for reduction in medical stigma: computing effect sizes using the coefficients in Table 3, the largest proportional reduction (52 percent) is seen for the broom task, and the smallest effect (34 percent reduction) on the detergent task.

While the level of social stigma could depend on the intensity of engagement with an HIV positive individual, the degree of interaction is constant across the tasks presented. We thus expect social stigma to be constant across tasks. However, recalling the discussion in Section 2, there exists a direct link between social stigma and medical stigma through the subjective probabilities underlying these. Namely, if it is true that many of those suffering from HIV acquired the virus through a transmission route other than risky sex, this implies a non-zero risk of infection through other channels, which could be perceived to include touching an object or consuming food handled by an HIV positive person. Thus reducing socially driven stigma may carry the unintended consequence of increasing medical stigma. Indeed, the message that that many people have become infected with HIV through unsafe medical practices rather than by practicing unsafe sex reduces stigma overall, but this effect is driven entirely by those tasks perceived as lower risk. This disassociation message reduces the stigma premium associated with the broom task by 66 percent, and that associated with the detergent task by 41 percent. The groundnuts task, however, is unaffected, with a negative coefficient equal to 18 percent of the stigma premium, but statistically indistinguishable from zero, suggesting that the decrease in social stigma may be offset by an increase in medical stigma.

Support for the hypothesis that the disassociation statement increases medical stigma is found in responses to a question administered during the exit survey, in which participants were asked what was foremost on their minds while bidding on each of the tasks. Table 5 shows marginal effects from a multinomial logit model in which the dependent variable is a categorical variable indicating the main consideration on participants' minds while bidding on each positive task. First, we note that danger of contracting HIV is reported as the main consideration by a majority of participants in the baseline message treatment, for both the groundnut and detergent tasks, and also receives largest share of responses for the broom task. Negative judgment or dislike of those with HIV ranks second across tasks, accounting for approximately a third of responses in the baseline message group. Finally, other responses, including concern for people

living with HIV/AIDS, the impossibility of transmission through this type of contact, and the resolve not to discriminate make up between 11 and 18 percent of responses.

The transmission message has no significant effect on the likelihood of giving any particular response, but the disassociation message sharply reduces negative judgment, while increasing the fear response. The increase in the level of fear is seen most strongly for the broom task; any incremental change in the perceived danger of the tasks seen as risky in the baseline treatment are more subtle, though detectable at 10 percent significance for the groundnuts task in the specification with controls. While the sensitivity of the self-reported response and the incentive compatible measure to detect changes at the various margins of medical stigma differ, both approaches point to the possibility that reducing negative judgment of those with HIV may come at the cost of increasing fear of transmission through casual contact. We note that while an increase in medical stigma appears to dampen the reduction in stigma achieved by the disassociation message for some tasks, the net qualitative effect of this message on stigma remains negative.

5.4 Covariation of stigma at the community level

If HIV stigma is driven in part by social norms, it would be expected to be correlated within communities, and perhaps to vary across generations. Restricting the sample to the baseline message group, we predict stigma (measured as the average WTA bid for the three positive tasks) using a binary variable indicating whether a subject knows someone with HIV, another indicating whether their age is above 45 years, village fixed effects, and the interactions of the age variable and village fixed effects. This regression explains a third of the variation in overall stigma (Table 6, column 1). We repeat this exercise for the level of stigma associated with each specific task. Consistent with the hypothesis that aversion to the groundnuts and detergent tasks is driven largely by fear of transmission, which may be based on idiosyncratic attributes such as risk preferences, the degree to which social network variables predict WTA are lower for these tasks, at 32 and 27 percent respectively, than for the broom task at 39 percent.

Next, we use the coefficients from each of these regressions on the baseline group to generate the predicted WTA bid, $\widehat{wta}$ for the entire sample. This predicted variable is then entered as an explanatory variable, both alone and interacted with each of the message treatments, into a tobit model in which the outcome is WTA for the positive task. Columns 5

through 8 of Table 6 show results from these models, in which the standard errors are bootstrapped to account for prediction error in $\widehat{wta}$. As shown in column 5, both the disassociation and transmission statements are effective overall, but only the disassociation statement affects the social component of stigma; the interaction of $\widehat{wta}$ and the transmission message is not significantly different from zero, while the disassociation statement has an especially large effect on those who are predicted to exhibit a high level of stigma. Considering each of the tasks individually in columns 6 through 8, both messages have a greater effect on those predicted to exhibit greater stigma. For each task, this interaction effect is larger for the disassociation task, though the difference is significant only for the groundnuts task.

6. Conclusion

Stigma has been invoked by economists as an explanation for a variety of social phenomena including long-term unemployment, low take-up of public benefits, and trends in non-marital fertility trends. The stigma associated with HIV and AIDS is believed by many in the public health community to be a major barrier to combatting the epidemic. In this paper, we use an incentive compatible mechanism to demonstrate that stigma is measurable and economically meaningful in the context of HIV in rural Kenya, amounting to nearly five times annual per capita income on average. Our approach allows us to distinguish two sources of HIV stigma: fear of transmission and association with behaviors that violate social norms. Messages addressing each of these sources of stigma significantly reduce avoidance behavior, but we find evidence that reducing one type of stigma may exacerbate the other. Our results suggest that to be most effective, campaigns to combat HIV stigma should address both fear of transmission and the social dimension of stigma. The methods in this paper could be easily adapted to understand stigmatization of and discrimination against such conditions and characteristics as mental illness, sexual orientation, caste, and ethnic or racial identity.

7. References

ActionAid International Kenya (AAIK). 2009. *Extent and Impact of Stigma and Discrimination on Women and Children Infected and Affected by HIV and AIDS*. Nairobi, Kenya: ActionAid International.

Akerlof, George A., Janet L. Yellen and Michael L. Katz. 1996. "An Analysis of Out-of-Wedlock Childbearing in the United States." *Quarterly Journal of Economics* 111(2): 277-317.

Alonzo, Angelo A. and Nancy R. Reynolds. 1995. "Stigma, HIV and AIDS: An Exploration and Elaboration of a Stigma Trajectory." *Social Science and Medicine,* 41(3): 303-315.

Blume, Lawrence. 2002. "Stigma and Social Control." Institut für Hoehere Studien Economics Series 119.

Bond, Virginia, Elaine Chase, and Peter Aggelton. 2002. "Stigma, HIV/AIDS Prevention, and Mother to Child Transmission in Zambia." *Evaluation and Program Planning,* 25(4):242–356.

Brown, Lisanne, Kate Macintyre, and Lea Trujillo L. 2003. "Interventions to Reduce HIV/AIDS Stigma: What Have We Learned?" *AIDS Education and Prevention,* 15(1):49-69.

Chesney, Margaret A. and Ashley W. Smith. 1999. "Critical Delays in Testing and Care: The Potential Role of Stigma." *American Behavioral Scientist,* 42(7): 1162–1174.

Durlauf, S.N. and L.E. Blume, 2008. "Stigma." The New Palgrave Dictionary of Economics. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008. The New Palgrave Dictionary of Economics Online. Palgrave Macmillan.

Furuya, Kaku. 2002. "A Socio-Economic Model of Stigma and Related Social Problems." *Journal of Economic Behavior & Organization,* 48(3): 281-290.

Hlabana, Thandie A. 2007. "HIV/AIDS Stigma and Condom Use Among Adolescents in Lesotho." Paper presented at the annual meeting of the American Sociological Association, New York City, New York, August 11-14.

Holzemer, William L., Sarie Human, John Arudo, Maria E. Rosa, Mary Jane Hamilton, Inge Corless, Linda Robinson, Patrice K. Nicholas, Dean J. Wantland, Shahnaz Moezzi, Suzanne Willard, Kenn Kirksey, Carmen Portillo, Elizabeth Sefcik, Marta Rivero-Méndez, and Mary Maryland. 2009. "Exploring HIV Stigma and Quality of Life for Persons Living With HIV Infection." *The Journal of the Association of Nurses in AIDS Care,* 20(3): 161-168.

Ishida, Junichiro. 2003. "The Role of Social Norms in a Model of Marriage and Divorce." *Journal of Economic Behavior & Organization,* 51(1): 131-142.

Kalichman Seth C. and Leickness C. Simbayi. 2003. “HIV Testing Attitudes, AIDS Stigma, and Voluntary HIV Counseling and Testing in a Black Township in Cape Town, South Africa.” *Sexually Transmitted Infections,* 79(6): 442-447.

Kanter Christopher, Kent D. Messer and Harry M. Kaiser. 2009. “Does Production Labeling Stigmatize Conventional Milk?” *American Journal of Agricultural Economics,* 91(4):1097-1109.

Leclerc-Madlala, Suzanne. 1997. “Infect One, Infect All: Zulu Youth Response to the AIDS Epidemic in South Africa.” *Medical Anthropology,* 17(4), 363-380.

Messer, Kent D., William D. Schulze, Katherine F. Hackett, Trudy Cameron, and Gary H. McClelland. 2006. “Can Stigma Explain Large Property Value Losses? The Psychology and Economics of Superfund.” *Environmental and Resource Economics,* 33(3): 299-324.

Mishra, Vinod, Praween Agrawal, Soumya Alva, Yuan Gu, and Shanxiao Wang. 2009. *Changes in HIV-Related Knowledge and Behaviors in Sub-Saharan Africa.* DHS Comparative Reports No. 24. Calverton, Maryland, USA: ICF Macro.

Moffitt, Robert. 1983. “An Economic Model of Welfare Stigma.” *American Economic Review,* 73(5): 1023-1035.

O'Flaherty, Brendan and Rajiv Sethi. 2008. “Racial Stereotypes and Robbery.” *Journal of Economic Behavior and Organization,* 68(3-4): 511-524.

Steward, Wayne T., Gregory M. Herek, Jayshree Ramakrishna, Shalini Bharat, Sara Chandy, Judith Wrubel, and Maria L. Ekstrand. 2008. “HIV-Related Stigma: Adapting a Theoretical Framework for use in India.” *Social Science & Medicine,* 67(8): 1225-1235.

Turan, Janet M., Elizabeth A. Bukusi, Maricianah Onono, William L. Holzemer, Suellen Miller, and Craig R. Cohen. 2011. “HIV/AIDS Stigma and Refusal of HIV Testing Among Pregnant Women in Rural Kenya: Results from the MAMAS Study.” *AIDS and Behavior,* 15(6):1111-1120.

Tara Vishwanth, 1989. “Job Search, Stigma Effect, and Escape Rate from Unemployment.” *Journal of Labor Economics,* 7(4): 487-502.

Walker, Vern R. 2001. “Defining and Identifying Stigma.” In *Risk, Media, and Stigma: Understanding Public Challenges to Modern Science and Technology,* edited by James Flynn, Paul Slovic and Howard Kunreuther, Chapter 22. London: Earthscan Publications.

Yoder, P. Stanley, David Kyaddondo, Anne R. Katahoire, Zainab Akol, Frank Kaharuz, and Rebecca Bunnell. 2006. “Home-Based HIV Testing and Counselling in a Survey Context in Uganda.” *Context.* 68.

8. Tables and Figures

Table 1: Summary of Experiment Design

	Mechanism Practice	Measuring Stigma
Auction Type	Second-price WTA	Second-price WTA
Offer Range	0 to 700,000 KSH ($0 to ~$8,750 USD)	0 to 700,000 KSH ($0 to ~$8,750 USD)
Reserve Price	Random for each auction Average: 2,000 KSH Maximum: 699,999 KSH	Random for each auction Average: 2,000 KSH Maximum: 699,999 KSH
Tasks	Eat a piece of candy Draw a picture	*High medical risk* • Peanuts+ • Peanuts- *Medium medical risk* • Detergent+ • Detergent- *Low medical risk* • Broom+ • Broom-
Order of Tasks	Consistent for all sessions	Randomly determined for each session
When Tasks Implemented	Immediately after offers are submitted for that task	After all offers have been submitted for all six tasks of Part B
Auction Feedback	Public • Offers shown without ID number • Winner known by all participants and research administrators • Tasks known by all participant and research administrators	Private (double-blind) • Offers not shown • Winner known only by research assistants • Task known only by winning participant
Information Treatments	None	Baseline Transmission Disassociation

Table 6: Effect of message treatments on predicted stigma

	Baseline Message Treatment				Whole Sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	average +	gnuts +	det +	broom +	average +	gnuts +	det +	broom +
individual attributes								
age > 45	4586*	3056	5531*	5171*				
	(2488)	(3079)	(3203)	(2983)				
know HIV +	-2351***	-2530**	-1901*	-2621**				
	(830)	(1027)	(1068)	(995)				
predicted WTA					4045***	8006***	5067***	6228***
					(647)	(1196)	(863)	(863)
message treatments								
transmission					-1857***	-3068**	-3186***	-2956***
					(696)	(1376)	(1208)	(973)
disassociation					-1905**	-2498*	-3377***	-3617***
					(752)	(1309)	(1296)	(984)
interactions								
predicted × transmission					-1079	-2836**	-2195**	-3171***
					(763)	(1341)	(1078)	(1019)
predicted × disassociation					-2930***	-6865***	-3164***	-4464***
					(759)	(1322)	(1077)	(940)
N	90	90	90	90	272	272	272	272
R-squared	0.3341	0.3247	0.2719	0.3904				
LLR					-1902.3	-1429.7	-1524.0	-1744.1
Censored Obs					84	141	132	105

* p<0.10, ** p<0.05, *** p<0.01; standard errors in parentheses.
Village FE and age × village FE included in columns 1-4. Standard errors in columns 5-8 are bootstrapped.

Reviewer Appendix: Experiment Instructions (English version)

Key:
Text in regular font is read to participants.
Instructions to experimental staff are in italics and are not read aloud to participants.
Headings are in bold, and are not read aloud.

Welcome to an experiment in decision making. In the course of this experiment, you will have several opportunities to earn some cash. Please listen carefully to my instructions and do not communicate with other participants. Anyone who disrupts experiment may be asked to leave. As stated in the Consent Form, your participation in this experiment is voluntary and you can leave at any time if you wish.

Show-up Payment
For coming here today, you have been given 300 shillings. This money is yours to keep. You may also earn additional money for yourself during the experiment.

Submitting Your Offer
I will now introduce several tasks, and I will ask you to indicate the minimum amount you would require to be paid, in order to do the task. We will refer to this amount as your offer.

Part A: Eating a Candy, Drawing a Picture
The first task that you will be asked to do is to eat a piece of candy. You may be willing to eat the candy for free – if this is the case, you would offer zero. If you would rather not eat the candy, but would be willing to eat it if we paid you 10 shillings, then you would submit an offer of 10 shillings.

If you really don't like this type of candy, in fact you dislike it so much that we would have to pay you 5000 shillings in order to convince you to eat it, you would offer 5000 shillings. If you absolutely do not want to eat the candy for any amount of money, then you can offer an amount greater than 700,000 shillings, which will ensures under no circumstance will you eat the chocolate bar.

Once all the offers for the candy have been submitted, I will rank all of the offers from the lowest to highest amount of compensation demanded. The person who demands the smallest amount of compensation will eat the piece of candy, and will receive the amount of compensation demanded by the person submitting the next-lowest offer.

For example, if I am willing to eat the candy for 10 shillings, and Jacob is demanding to be paid 20 shillings in order to eat it, and everyone else is asking for 30 shillings, then I will receive the candy and receive 20 shillings.

If two people offer the same value, we will have a draw to decide who gets the candy, and the person who gets it will receive the amount they offer. Are there any questions about this procedure?

Let's do an example. What if I asked for 10 shillings, Jacob asked for 20, and you (*point to someone*) were willing to eat the groundnuts for nothing? Please write down who would get the groundnuts and how much they would be paid, if anything (*subject would get the groundnuts and be paid 10 shillings*).

Let's do another. Say I offer 50 shillings, and Jacob offers 700,001 shillings, and you (*point to one of the subjects*) offer 40 shillings. Who gets the candy? (*you do*) How much does that person receive? (*50 shillings*) Please write down your answer on the paper provided. (*Announce the correct answer once everyone has written their answer.)*

One more example: What if I offer 0, Jacob offers 10, and you offer 700,001 shillings? Who gets the candy? (*I do*) How much does that person receive? (*10 shillings*) Please write down your answer on the paper provided. (*Announce the correct answer once everyone has written their answer.)*

You can submit an offer of any amount. However, there is a limit on the maximum compensation to be paid. This value has been determined before the start of the session. This limit may be as high as 700,000 shillings and has been chosen randomly with a different value for each part of this experiment. The maximum possible compensation is written on a piece of paper in the sealed envelope labeled with today's date at the front of the room and will be shown to everyone at the conclusion of this part of the experiment.

Does everyone understand this procedure?

Are there any questions?

Proceed with WTA auctions for the candy. Collect the offers, write these publicly on a flip chart, and announce the winner and their compensation, ask them to eat the candy and then pay them.

The next task that you will be asked to do is to draw a picture using this pencil. You may be willing to draw the picture for free – if this is the case, you would offer zero. If you would rather not draw the picture, but would be willing to do so if we paid you 10 shillings, then you would submit an offer of 10 shillings. If you really don't like drawing pictures, in fact you dislike it so much that we would have to pay you 5000 shillings in order to convince you to draw it, you would offer 5000 shillings. If you refuse to draw a picture for any amount of money you can offer an amount greater than 700,000 shillings and you won't have to draw anything, no matter what happens.

Proceed with WTA auctions for the pencil / drawing. Collect the offers, write these publicly on a flip chart, and announce the winner and their compensation, ask them to draw the picture, and then pay them.

Part B:
This part of the experiment will operate in a similar manner to Part A, except that it will now involve six different tasks. Again, you can submit an offer of any amount. The compensation you receive for performing the task will, as before, be the value of the next highest offer.

The main difference in this part of the study is that only one of the six tasks will actually be performed. Compensation will be paid only for this task. The task to be performed is written in this envelope. We will show the contents of this envelope only to the person who demanded the least compensation to perform the task, and we will do so at the end of the session.

Another difference is that your offers will remain confidential. No one will know how compensation you asked for, and no one except the one performing the task will know who performs the task, or even which task was performed. At the end of the session, each of you will be called individually to stay with us in this room for five minutes. During that time, you may be performing one of the tasks, or you may just be waiting. We will not reveal what you did to anyone.

Again, you can submit an offer of any amount, and the maximum compensation amount is in this envelope. This value could be as high as 700,000 shillings. I will show the contents of the envelope to everyone once all the offers have been submitted.

Determine task order by two-stage random draw, first selecting the task type, and then whether the task using the item from the HIV negative or positive person is bid on first.

If the session is a "control" session, skip the following sentence: As you think about how much to offer, you should consider that [*read stigma-related message according to session type*]

Describe each task according to the order determined through the random draw. Collect bids for each task before describing the next task.

The [first / second / third / fourth / fifth / sixth] task is:

Task #1: Eat this bag of groundnuts, which has been packed by someone in Kenya who has been tested by a doctor and determined **not** to have HIV or AIDS.

Task #2: Eat this bag of groundnuts, which has been packed by someone in Kenya who been tested by a doctor and determined to **have** HIV or AIDS.

Task #3: Use this detergent, which was produced by someone in Kenya who has been tested by a doctor and determined **not** to have HIV or AIDS, to wash a dish using purified water, and then eat lentil stew from the dish. You may take the detergent home with you.

Task #4: Use this detergent, which was produced by someone in Kenya who has been tested by a doctor and determined to **have** HIV or AIDS, to wash a dish using purified water, and then eat lentil stew from the dish. You may take the detergent home with you.

Task #5: Use this broom, which was produced by someone in Kenya who has been tested by a doctor and determined **not** to have HIV or AIDS, to sweep the floor. You may take the broom home with you.

Task #6: Use this broom, which was produced by someone in Kenya who has been tested by a doctor and determined to **have** HIV or AIDS, to sweep the floor. You may take the broom home with you.