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## Social Norms and Misinformation: Experimental Evidence on Learning about Menstrual Health Management in Rural Bangladesh

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# Social Norms and Misinformation: Experimental Evidence on Learning about Menstrual Health Management in Rural Bangladesh

## Abstract

Inadequate hygiene during menstruation can have severe consequences, such as adverse health effects, lower educational attainment and higher work absenteeism. Cultural taboos and social norms surrounding menstruation may contribute to misinformation about menstrual hygiene and may also interfere with attempts to improve knowledge. Using lab-in-the-field experiments with women in rural Bangladesh, we measure social norms in the form of empirical and normative expectations about menstrual health and hygiene explicitly, and relate them to behavior and knowledge. We then provide an information intervention on menstrual health and hygiene and observe how this changes the perceived social norms. We find that the majority of women report decreased physical and mental well-being, in particular stress and shame, during their menstruation. Further, we find knowledge gaps on the proper use of hygienic material for menstrual health management and that empirical and normative expectations are well matched to reported adverse health behavior. The information intervention helps to correct harmful social norms, although results are more pronounced for women who have more autonomy and agency over their own decisions.

JEL-Codes: I120, I150, D910, O120.

Keywords: social norms, menstrual health management, menstrual hygiene, information, adverse health behavior.

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# 1 Introduction

In recent years, inadequate menstrual health management has been acknowledged as a global public health concern by practitioners and academics alike. It is linked to adverse health consequences, social injustice, and human rights violations. In particular in low income countries, reports about inadequate menstrual hygiene abound: Women rely on inadequate materials such as old cloth, cotton wool, leaves or ash to manage their menstrual flow (Sumpter and Torondel, 2013; Van Eijk et al., 2016; Kuhlmann et al., 2017), and they re-use material, such as menstrual cloth, without treating it properly by washing it with water and soap and drying it in the sunlight (McMahon et al., 2011; Crichton et al., 2013). Sunlight is crucial because it is the only available method of killing bacteria in the cloth in many low-income settings (Torondel et al., 2018). Inadequate hygiene during menstruation can have adverse consequences both for the women and for their families: adverse health effects due to urogenital tract infections (Das et al., 2015; Hulland et al., 2015), lower education participation, since adolescent girls increasingly drop out of school when menstruating or miss more days at school (Montgomery et al., 2012; Hennegan and Montgomery, 2016; Benschaul-Tolonen et al., 2019), and higher work absenteeism (Krenz and Strulik, 2019; Czura et al., 2020).<sup>1</sup> Most studies focus on restricted access to better menstrual hygiene information and products, such as sanitary pads or menstrual cups, since the cost and availability of these products in the local markets are suspected to be the main reasons for low uptake.<sup>2</sup> However, other research has documented that the willingness to pay for sanitary pads, along with the increasing availability of commercial products, are not the biggest constraints on the adoption of sanitary pads (Garikipati and Boudot, 2017). This is in line with several descriptive studies documenting the myths, taboos, cultural restrictions and secrecy surrounding menstruation, along with knowledge gaps about menstrual health and hygiene (Khanna et al., 2005; Dasgupta and Sarkar, 2008; Mohamed et al., 2018; Thapa et al., 2019). There remains limited understanding of the importance of social norms and restrictions surrounding menstruation and how these may interact with attempts to improve knowledge about menstrual health management.

In this paper, we study social norms surrounding menstruation and their interaction with information provision: First, we measure social norms in the form of empirical and normative expectations and we relate these measures to self-reported behavior on menstrual hygiene and knowledge; the effects of menstruation on physical and mental well-being, and behavioral

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<sup>1</sup>For example, a study by the Water Supply Sanitation Collaborative Council (WSSCC) in Bangladesh suggests that an infection caused by using cloth during menstruation leads to 73 percent of women missing work for an average of 6 days a month (WSSCC, 2013).

<sup>2</sup>See, for example, Oster and Thornton (2011); Montgomery et al. (2012); Hennegan and Montgomery (2016); Van Eijk et al. (2016); Benschaul-Tolonen et al. (2019); Czura et al. (2020) on the effects of the provision of information and menstrual products on educational attainment and work absenteeism.

restrictions. Second, we provide an information intervention on menstrual health and hygiene and observe how this changes the perceived social norms. Third, we investigate taboos and stigma surrounding menstruation, how these may affect our social norm elicitation and how they may render some social restrictions impervious to our information intervention.

We use data from lab-in-the-field experiments conducted with poor female artisans working in embroidery centers in rural Bangladesh. We collected data on self-reported behavior and well-being, and elicited social norms in the form of empirical and normative expectations (Bicchieri, 2005) using a state-of-the-art, monetarily incentivized experimental elicitation procedure (Krupka and Weber, 2013). We compare our social norms measures before and after an information intervention on menstrual health and hygiene delivered by an experienced local NGO. Additionally, we investigate social image concerns and prevailing taboos in the norm elicitation process by exogenously varying whether social norms are elicited privately or whether each respondent's answers are publicly observable by their coworkers.

We find that the majority of women report decreased physical and mental well-being, in particular stress and shame, during their menstruation. The reported fear of others noticing their menstruation due to stains or odor indicate that the women in our sample are not using adequate absorbent material to manage their menstruation: 70 percent of women report using cloth regularly to manage their menstruation, 46 percent also report using sanitary pads with frequency. While we do not find extensive support for mobility restrictions, we do find knowledge gaps on the proper use of hygienic material for menstrual health management - around 25 percent do not know how to clean and dry re-used menstrual cloth properly - that translate to improper menstrual hygiene management. Only 9 percent follow the recommended cleaning and drying process for re-usable menstrual cloth. In our social norm elicitation, we find that reported adverse health behavior is well reflected in empirical and normative expectations. The information intervention helps to correct this harmful social norm: Respondents report that the correct drying of reusable cloth is about 30 percent more frequently empirically observed and more socially appropriate after the information intervention. Information also positively affects other social norms about mobility restrictions and communication that are not directly addressed in the intervention. In further analyses we show that the positive effects of the information intervention are larger for women who are more self-directed and have larger autonomy over their decisions, as measured by an agency index. We do not find systematic effects of social image concerns in the private vs. public elicitation procedures nor in its interaction with the information intervention.

Our research contributes to three strands of literature. First, we contribute to the literature on menstrual health management. Studies in the field of public health and economics have sought to identify how improved access to menstrual hygiene material can help reduce adverse effects on educational attainment or work absenteeism. There are mixed results for the effects of access to menstrual material on educational attainment among school girls:

In a systematic review of eight studies, Hennegan and Montgomery (2016) found moderate, but non-significant standardized mean effects of sanitary pad provision on school attendance, but they recognize limitations in terms of comparability and unbiasedness of the included studies. For example, in a non-randomized trial, Montgomery et al. (2012) find improved attendance of school girls who received free sanitary pads in rural Ghana, while Oster and Thornton (2011) find no substantial improvements in school attendance for girls who received menstrual cups in a randomized-controlled trial, partially due to a very low baseline level of days missed at school in urban Nepal. For working women, Krenz and Strulik (2019) use propensity score-matching to identify differences in work absenteeism between women in Burkina Faso who report using disposable sanitary pads and those that use traditional menstrual material and they find a sizable reduction in work absenteeism. Using data from a randomized-controlled trial with information provision and the distribution of free sanitary pads, Czura et al. (2020) find some reduction of worker absenteeism by access to free sanitary pads. Czura et al. (2020) also report adherence to traditional and health-adverse taboos surrounding menstruation. Our study complements existing studies by focusing on the role of social norms and taboos in menstrual hygiene and by analyzing the effect of information provision on these norms in a controlled environment.

Second, we contribute to a growing literature on the importance of social norms in economics, including norms for risk sharing in village economies (Jakiela and Ozier, 2016), productivity in firms (Huck et al., 2012), xenophobia (Bursztyn et al., 2020a), female genital cutting (Efferson et al., 2015; Vogt et al., 2016; Novak, 2020) and female labor force participation (Bursztyn et al., 2020b). On a broader scale, we also contribute to the literature on the role of culture and social norms in health behavior in social sciences and medicine. In recent years there has been renewed focus on influencing cultural beliefs as a mechanism for achieving behaviour change and improving individuals' health (see Mollen et al. (2010) for an overview). For example, Templeton et al. (2016) show that people update their food preferences for healthy and unhealthy foods depending on their (manipulated) peers' preference rating and hence updated empirical expectations. A similar, important influence of peer behavior and the implied social norms has been documented for unhealthy weight-control behaviors among adolescent girls (Eisenberg et al., 2005), physical activity and eating behaviors among adult women (Ball et al., 2010), and hand-washing behavior among university students (Dickie et al., 2018). Our contribution to this literature is to measure social norms in the context of menstruation in a low-income country directly and to compare these measures to self-reported behavior.

Finally, we contribute to the literature on the role of information provision in health behavior. For the promotion of hand washing behavior, for example, information provision leads to mixed results for final health outcomes. While some studies find a reduction in associated diarrhoeal diseases (Haggerty et al., 1994), others only find an improvement in

knowledge about appropriate hand washing behavior but not in health outcomes (Galiani et al., 2016). The type of information provided seems to be important: While information on risky sexual behavior in the form of behavior recommendations promoting abstinence was found ineffective in preventing teen pregnancy, information on the risk of HIV infections lead to substantial reductions (Dupas, 2011). For hand washing promotion, the communication of emotional motivations such as nurture or disgust helped to promote hand washing behavior significantly in India (Biran et al., 2014). Bennett et al. (2018) find that information provision alone is ineffective when it contrasts with traditional beliefs and culture: Standard hygiene instructions did not change respondents' health behavior unless they were accompanied by a module that also addressed traditional health beliefs in Pakistan. Our contribution here is to analyze how information provision on menstrual hygiene and health management affects measures of social norms. We shed further light on the relationship between, on one side, culture and traditional beliefs and on the other, the ability to absorb new information.

In the next section we present detailed information about the background of the study and the sample characteristics at baseline. The study design is described in section 3. Section 4 presents the results, and section 5 concludes.

## **2 Background**

### **Practices During Menstruation in Developing Countries**

Menstruation is a natural physiological process and women have developed different methods to manage their hygiene during menstruation. These methods vary widely according to available resources, socio-economic conditions, local traditions, cultural beliefs, and education. An increased focus on menstrual health management has revealed shortfalls in information, insufficient availability of absorbent material, lack of sanitary facilities, lack of knowledge on cleaning, drying and storing absorptive materials, and secrecy and restrictive taboos surrounding menstruation seem to be responsible (McMahon et al., 2011; Crichton et al., 2013; Garikipati and Boudot, 2017). This is particularly worrying, since inadequate menstrual health management can have significant adverse consequences for women and for their families: urogenital infections or symptoms related to these, and even infertility and disability (Muhit and Chowdhury, 2013; Levi Strauss Co., 2013; WSSCC, 2013; UNESCO, 2014; Das et al., 2015; Hullah et al., 2015; Salim and Begum, 2016; Garikipati and Boudot, 2017); behavior restrictions based on taboos and stigmatisation of menstruation (Ali and Rizvi, 2010; McMahon et al., 2011; Kumar and Kundan, 2011; Crichton et al., 2013; Mason et al., 2013; Garikipati and Boudot, 2017; Mohamed et al., 2018); lower educational participation, since adolescent girls drop out of school when they start menstruating (Montgomery



et al., 2012; Hennegan and Montgomery, 2016; Benschaul-Tolonen et al., 2019)<sup>3</sup>, and higher work absenteeism (Krenz and Strulik, 2019; Czura et al., 2020).

In the last twenty years, descriptive studies across low- and middle-income countries have showcased the extent and impact of inadequate menstrual management practices. Several studies report that women rely on inadequate absorbent materials such as old cloths, tissue paper, cotton pieces, leaves or ash to manage their menstrual bleeding (Adinma and Adinma, 2008; Kumar and Srivastava, 2011; McMahan et al., 2011; Sumpter and Torondel, 2013; Hennegan and Montgomery, 2016; Van Eijk et al., 2016; Kuhlmann et al., 2017). For reusable menstrual cloth products to be hygienic they need to be treated appropriately, for example by washing them with clean water and soap and drying them in sunlight. But often reusable products are neither washed nor dried properly and are directly stored wet and damp after washing, in concealed places such as cupboards or under the mattress (ICDDR, 2014). Commercially available disposable sanitary pads offer a good alternative, and women report using them because they are seen as more comfortable and less likely to leak. But the rates of pad usage are rather low<sup>4</sup> and high prices, lack of knowledge and stigmatisation of menstruation are suspected culprits (Averbach et al., 2009; Crofts and Fisher, 2012; Jewitt and Ryley, 2014).

When it comes to sanitary facilities, numerous descriptive studies and technical reports identify that schoolgirls and adult women in low- and middle-income countries often lack the facilities to change their menstrual absorbents in privacy and with appropriate hygiene. Toilets at schools lack cleanliness, light, soap or water (Boosey et al., 2014), they are shared with boys, they have no doors and when they do, they lack locks (Crofts and Fisher, 2012; Alexander et al., 2014; Guya et al., 2014). A quarter of girls interviewed in schools report not attending school during menstruation due to inadequate sanitary facilities (Van Eijk et al., 2016; Adukia, 2017). In the home environment, women with less access to sanitation facilities have to manage their menstruation outdoors or use the sleeping area of the house (Hennegan et al., 2018).

Knowledge gaps and mistaken beliefs about menstruation are widespread in low- and middle-income countries. While public health experts have assumed that girls receive pubertal-related guidance from parents or relatives, studies suggest that in fact they remain ignorant about menarche before its onset and may even hide the arrival of their first menstrual period

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<sup>3</sup>While there is an increasing number of observational studies investigating the relationship between menstrual health and participation in school, these studies often fail to identify a causal relationship. Those studies that strive for causal identification provide contradictory conclusions and suffer from sub-optimal research design with a significant risk of biased estimates (Montgomery et al., 2012; Hennegan and Montgomery, 2016; Benschaul-Tolonen et al., 2019) and ceiling effects (Oster and Thornton (2011)).

<sup>4</sup>The Indian Institute for Population Sciences (2017) estimates that of the 336 million menstruating women in India, about 121 million women (roughly 36 percent) are using sanitary pads, locally or commercially produced. The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, 2014) estimates that in Bangladesh disposable pads are used by one quarter of adult women.

due to the fear of being punished for perceived sexual activity (Mason et al., 2013; Sommer and Sahin, 2013; ICDDR, 2014). Hence, the majority of girls enter puberty with no or little correct information about menstruation - a consequence of the adults around them being ill-informed and uncomfortable discussing menstruation (Chandra-Mouli and Patel, 2017). Health education programs for young women in developing countries do not often address menstrual hygiene practices and disorders. Moreover, teachers and schools have an almost negligible role in providing information about menstruation (Khanna et al., 2005; ICDDR, 2014; Michael et al., 2020), leaving schoolboys completely uninformed and girls with only limited information about the physiological processes involved. Menstrual hygiene is usually not discussed in the formal school education. The silence surrounding menstruation seems to burden young women by keeping them uninformed about their bodies. This knowledge gap persists during adulthood. Although adult women have more experience, they do not have access to more information.

Numerous myths, cultural restrictions, and psycho-social constructs exist around menstruation. Cultural beliefs and taboos may also contribute to poor menstrual hygiene management through the perpetuation of misinformation or unhygienic customs. Common myths arise from the nature of menstruation, which is not seen as a natural process but perceived as a divine curse, a disease, or the result of a sin (Khanna et al., 2005; Dasgupta and Sarkar, 2008). The belief that menstrual blood is dirty, toxic, or impure is also widespread including in India (Kumar and Srivastava, 2011), Nepal (Thapa et al., 2019), Fiji, Solomon Islands, and Papua New Guinea (Mohamed et al., 2018). It is believed that seeing menstrual blood can bring infertility, blindness (Garikipati and Boudot, 2017) and bad luck to men (Mohamed et al., 2018), therefore, women resort to burying pads or menstrual cloth due to the lack of disposal facilities. Studies in various contexts have reported taboos around the disposal of menstrual blood and practices including restrictions on bathing and participation in social activities. It is commonly believed that taking a bath during menstruation increases the flow of menstrual blood or can cause problems during pregnancies in the future. There are restrictions on praying or entering places of worship, entering kitchens and attending guests during menstruation, going to the market, and talking about menstruation itself (Kumar and Kundan, 2011; Kumar and Srivastava, 2011; Dasgupta and Sarkar, 2008). Women report not eating certain foods - such as sour food, bananas or radish - depending on the cultural context, not performing household work, and not attending school or social events, such as a marriage or a festive gathering. Further, cultural norms dictate that menstruation and all associated practices should remain completely hidden (Mason et al., 2013). This can lead to stress and shame and inadequate menstrual hygiene management with all the negative consequences reported above, if women are not bathing, washing and drying their menstrual cloth properly, or buying sanitary pads out of fear of being seen. Further, women's mental health seems to be affected because of feelings of shame, stress, and worry about menstruation

(Sahoo et al., 2015; Hulland et al., 2015) .

Public and private institutions alike have recognized menstrual health management as a global public health concern and have started implementing strategies for improving access to menstrual health commodities and providing information. First, there are initiatives for access to free sanitary pads, mostly from private enterprises such as commercial pad producers<sup>5</sup> or local NGOs, or at subsidized rates<sup>6</sup>. Second, there are attempts to educate school age children about puberty, menstrual health management methods and hygiene practices.<sup>7</sup>

In Bangladesh, the country of our study, there has been a significant mobilization by humanitarian organizations and the private sector around the lack of access to commercial products and girls' decreased school attendance during their menstruation (Muhit and Chowdhury, 2013; ICDDR, 2014; Salim and Begum, 2016; Alam et al., 2017). For example, in the Bangladeshi garment industry there is an active discussion among various stakeholders about improving menstrual health for its large, mostly female workforce. An example of how visible this issue is becoming is the recent round table event hosted by the leading local newspaper, the Daily Star.<sup>8</sup> Several NGOs such as SNV, RHSTEP and CARE have initiatives to improve access to menstrual health management products in garment factories.<sup>9</sup> There have also been efforts at the national level with programs such as the *Bangladesh National Hygiene Promotion Strategy* that includes menstrual health advancement as one of its key targets and the *National Health and Population Policies* that are seeking to improve women's health. However, little research has been carried out in Bangladesh to help guide these efforts.

Misinformation and unhygienic practices are widespread in Bangladesh and the biological process of menstruation continues to be closeted in a culture of shame. According to the *Bangladesh National Hygiene Survey* (ICDDR, 2014) less than one third of respondents followed proper menstrual hygiene practices. The study, carried out in 2013, aimed to provide a representative picture of current personal hygiene practices in the country. It covered a broad range of population groups (women and girls in households and schools) and a total of 2,500 households and 700 schools were sampled. Only 20 percent of girls and women used hygienic products for absorbing menstrual blood; the rest of the women used old cloth

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<sup>5</sup>For example, Proctor and Gamble has a major program providing pads for free in more than 50 countries, in partnership with UNICEF and Save the Children (<https://always.com/en-us/about-us/girl-empowerment-throughout-the-world-with-always>).

<sup>6</sup>See, for example, the Sanitary Pad Scheme by the Indian Central Government and the pledge of the Clinton Global Initiative of \$2.8 to aid businesses that supply inexpensive sanitary pads.

<sup>7</sup>In the last decade UNESCO has encouraged the Ministries of Health of different low- and middle-income countries to include puberty and menstruation education in the school curricula, and nearly every country has attempted to improve education on puberty (<https://unesdoc.unesco.org/ark:/48223/pf0000226792>).

<sup>8</sup><https://www.thedailystar.net/round-tables/ensuring-sexual-and-reproductive-health-and-rights-srhr-garment-workers-through-health>

<sup>9</sup>The NGO SNV recently started a project which provides access to subsidized sanitary pads in 25 factories. A baseline survey for their project shows that 60 percent of female workers are still using old cloth or paper during their menstruation, while 40 percent currently use disposable or reusable sanitary pads (SNV, 2016).

for several menstrual cycles without proper cleaning, drying, and storing of the absorbent material. Nearly 90 percent of schoolgirls stored their menstrual cloth in a hidden place for repeated use and never changed their cloth at school. Other studies have shown that only 3 percent of school girls wash their menstrual cloth with soap, dry them in sunlight, and then store them with other cloth for repeated use (Alam et al., 2017). Education on menstruation is not provided in formal education and the topic is discussed only scarcely at home. Only 6 percent of the schools in the sample of the *Bangladesh National Hygiene Survey* provide girls with menstrual hygiene education sessions, despite the topic being part of the school curriculum (ICDDR, 2014).

## Sample Characteristics

Our data come from primary data collection in lab-in-the-field experiments conducted in April 2019 with 111 women from the region of Maniganjk, a rural district situated 50 kilometers west of the capital city of Dhaka in Bangladesh. All respondents work as artisans in one-room embroidery centers of the social enterprise Aarong, which is part of the non-profit development agency BRAC. We collaborated with Aarong to improve knowledge about menstrual health management for its all-female workforce and visited four different artisan centers to carry out information campaigns on menstrual health management, described below, and to collect data for our study. All surveys were conducted by a team of female enumerators.

Table 1, column 1, lays out the characteristics of respondents in our all-female sample. The women in our sample are on average 32 years old, 86 percent are Muslim, 95 percent are married, and they have on average 10 years of experience working as artisans for the enterprise that hand-produces ethnic wear. Our respondents are neighbours and belong to the same local community: They live near the artisan centers, which are usually situated in the middle of the village, and commute on average 11 minutes from home to their workplace.

[Insert Table 1 here]

With respect to menstrual health management, 70 percent report using cloth and 46 percent report using pads. These percentages refer to methods used frequently, not exclusively, as some women use more than one method during menstruation. Older and less educated women seem to use cloth (self-reported menstrual cloth use is strongly positively correlated with age (Pearson's correlation coefficient: 0.26, p-value: 0.00) and negatively correlated with years of education (Pearson's correlation coefficient: -0.27, p-value: 0.00) while the opposite holds for women who use pads (Pearson's correlation coefficient for age: -0.36, p-value: 0.00; and for years of education: 0.26, p-value: 0.00). Twenty-three percent of women report that they had missed work due to menstruation.

While substantial knowledge gaps about menstruation exist in Bangladesh, as outlined above, we do find mixed support for existing knowledge gaps at baseline in our sample (see Table 1). Over 97 percent of our respondents are aware that menstruation is a natural process that affects women worldwide, they know that menstruation is not a curse (98 percent), and the majority does not consider it an illness (73 percent). Yet 97 percent think that menstruation is a process of eliminating toxic blood from the body. While in general there seems to be a sufficient understanding of menstruation, there are some misconceptions, in particular about menstruation as an illness and menstrual blood as being toxic.

Regarding knowledge about menstrual hygiene, three quarters of the respondents answer all the menstrual hygiene questions correctly. While 97 percent accurately state that cloth used as absorbent material should be washed with soap, around 25 percent think that cloth can be stored directly after washing without drying. This is in line with the reports on unhygienic menstrual practices listed above and reveals a large knowledge gap in proper menstrual health management for the most commonly used absorbent. Similarly, only 77 percent report that cloth needs to be dried in sunlight, an action that is deemed essential to kill all bacteria. There is a high risk of infection for women who re-use absorbent cloths that have not been dried in sunlight. For sanitary pads, only 5 percent of respondents wrongly think that they can be used again, but 20 percent believe that pads should be washed. This is in line with the superstitious belief that menstrual blood is toxic and harmful, so women would wash the disposable sanitary pads to remove the menstrual blood before actually disposing of them.

We conclude that women in our setting are aware of the nature of menstruation and myths are not as widespread as feared. Nevertheless, knowledge gaps exist with respect to menstrual health management and we see some indication of superstitious beliefs and taboos.

### **3 Study Design**

While we know that knowledge about menstruation is limited and that there are many social restrictions, taboos, and stigmas around menstruation, we do not know how cultural aspects and information interact: Is information provision about menstruation hampered by cultural taboos and stigma? Does information about menstruation affect the perceived cultural and social restrictions surrounding menstruation? In this study we seek, first, to document the prevailing cultural and social beliefs and restrictions using both incentivized and unincentivized elicitation procedures, second, to analyze the effects of an information intervention on these cultural and social beliefs and restrictions, and third, to analyze how sensitive our measurements of cultural and social beliefs are to social image concerns.

## Measuring Social Norms Surrounding Menstruation

Prevailing cultural and social beliefs and restrictions can be understood as social norms, defined as *"a rule of behavior such that individuals prefer to conform to it on condition that they believe that (a) most people in their reference network conform to it (empirical expectation), and (b) that most people in their reference network believe they ought to conform to it (normative expectation)"* (Bicchieri, 2005). Ongoing research in social sciences strives to set a detailed framework that delineates what is understood as social norms, cultural traditions, and personal preferences (Bicchieri, 2005, 2017; Tremewan and Vostroknutov, 2020).

In this paper, we follow the definition outlined above by Bicchieri (2005) and elicit self-reported own behavior as well as empirical and normative expectations of Bangladeshi women on various issues surrounding menstruation: knowledge about menstruation, effects of menstruation on physical and mental well-being, menstrual health management, mobility restrictions, and communication about menstruation. For the self-reported own behavior, the respondents rated their agreement on a four-point Likert-scale (1 'completely agree', 2 'agree', 3 'disagree', and 4 'completely disagree') for statements about their mental and physical well-being and mobility restrictions they face when they have their period. The empirical and normative expectations were elicited based on the incentivized method proposed by Krupka and Weber (2013) who show that norms can be obtained by using a matching coordination game: Participants are incentivized not to reveal their own valuations, but to match those of others. Hence, norms emerge as the focal point in this coordination game about the social appropriateness, our measure for normative expectations (or injunctive norms), or the observed frequency, our measure for empirical expectations (or descriptive norms), of a given behavior.

We elicit both types of expectations with vignettes describing different behaviors of a woman in Bangladesh who had her period. To illustrate the vignette we showed a picture of a Bangladeshi woman, who we called Romana. For example, in one picture Romana was shopping for groceries and the vignette described her as having her monthly period and going to the market to buy food. For the empirical expectations, participants rated the frequency with which the described behavior is observed on the four-point Likert-scale: 1 'very rare', 2 'rather rare', 3 'rather frequent', and 4 'very frequent'. For the normative expectations, participants rated the social appropriateness of the described behavior on the four-point Likert-scale: 1 'very socially inappropriate', 2 'socially appropriate', 3 'socially inappropriate', and 4 'very socially appropriate'. The respondents received answer cards that illustrated the different answer options using pictures with smaller or larger groups of people to symbolize the various levels of observed frequency or different smileys to symbolize the various levels of social appropriateness. To place their rating, the respondent selected one

of the answer cards and enumerators recorded the answers. Each respondent rated various vignettes, first on their observed frequency and then on their social appropriateness. For each norm elicitation procedure, there was a practice round based on a vignette on the observed frequency or the social appropriateness of a Bangladeshi woman going to the mosque without wearing a head scarf - a behavior unrelated to menstruation.

All answers are monetarily incentivized: Workers receive a bonus payment if their answer for a given behavior matches the modal answer among other respondents in the same artisan working center. After the respondent went through all the vignettes, one question was randomly chosen by the enumerator and compared to the modal answer to determine whether the worker received the bonus payment. We measure social norms both before and after an information intervention.

## **Information Intervention**

We address information constraints in a one-hour information session that is conducted by the staff of an experienced NGO, which has conducted such sessions for many years in other workplaces and factories in the country. The session took place at the artisan work center, and all the study participants attended the session. The sessions provide an anatomical explanation for why menstruation occurs and stress the importance of hygienic menstrual health management, either through the use of modern disposable absorbents (disposable sanitary pads) or through proper treatment of reusable absorbents (cloth), that is, to wash them with water and soap and dry them in the sun. Furthermore, the sessions provide advice for remedies against period pain and for communicating about menstrual health management with adolescent girls. The NGO generally provides these courses to a mixed audience of male and female workers, but for our project the sessions are held for a purely female audience since only female workers are employed in the artisan centers. To measure the effect of the information intervention on social norms, we compare the social norm elicitation before and after the information intervention. We also measure a larger array of norms after the information session to extensively document the prevalence of norms after the information session.

## **Social Image Concerns**

Our elicitation of social norms may be influenced by stigma and taboos that surround menstruation. Despite the monetary incentive, respondents might refrain from truthfully reporting the norms, in particular if their answers may be observed and they fear social sanctions if their reported norm deviates from the common understanding in their reference group. To detect potential social image concerns in our incentivized elicitation of social norms, we exogenously varied whether participants reported their answers privately or publicly.

After the initial baseline questions, respondents were randomly assigned to a private or a public social norm elicitation by picking a card from a box. About half of the respondents in each artisan center were assigned to a private individual social norm elicitation: First, a vignette describing a behavior of a Bangladeshi woman who has her period was presented. Second, the respondent was asked to rate the social appropriateness (normative expectation) or the empirically observed frequency (empirical expectation) of this behavior as outline above using answer cards. Third, the respondents showed the chosen answer card to the enumerator who made sure that the answer card was not observed by others and noted down the answer. The other half of the respondents in each artisan center were assigned to the public elicitation procedure in groups of 8 to 12 respondents where, first, the group was shown the vignette, second, the respondents privately chose their answer card, and, third, once all respondents had made their choice, they simultaneously showed their answer card to the enumerator and the other participants. While the choice of the card was made privately, the selected card was seen by the rest of the group while the enumerator noted down the answers. This randomly assigned variation in the observability of the social norm elicitation by a relevant reference group allows us to analyze the presence of social image concerns in the norm elicitation. Our sample seems well-balanced with respect to the random assignment of the mode of elicitation (see Table 1, column 4).

## Empirical strategy

For our analyses, we start by describing observed own behavior and the elicited empirical and normative expectations. For the empirical and normative expectations, we show the distribution of ratings before and after the information intervention and across public and private elicitation. Differences in the distribution are identified using a Kolmogorov-Smirnov test. In a final step we test for shifts in the mean of the empirical and normative expectations. For this we rely on our two sources of variation in the norm elicitation procedure: we compare the observed frequency and social appropriateness ratings elicited before and after the information intervention in private vs. public elicitation procedures. This allows us to assess whether information provision and social image concerns affect the observed frequency and social appropriateness ratings. We use the following difference-in-differences specification to estimate changes in the empirical and normative expectations:

$$y_{it} = \alpha + \beta_1 info_t + \beta_2 public_i + \beta_3 info * public_{it} + \epsilon_{it} \quad (1)$$

where  $y_{it}$  is the outcome variable for respondent  $i$  at time  $t$ ,  $info$  is a binary variable equal to one if the social norm was elicited after the information session and zero if it was elicited before, and  $public$  is a binary variable equal to one if the social norm was elicited



publicly in a group setting and zero if it was elicited privately from the individual;  $\epsilon_{it}$  refers to robust standard errors.

We consider the following sets of empirical and normative expectations as outcome variables: (i) related to food limitations: preparing a meal for the family, going to the market to purchase food, or cooking for an ill person or for a newborn; (ii) related to daily activities: to pray, go to work, visit newborns, or go to school; (iii) related to menstrual hygiene management: cloth use, pad use, purchase pads, or dry cloth outside; (iv) related to communication or secrecy regarding menstruation such as talking to mother or husband about menstruation.

## 4 Results

### 4.1 Description of Social Norms

#### Well-being and own behavior

Table 2, column 1, sets out a detailed picture of the physical and mental well-being of respondents during their menstruation. When menstruating, the respondents feel tired (77 percent), suffer from acute pain (73 percent) and some take painkillers (20 percent). About half of the respondents report abundant bleeding (47 percent), having blood on their outer clothes that has leaked through their absorbent material and underwear (59 percent) and having a strong menstrual odor (50 percent). These findings suggest that respondents are not using adequate absorbents.

[Insert Table 2 here]

Not using adequate absorbent material can be a source of stress or shame in an environment where menstruating women are stigmatized. In fact, we find substantial self-reported negative effects on mental health during menstruation. Half of our sample reports increased feelings of stress (44 percent) and shame (52 percent) and they are concerned about others noticing that they are menstruating, both due to stains on their cloths (62 percent) and menstrual odor (56 percent). Two thirds report finding it more difficult to fulfil their work tasks during this time. These findings suggest that the subjects had been experiencing psychological stress.

Figure 2 shows the self-reported behavior of the respondents during menstruation with respect to mobility restrictions.<sup>10</sup> During menstruation, half of the respondents avoid going to the market and three out of four avoid visiting ill people. Both these mobility restrictions are in line with previous studies. In contrast to other studies, in our sample there is no restriction

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<sup>10</sup>While Figure 2 shows the share of participants for each possible response, we report the joint figures here for all respondents who either agree or completely agree with the stated mobility restrictions.

imposed when it comes to entering the kitchen or even touching food: 96 percent of the respondents report cooking for the family during their menstruation. Also, attending social gatherings seems more common than reported in previous studies (Dasgupta and Sarkar, 2008; Kumar and Srivastava, 2011). When it comes to good menstrual hygiene practices, 88 percent report washing their menstrual cloths without being seen and only 9 percent report drying their menstrual cloths in the sun. Recalling that 77 percent knew that cloth must be hanged in the sun to dry (Table 1, column 1) suggests that own behavior seems to be influenced by factors other than knowledge.

[Insert Figure 2 here]

We now shed more light on the potential secrecy and taboos surrounding menstruation by looking at communication patterns around menstruation. Women are asked what reason they would give if they need to miss a day of work due to their menstruation when communicating with i) their supervisor (supervisors are also female in our sample), ii) their coworkers, or iii) their family at home. Respondents stated their level of agreement to giving their reason as i) menstruation, ii) feeling unwell (*shorir karap*) or iii) no specific reason. While *shorir karap* is commonly used to refer to one's period, it is also used to state a general feeling of uneasiness which allows a woman to hide the true reason for missing a day at work.

[Insert Figure 1 here]

Figure 1 displays the distribution of answers. There are some indications that there is a taboo that precludes women from being truthful at home and at work about the real reason for not attending work. Figure 1, panel *a*, shows that the respondents would choose nearly unanimously not to inform their female supervisor about menstruation being the true reason for missing work and would rather indicate that they are feeling unwell. When it comes to their coworkers, the majority of the respondents would state the real reason (Figure 1, panel *b*). Lastly, looking at the domestic environment, we can also observe a stronger taboo in place, since the respondents prefer to indicate that they are feeling unwell than to state that they are menstruating (Figure 1, panel *c*). We conclude that the taboo is not apparent in horizontal communication among individuals of the same hierarchical status, represented in our sample by the coworkers, but is more apparent in vertical communication among different hierarchical statuses: in the communication between workers and supervisors or between wife and husband, daughter and mother or step-mother. Secrecy and taboos around menstruation seem to be particularly present in communication across different hierarchical levels and may pose constraints to information transmission across these levels.

## Empirical Expectations

We now present the results from the incentivized elicitation of social norms.<sup>11</sup> Table 3 sets out the mean and the distribution of the empirical expectations stating the percentage share of respondents choosing this answer option.

[Insert Table 3 here]

The left side of Table 3, panel A, shows the elicited empirical expectations before the information intervention was provided. We observe that our respondents believe that praying during menstruation (93 percent) and drying menstrual cloth outside (59 percent) are very rarely observed. For the remaining empirical expectations, the focal point is on the highest possible frequency: Respondents report very frequently observed behavior for cooking (86 percent), going to the market (50 percent), working (93 percent), using cloth (49 percent), using pads (62 percent), buying pads (50 percent) and talking to their mother (75 percent) and their husband (81 percent) about menstruation.

[Insert Table 3 here]

When comparing empirical expectations at baseline on similar domains, we observe disparity in the answer distribution when a public dimension is included in the behavior. For example, we have two empirical expectations involving pads: buying pads (publicly in a store) and using pads (private decision with no public component). We observe that while 66 percent believe this for buying pads, 85 percent of the respondents believe that other women use pads frequently or very frequently. We observe a similar pattern on empirical expectations in the domain of food. If we compare the behavior of buying food in the market (public component) with cooking food (private), we see an even larger difference in the empirical expectations (65 percent for going to the market vs. 94 percent for cooking).

## Normative Expectations

Table 4 sets out the mean and the distribution of the normative expectations stating the percentage share of respondents choosing each answer. The left side of Table 4, panel A, shows the elicited normative expectations before the information intervention was provided. The respondents think that it is considered very socially inappropriate to pray during menstruation (93 percent) and to dry menstrual cloth outside (59 percent). The norm against correct drying of menstrual cloth is especially concerning, as it increases the risk of infection

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<sup>11</sup>To make our answers comparable across the various Likert-scales used for elicitation, we convert the responses into numerical scores. A rating of "very rare" received a score of 0, "rather rare" a score of 1/3, "somewhat frequent" a score of 2/3, and "very frequent" a score of 1. We proceed in the same way for the other Likert-scales, where zero refers to the least frequent, least socially appropriate or least agreeable category, and one refers to the most frequent, most socially appropriate or most agreeable category.

(Torondel et al., 2018). For the remaining normative expectations, the focal point is on the highest social appropriateness rating: Respondents report that it is considered very socially appropriate to cook (74 percent), go to the market (51 percent), work (83 percent), use cloth (57 percent), use pads (77 percent), buy pads (56 percent) and talk to their mother (88 percent) and their husband (90 percent) about menstruation.

[Insert Table 4 here]

When comparing empirical and normative expectations, there is no difference in the focal point of rankings of different behavior, but there are smaller discrepancies with respect to what behavior is considered socially acceptable and what is frequently empirically observed. For example, some actions are observed more frequently than they are considered socially appropriate: 74 percent consider cooking while menstruating very socially appropriate, 86 percent consider it to be very frequently observed. There are also some actions that are considered socially appropriate but are less frequently observed: While 88 percent (90 percent) consider it socially appropriate to talk to one's mother (husband) about menstruation, only 75 percent (81 percent) state that this is frequently observed. This contrasts with the communication patterns reported above, where the respondents preferred to give 'feeling unwell' as a reason for staying home when they were menstruating. Except for praying at a mosque and drying cloth in sunlight, there seem to be very few restrictions imposed by both empirical and normative expectations on women's behavior.

### **Social Norms and Own behavior**

Now we contrast empirical and normative expectations with the self-reported own behavior to further investigate discrepancies between own behavior and measured social norms. Lack of compliance with social norms may undermine them and foster their erosion (Bicchieri, 2017). Figure 3 shows the distribution of empirical and normative expectations as well as own, self-reported behavior for six different actions when menstruating. While self-reported behavior seems more or less in line with empirical and normative expectations for cooking, praying, drying cloth and using cloth, there are larger discrepancies for going to the market or using pads. While neither action seems to be overly restricted by empirical or normative expectations, about half of the respondents report not going to the market when they have their period or not using pads to manage their menstruation.

[Insert Figure 3 here]

To investigate differences between respondents who go to the market or use pads when menstruating, we compare the characteristics of women who (i) use pads to women who do not use pads and (ii) report going to the market during menstruation to those who do not.

Table 2 columns 2 to 7 set out the results. Women who use pads are significantly younger, less likely to be married, more educated and have less work experience (see Table 2, column 4). There are hardly any differences with respect to their physical or mental well-being: they are less likely to report leakage onto their clothes and more likely to feel irritated. Women who go the market when menstruating are more educated and live closer to their work place. They are substantially less likely to report any negative impacts on their mental well-being when having their period (see Table 2, column 7). Women who do not go to the market are more likely to suffer from feelings of stress and shame. They are more concerned that others might notice menstrual stains or odor and they also report feeling more irritated when menstruating, and finding it more difficult to accomplish tasks. We conclude that mobility restrictions, in particular not going to the market, do not seem to be driven by empirical or normative expectations, but result from the negative effects of menstruation on mental well-being, such as feelings of shame and the fear that their menstruation could be noticed. The latter two seem to be driven by stigma associated with menstruation.

## 4.2 Effects of Information Provision and Public Elicitation of Norms

To assess the effect of the information intervention and of the private vs. public elicitation of social norms, we first look at the distribution of empirical and normative expectations. Table 3, panel A, sets out the empirical expectations before (left side) and after (right side) the information intervention. We see that there are no differences in the focal points before and after the information intervention except for the empirical expectation on drying cloth in sunlight. Here we do see that the focal point shifted from 'very rarely observed' to 'very frequently observed' behavior. Since the information intervention explicitly states the importance of drying washed cloth in sunlight, this shift may reflect an information update that all respondents have received and not a shift in the empirical expectations themselves. Later in this section, we investigate this strong shift of the focal point further and shed light on shifts in knowledge about menstrual health management and heterogeneous effects for different types of respondents in order to address this concern.

Even though we predominantly see no shift in the focal point of empirical expectations, we do observe differences in the distribution of empirical expectations: A Kolmogorov-Smirnov test compares the distribution of answer possibilities before and after the information intervention. We observe that after the information intervention, the distribution of answers concentrates on higher frequencies of observed behavior. For example, while about 65 percent of respondents reported that going to the market while menstruating is frequently or very frequently observed before the information intervention, 99 percent report so after the information intervention. Similarly, we observe that the distribution gets more concentrated for using and purchasing pads, and talking to one's mother about menstruation.

We observe very similar reactions for normative expectations (see Table 4, panel A). We observe a shift of the focal point only for drying pads when comparing the distribution before the information intervention (left side) to the one after (right side), but we observe significantly more concentrated distributions for preparing food, going to the market, and using and purchasing pads.

Panel B of Tables 3 and 4 set out the elicitation of empirical and normative expectations, respectively, pooled before and after the information campaign separated by private elicitation (left side) and public elicitation (right side). Looking only at private vs. public elicitation shows hardly any differences in empirical and normative expectations: There is no shift in focal points and only the distribution of empirical expectations about talking to mother and husband get more dispersed in the public elicitation compared to the private elicitation.

Given the strong reaction of the empirical and normative expectations to the information provision, we apply difference-in-differences estimations and estimate equation 1 to precisely disentangle the effects of the information provision and the mode of elicitation on the mean ratings of empirically observed frequency and social appropriateness of behavior. Table 5 provides the estimates of equation 1 for the empirical (Panel A) and normative (Panel B) expectations that directly relate to menstrual health management. To account for multiple hypothesis testing, we create an index of all reported behaviors and test the overall effect on this index (Table 5, column 1). Both for the empirical and the normative expectations, the information intervention has a positive and significant effect on the mean expectation rating: after the information intervention, the mean empirical and normative expectation both increase by 21 percentage points, which corresponds to a shift of 33 percent for the empirical and 31 percent for the normative expectations evaluated at their baseline mean. When looking at the different components, we observe that the information intervention affects expectations on using pads (column 3), buying pads (column 4) and drying cloth outside (column 5). The norm that experiences the largest shift in the mean rating is drying menstrual cloth outside after washing (168 percent and 196 percent change evaluated at the sample mean). There is no significant effect with regard to the social image concerns addressed in the public vs. private elicitation or the interaction term. Since the estimated coefficients are close to zero, we interpret these as quite precisely estimated null effects.

[Insert Table 5 here]

Menstrual health management is directly addressed in the information session: The increased risks of infections that arise from not properly drying menstrual cloth are explained together with instructions for proper washing and drying. The positive effect of the information intervention might be confounded with the fact that the respondents have recently

received this - possibly new - information and they reproduce it during the elicitation. Therefore, if the positive effect of the information intervention were just an information update, we would expect to see a series of factors: (i) the information is new information that the respondents were not aware of before, (ii) an improvement in their knowledge after the information session, and (iii) that the social norms that involve matters not addressed in the information session remain unaltered. We have already documented above in section 2 that knowledge gaps at baseline are not excessive (see also Table 1). Table 6 elicits changes in knowledge after the information intervention. We see modest variation in knowledge after the information session. We do not see a significant effect on the aggregated index (Table 6, column 1), even though we see improvements in knowledge on the misconception that menstruation is an illness (21 percentage points) and that menstrual blood is toxic (31 percentage points). On the latter, the knowledge gap remains large (67 percent of the respondents still believe that menstruation is composed of toxic blood after the information session).

[Insert Table 6 here]

Next, we look at the effects of the information intervention and the mode of elicitation for behavior that is not directly addressed in the information session reported (see Table 7). We observe an overall effect of the information intervention on both the empirical expectations (14 percent evaluated at the sample mean) and the normative expectations (11 percent evaluated at the sample mean) for mobility restrictions and communication (Table 7, column 1). This effect seems to be driven by increased ratings of empirically observed frequency or social appropriateness, respectively, for going to work, preparing meals, going to the market, and visiting newborns while menstruating. For normative expectations, we do not see any effect of the public elicitation procedure nor its interaction with information intervention. We do not find a significant effect of the public elicitation or its interaction with the information provision on the mobility restriction and communication index (Table 7, column 1). Overall, the information intervention did significantly increase the mean ratings for the empirical and normative expectations about behavior not addressed in the information intervention directly. In light of these three observations, it seems more plausible that the information intervention actually affected empirical and normative expectations and then increased expectations purely mechanically.

[Insert Table 7 here]

Further, we analyze the changes in empirical and normative expectations with respect to communication patterns (Table 7, columns 7 and 8). The changes are significant but modest, mainly because the level of observed frequency and social acceptability was already high at the baseline. The information session leads to an increased level of observed frequency and

social acceptability of 3 to 4 percent, evaluated at the baseline sample mean. While the mean expectations for talking to one’s mother were shifted for both empirical and normative expectations, mean normative expectations also changed with respect to talking to one’s husband about menstruation. For empirical expectations, respondents report a lower frequency of talking both to one’s mother and husband about menstruation in a public elicitation before the information intervention, where social image concerns may affect the answers. This effect is reversed after the information session: respondents in the public elicitation after the information session report larger empirical expectations for communication about menstruation.

### 4.3 Further Analysis

We have observed in the previous section that information provision can lead to variations in the perceived social norms. While for some types of behavior there is only a shift in the mean rating of the empirical or normative expectations (going to the market, using pads, buying pads), there is a shift of the focal point in the empirical and normative expectations for drying menstrual cloth in sunlight. To provide a more extensive documentation of the potential persistence of restrictive norms after the information intervention, we present results for a set of behaviors for which we measured empirical and normative expectations only at endline (Table 8). The left side of the table shows the elicited empirical expectations and the right side provides the results from the normative expectations.

[Insert Table 8 here]

We observe that our respondents believe that cooking during menstruation, either for an ill family member, a newborn or cooking a different type of food, is frequent and socially appropriate (mean ratings are larger than 96 percent). The respondents coordinate nearly perfectly around the focal point of the answers (only 1 percent report finding these behaviors rare or inappropriate). Ratings of attending school during menstruation, buying pads in the market from a female clerk or even asking the husband to buy the pads have a focal point also on the highest level of frequency and appropriateness. Consistent with the results from the regression analysis, the religious rules remain restrictive: Participating in Ramadan during menstruation is seen as very rare (100 percent) and very socially inappropriate (98 percent). Lastly, for washing menstrual cloth in a public facility (or publicly) we observe a wide dispersion of answers: For the empirical expectations, 56 percent of respondents state this behavior is very frequently observed, but 25 percent note this behavior as very rarely observed. For the normative expectations, 40 percent consider this behavior to be very socially appropriate, and 44 percent perceive it to be very socially inappropriate. The strong dispersion suggests that the information session, in which this behavior was directly



addressed and the importance of washing menstrual cloth with clean water and soap was stressed, may not be sufficient to overcome restrictive norms on menstrual hygiene practices.

In particular in light of the living standards, where households only have access to communal water sources such as washing facilities in the village, large ponds, or rivers to launder their clothes, normative restrictions on washing menstrual cloth in public facilities may lead to unhygienic menstrual health management. Women seem to wash their menstrual cloth in places that provide privacy but that are unhygienic and do not facilitate effective washing, such as on the floor of toilets.<sup>12</sup> Although information leads to shifts in expectations related to menstrual hygiene (such as drying menstrual cloth) as our results show, deeply-rooted taboos, like the taboo of seeing menstrual blood, do not seem to be affected by information provision. When the menstrual cloth is hanged outside to dry, it has already been cleaned so the taboo or secrecy that affects menstruation has a lower intensity than when washing menstrual cloth. We interpret this finding as further support for the important role of taboos and cultural norms: Some practices are not affected by available information and improving knowledge alone might not change unhygienic behaviours, if they are connected to deeply-rooted taboos.

[Insert Table 9 here]

To shed light on other channels that could support behavior change, we analyze heterogeneous effects with respect to the level of agency of the respondents. According to Bicchieri and Lindemans (2014) individuals are asymmetrically sensitive to social expectations and these differences are often related to a lack of agency or autonomy. Agency (or autonomy) is the ability and inclination to make one’s own choices (Bavetta and Navarra, 2012), rather than having others make choices and decide for oneself (Bicchieri and Lindemans, 2014). In Table 9 we replicate the analyses of Table 5 on two sub-samples: respondents with high levels of agency (uneven columns) and those with low level of agency (even columns).

We measure the agency of our respondents based on a range of standard measures of independent thinking drawn from the psychology literature, specifically the Portrait Values Questionnaire (PVQ) proposed by Schwartz (2012). The PVQ is a survey developed to measure the ten basic values in samples of respondents not educated in Western schools that emphasize abstract, context-free thinking. The questionnaire includes short verbal portraits of different people, gender-matched with the respondent. Each portrait describes a person’s goals, aspirations, or wishes that point implicitly to the importance of a value. For example: “Thinking up new ideas and being creative is important to her. She likes to do things in her own original way” describes a person for whom self-direction values are important. “It

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<sup>12</sup>See, for example, Das et al. (2015) who report that the 69 per cent of the women in their study in Odisha, India, wash their menstrual cloth in the toilet and not at the public washing facility, the pond or at a tub well or yard. Qualitative interviews with respondents in our sample also confirmed these practices.

is important to her to be rich. She wants to have a lot of money and expensive things” describes a person who cherishes power values. For each portrait, respondents answer how much this person is like themselves. Responses range from *very much like me* to *not like me at all* on a four-point Likert-scale. Respondents’ own values are inferred from their self-reported similarity to people described implicitly in terms of the particular values. Respondents are asked to compare the portrait to themselves rather than themselves to the portrait since comparing others to oneself directs attention only to aspects of the other that are portrayed. Hence, the similarity judgment is also likely to focus on these value-relevant aspects. We compile an agency index based on the questions measuring self-direction, as this is the value that relates to independent thinking, action-choosing, autonomy and independence.

For the analysis, we divided the sample into high and low level of agency compared to the sample mean of the agency index. We test whether the effects of the information session differ depending on the respondents’ baseline values of agency. For pad use, we observe a positive effect of the information intervention on empirical and normative expectations (16.9 percent and 16.1 percent, respectively, evaluated at the overall sample mean) for respondents with a high agency index (Table 9, column 3). While we do not observe any significant effect for respondents with a low agency index, neither coefficient differs significantly. For pad purchase, we find a increase of 38.4 percent (31.6 percent) in the mean rating of the empirical expectations (normative expectations) after the information provision for respondents with a high agency index (Table 9, column 5). For respondents with a low agency index, the effect is significantly smaller for the empirical expectations (19.2 percent) but does not differ for the normative expectations (Table 9, column 6). For drying cloth in the sunlight, there is an increase of 220.7 percent (225.9 percent) in the mean rating of the empirical expectations (normative expectations) after the information provision for respondents with a high agency index (Table 9, column 7). For respondents with a low agency index, this increase is lower: 93.1 percent for the empirical expectations and 155.6 percent for the normative expectations, but only significantly lower for the former (Table 9, column 8).

From our results, we conclude that agency is relevant to efforts to improve menstrual health management in the presence of normative restrictions and taboos. While information provision brings some improvement in menstrual health management, deeply rooted taboos cannot be alleviated by information provision alone. Agency considers how much the recipients of the information intervention, the female respondents in our study, can actually react to the new information. Improvements in knowledge may need to be accompanied by improvements in women’s agency if they are to have a lasting impact. Lacking agency may be a reason why some taboos are pervasive despite the information intervention in our study and the general increased availability of disposable pads in the last decade.

## 5 Conclusion

In this paper, we present the results from lab-in-the-field experiments with poor working women in Bangladesh and document women’s wellbeing, knowledge gaps, taboos and social restrictions during menstruation. We conduct an information intervention on menstrual health and evaluate how information provision affects empirical and normative expectations. Both types of expectations are elicited using monetarily incentivized methods to measure social norms; self-reported behavior complements our data collection. To shed further light on measuring norms and expectations in the presence of taboos and stigma, we randomly varied the intensity of social image concerns in the elicitation process.

We report substantial self-reported negative effects on mental health during menstruation and secrecy surrounding menstruation. The majority of our respondents report feelings of shame and fear of others noticing that they are menstruating. We also observed that self-imposed constraints on behavior, like not going to the market during menstruation, are associated with the feelings of fear and shame and a general lower level of psychological wellbeing. Lastly, secrecy surrounding menstruation manifests in a preference to report feeling unwell to explain absences from work, rather than saying the absence is due to menstruation.

We find positive effects of our information intervention on restricted norms and behavioral expectations. The focal point for empirical and normative expectations only changed after the information provision for the practice of drying menstrual cloth in sunlight - an important factor in the hygienic re-use of menstrual cloth as absorbent material. For other behaviors, we find important changes in the average ratings of empirical and normative expectations after the information provision, and the distribution becomes less dispersed even when the focal points do not shift. We conclude that information can help close knowledge gaps and shape women’s empirical and normative expectations. Future research will need to document how persistently information provision can shape social norms and expectations, and whether it affects real behavior eventually.

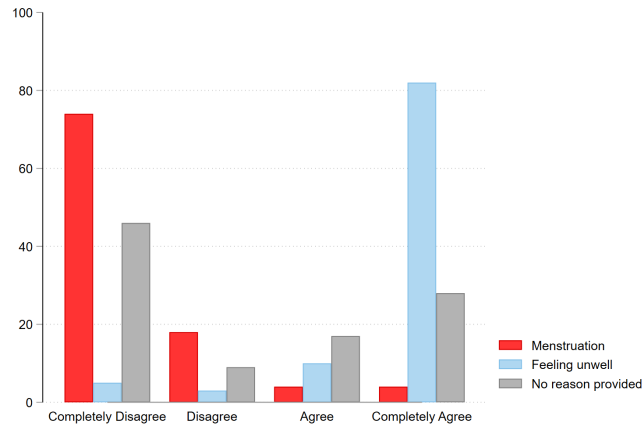
Given the taboos and stigmatisation of menstruation, restrictions on proper menstrual hygiene practices persist even after the information provision, such as the social appropriateness of washing menstrual cloth in public facilities - an important factor in menstrual hygiene in particular where there is limited access to private washing facilities. We conclude that taboos and stigmatisation may be an important impediment to any information uptake by respondents. Similar constraints have been found with traditional medical beliefs that hinder the efficacy of information provision. In Pakistan, standard hygiene instructions were found to be ineffective for behavior change and hygiene measures unless they were accompanied by a novel component, in which respondents also learned about microbes and the implied germ theory of diseases, which helped to justify hygiene instructions and substituted traditional medical beliefs with modern ones (see Bennett et al. (2018)). We extend this knowledge and

propose that not only traditional health beliefs, but any form of taboo or stigma may reduce the effectiveness of information provision. Further, the effects of information provision seem to be driven by the respondent's level of self-determination and agency. Future work could explore the wedge between information updates and the capacity of the respondent to act upon this information. This is in line with recent work by Ashraf et al. (2020) who find that negotiation training enables Zambian girls to resolve incomplete contracting problems with their parents and achieve higher educational outcomes. In case cultural norms and expectations restrict proper health behavior, information provision may need to be accompanied by measures that increase the agency and empowerment of the information recipient as well. For social norms and taboos surrounding menstruation, engaging men, in particular male family members, may be an important missing piece for future research.

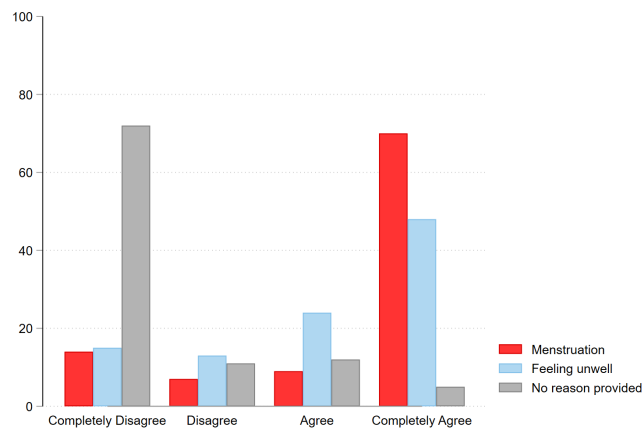
## 6 Figures

Figure 1: Communication Regarding Absence at Work

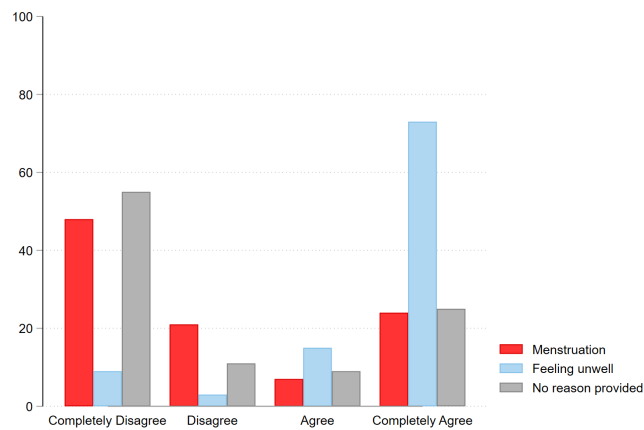
(a) Reasons told to female supervisor



(b) Reasons told to coworker

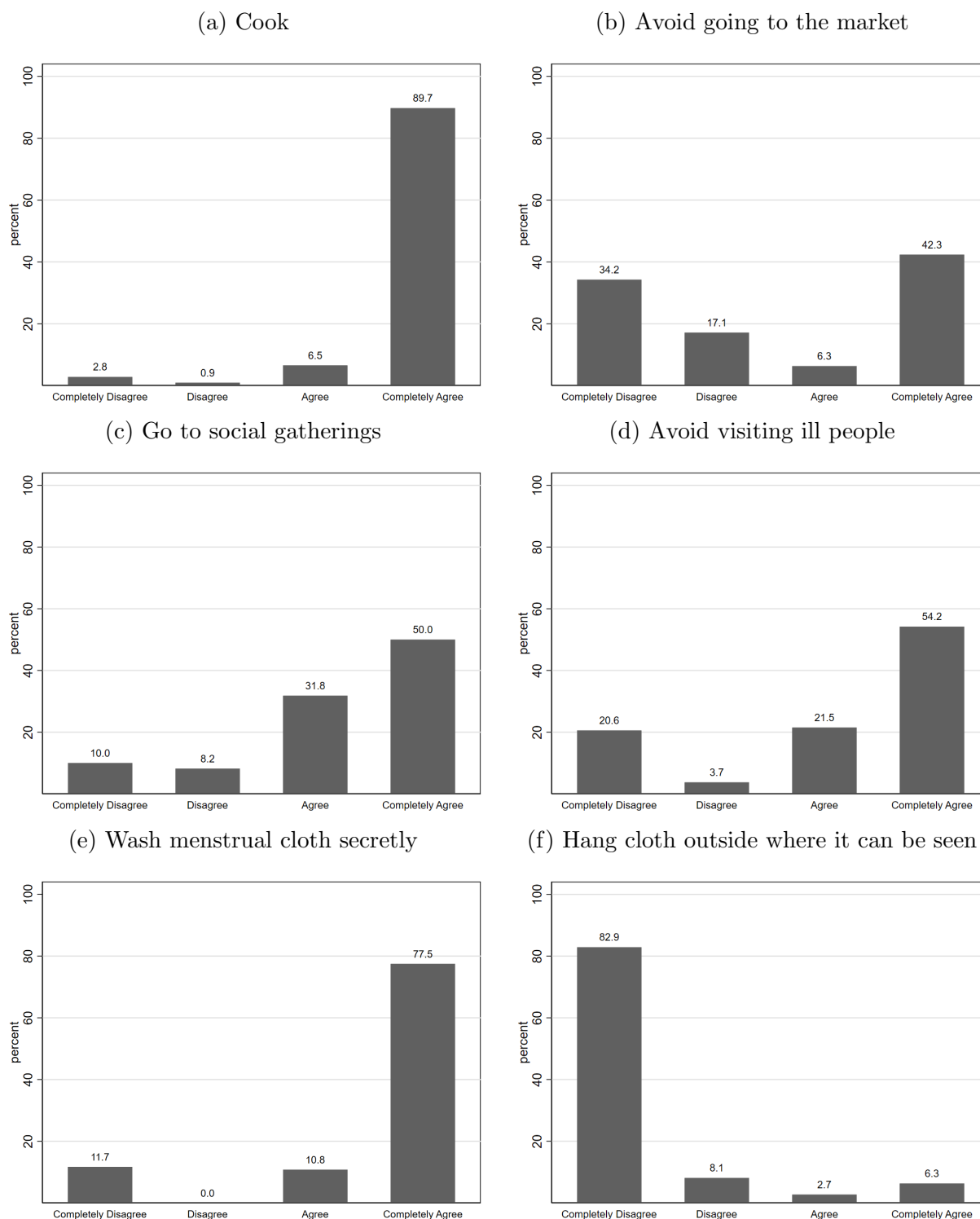


(c) Reasons told at home



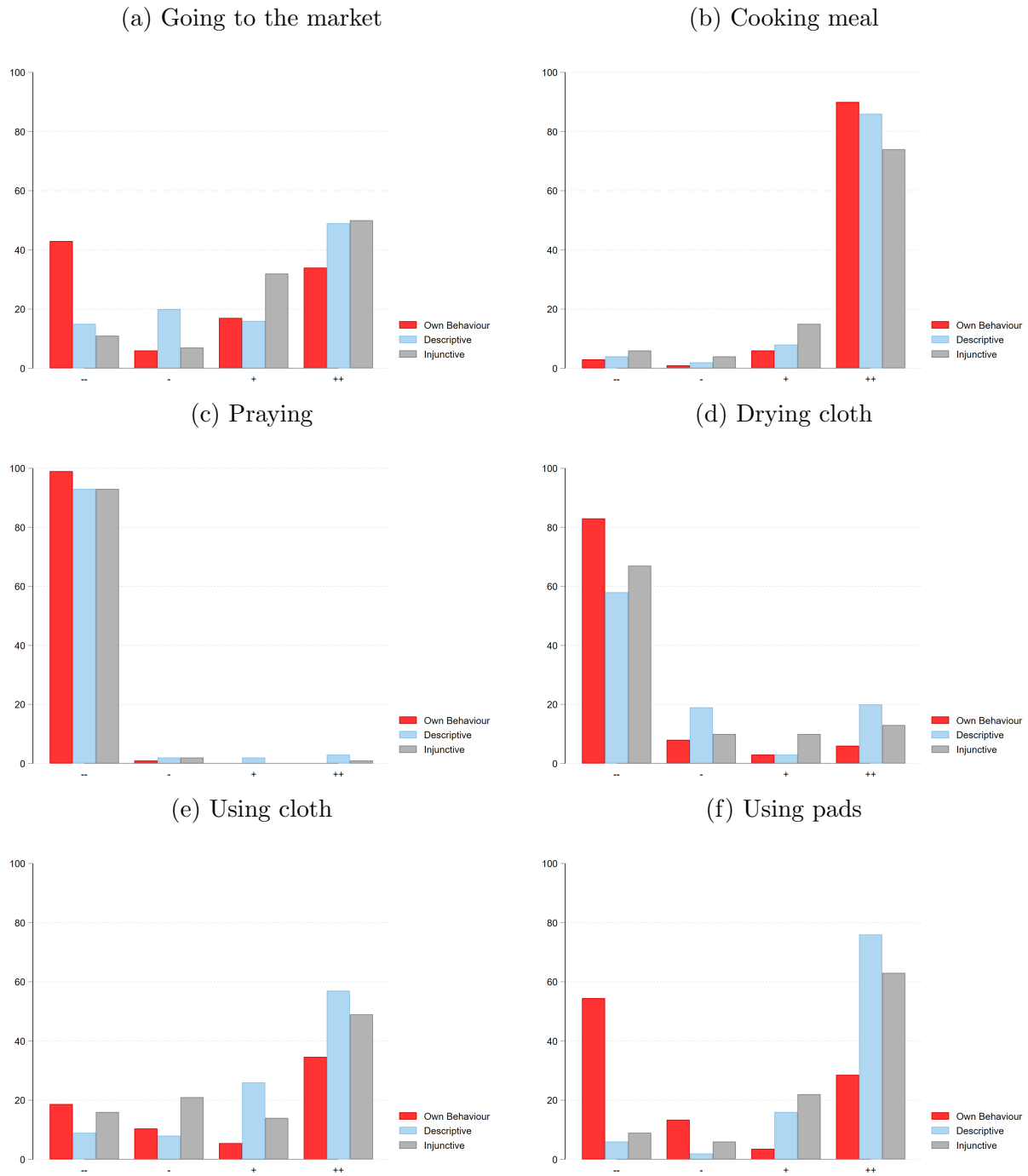
Notes: Self-reported level of agreement in percent to the communication strategies for needing to miss a day of work due to menstruation towards a) the supervisor, b) the coworker, and c) at home.

Figure 2: Behavior During Menstruation



*Notes:* Self-reported level of agreement about the following behavior during menstruation: (a) Cook for the family, (b) Avoid going to the market/bazaar (c) Go to social gatherings, (d) Avoid visiting ill people, (e) Wash menstrual cloth without being seen by anyone and (f) After washing, hang the menstrual cloth outside to dry where it can be seen by someone.

Figure 3: Social Norms and Individual behavior



*Notes:* The graphs compare the reported own behavior with the social norms elicitation (both empirical and normative expectations) across various dimensions. The x-axis displays the restrictiveness of the norm ranging from completely restricted (--) to hardly any restrictions (++). For individual behavior the answers range from large restriction (--), restriction (-), rather no restriction (+) or, completely no restriction (++). For the empirical expectations the answers are: very rare (--), rather rare (-), rather frequent (+) and very frequent (++). For the normative expectations the answers are: very socially inappropriate (--), socially inappropriate (-), socially appropriate (+), and very socially appropriate (++).



## 7 Tables

Table 1: Summary Statistics and Balance of Sample

	(1)	(2)	(3)	(4)
	Sample	Elicitation		Difference
	Private	Public		
Age	32.23 (8.16)	32.91 (9.20)	31.47 (6.82)	-1.44 (1.08)
Non-muslim (in %)	0.14 (0.35)	0.14 (0.35)	0.15 (0.36)	0.01 (0.05)
Married (in %)	0.95 (0.21)	0.95 (0.22)	0.96 (0.19)	0.01 (0.03)
Education (years)	6.36 (3.97)	6.59 (3.88)	6.11 (4.07)	-0.47 (0.53)
Work experience (years)	10.53 (7.57)	11.15 (8.05)	9.86 (6.99)	-1.28 (1.01)
Commute to work (min)	11.57 (11.22)	12.02 (11.90)	11.08 (10.45)	-0.94 (1.50)
Ever absent due to menstruation (%)	23.36 (42.41)	21.43 (41.22)	25.49 (43.80)	4.06 (5.83)
Cloth Use	70.00 (45.93)	68.42 (46.69)	71.70 (45.26)	3.28 (6.20)
Pad Use	46.36 (49.98)	43.86 (49.84)	49.06 (50.23)	5.20 (6.75)
<b>Knowledge</b> (% of correct answers)				
<i>Menstruation is a...</i>				
Curse	98.20 (13.36)	98.28 (13.13)	98.11 (13.74)	-0.16 (2.56)
Illness	72.97 (44.61)	70.69 (45.92)	75.47 (43.44)	4.78 (8.48)
Natural process	97.27 (16.36)	98.25 (13.25)	96.23 (19.24)	-2.02 (3.17)
Toxic	2.70 (16.29)	1.72 (13.13)	3.77 (19.24)	2.05 (3.15)
<i>Menstrual cloth...</i>				
can be reused	81.08 (39.25)	79.31 (40.68)	83.02 (37.73)	3.71 (5.26)
must be washed with soap	96.40 (18.68)	96.55 (18.33)	96.23 (19.15)	-0.33 (2.52)
should not be stored without drying	75.68 (43.00)	79.31 (40.68)	71.70 (45.26)	-7.61 (5.80)
must be hanged in the sun to dry	77.27 (42.00)	78.95 (40.95)	75.47 (43.23)	-3.48 (5.69)
<i>Disposable sanitary pads...</i>				
should be washed	79.28 (40.62)	77.59 (41.88)	81.13 (39.31)	3.55 (5.45)
cannot be reused	95.50 (20.79)	96.55 (18.33)	94.34 (23.22)	-2.21 (2.82)
Observations	111	58	53	

*Notes:* Means and standard deviations (in parentheses) for respondent's characteristics and knowledge about menstruation at baseline in columns 1 to 3. Column 4 reports the difference in the coefficient of a simple regression of the private vs. public elicitation on the variable with robust standard errors. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table 2: Summary Statistics - Pad use - Going to the market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Sample	Pad Use			Going to Market		
		No	Yes	Difference	No	Yes	Difference
Age	32.23 (8.16)	34.68 (7.54)	28.94 (7.20)	-0.06*** (0.01)	32.33 (8.06)	32.12 (8.37)	-0.21 (1.10)
Non-muslim (in %)	14.41 (35.20)	18.64 (39.11)	9.80 (29.88)	-0.09* (0.05)	18.52 (39.21)	10.53 (30.96)	-7.99* (4.74)
Married (in %)	95.50 (20.79)	98.31 (12.96)	92.16 (27.02)	-0.06** (0.03)	94.44 (23.12)	96.49 (18.56)	2.05 (2.81)
Education (years)	6.36 (3.97)	5.49 (3.70)	7.49 (3.96)	0.02*** (0.01)	5.70 (3.98)	6.98 (3.90)	1.28** (0.53)
Work experience (years)	10.53 (7.57)	11.51 (7.92)	9.06 (6.59)	-0.02** (0.01)	10.40 (7.62)	10.66 (7.63)	0.26 (1.02)
Commute to work (min)	11.57 (11.22)	11.71 (11.31)	11.53 (11.23)	-0.00 (0.02)	13.26 (12.78)	9.96 (9.40)	-3.29** (1.51)
Ever absent due to menstruation (%)	23.36 (42.41)	21.43 (41.22)	26.00 (44.08)	0.05 (0.06)	25.00 (43.72)	21.82 (41.68)	-3.18 (5.82)
<b>Physical Well-Being (in %)</b>							
Increased tiredness	77.48 (41.87)	76.27 (42.72)	78.43 (41.33)	0.02 (0.06)	77.78 (41.96)	77.19 (42.33)	-0.58 (5.63)
Suffer from acute pain	72.97 (44.51)	71.19 (45.48)	76.47 (42.63)	0.05 (0.06)	68.52 (46.88)	77.19 (42.33)	8.67 (5.98)
Use painkillers	19.52 (33.40)	16.38 (29.80)	23.53 (37.11)	0.07 (0.05)	16.67 (32.86)	22.22 (34.12)	5.56 (4.47)
Very abundant bleeding	46.97 (37.23)	44.63 (38.79)	50.00 (35.61)	0.05 (0.05)	49.69 (36.76)	44.44 (37.97)	-5.24 (5.02)
Full of energy	55.26 (36.01)	55.93 (32.29)	54.25 (40.33)	-0.02 (0.05)	50.62 (37.05)	59.65 (34.92)	9.03* (4.82)
Leaks in clothes	59.46 (49.21)	64.41 (48.08)	52.94 (50.16)	-0.11* (0.07)	62.96 (48.74)	56.14 (50.06)	-6.82 (6.60)
Strong menstrual odor	49.25 (35.27)	51.41 (33.94)	46.41 (36.98)	-0.05 (0.05)	50.00 (35.32)	48.54 (35.67)	-1.46 (4.74)
<b>Mental Well-Being (in %)</b>							
Increased level of stress	46.85 (50.01)	42.37 (49.63)	50.98 (50.24)	0.09 (0.07)	59.26 (49.60)	35.09 (48.15)	-24.17*** (6.54)
Increased feeling shame	51.82 (50.08)	50.85 (50.21)	52.00 (50.21)	0.01 (0.07)	66.04 (47.81)	38.60 (49.11)	-27.44*** (6.51)
Concern noticeable stains	62.16 (48.61)	62.71 (48.56)	60.78 (49.06)	-0.02 (0.07)	75.93 (43.15)	49.12 (50.44)	-26.80*** (6.26)
Concern noticeable odor	56.36 (49.71)	56.90 (49.74)	54.90 (50.00)	-0.02 (0.07)	64.15 (48.41)	49.12 (50.44)	-15.03** (6.63)
Increased feeling irritated	57.88 (40.21)	52.87 (40.78)	62.75 (39.05)	0.10* (0.05)	64.15 (36.31)	52.05 (43.19)	-12.10** (5.34)
Increased stress	43.54 (39.55)	41.24 (40.10)	45.75 (39.22)	0.05 (0.05)	55.56 (37.76)	32.16 (38.30)	-23.39*** (5.08)
Increased difficulty of reaching work tasks	67.57 (46.92)	62.71 (48.56)	72.55 (44.85)	0.10 (0.06)	74.07 (44.23)	61.40 (49.11)	-12.67** (6.24)
Observations	111	59	51		54	57	

*Notes:* Means and standard deviations (in parentheses) of baseline characteristics by "pad use" and "going to the market during menstruation". Physical and mental well-being measures equal 1 for "(completely) agree" and 0 for "(completely) disagree". Columns 4 and 7 report the difference between the two sub-samples based on a simple regression with robust standard errors (in parentheses). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 3: Empirical Expectations

			Percent of Respondents						Percent of Respondents				K-S <i>test</i>
	Mean	SD	--	-	+	++	Mean	SD	--	-	+	++	
<i>Panel A</i>	<i>Before Information</i>						<i>After Information</i>						
Praying	0.06	0.23	<b>93</b>	2	0	5	0.03	0.17	<b>97</b>	0	0	3	1.00
Cooking	0.92	0.24	5	2	8	<b>86</b>	0.98	0.07	0	0	5	<b>95</b>	0.69
Market	0.67	0.38	14	20	15	<b>50</b>	0.95	0.13	0	1	14	<b>85</b>	0.00***
Work	0.95	0.20	3	3	2	<b>93</b>	0.97	0.12	1	0	5	<b>94</b>	1.00
Cloth use	0.65	0.39	16	21	14	<b>49</b>	0.67	0.33	8	25	26	<b>41</b>	0.81
Pad use	0.79	0.32	9	6	23	<b>62</b>	0.93	0.17	0	5	12	<b>83</b>	0.02**
Pad purchase	0.70	0.34	7	26	16	<b>50</b>	0.89	0.22	0	10	11	<b>78</b>	0.00***
Drying	0.28	0.39	<b>59</b>	18	4	20	0.79	0.31	5	16	16	<b>63</b>	0.00***
Mother	0.85	0.29	5	12	9	<b>75</b>	0.97	0.10	0	1	6	<b>93</b>	0.05**
Husband	0.88	0.25	1	14	5	<b>81</b>	0.97	0.14	1	2	4	<b>93</b>	0.37
<i>Panel B</i>	<i>Private elicitation</i>						<i>Public elicitation</i>						
Praying	0.04	0.19	<b>96</b>	0	0	4	0.05	0.22	<b>93</b>	2	0	5	1.00
Cooking	0.93	0.22	5	1	5	<b>90</b>	0.97	0.11	0	1	8	<b>91</b>	1.00
Market	0.80	0.31	5	14	15	<b>65</b>	0.81	0.33	9	7	14	<b>70</b>	1.00
Work	0.96	0.18	3	1	1	<b>95</b>	0.96	0.15	1	2	6	<b>92</b>	1.00
Cloth use	0.66	0.35	12	21	25	<b>42</b>	0.66	0.37	12	25	15	<b>47</b>	1.00
Pad use	0.88	0.24	5	1	20	<b>75</b>	0.83	0.29	5	10	15	<b>70</b>	0.69
Pad purchase	0.84	0.27	4	10	18	<b>68</b>	0.75	0.33	4	27	9	<b>59</b>	0.07
Drying	0.53	0.45	37	11	9	<b>43</b>	0.53	0.42	27	24	10	<b>39</b>	0.70
Mother	0.98	0.12	1	0	5	<b>95</b>	0.84	0.29	4	13	10	<b>73</b>	0.01***
Husband	0.99	0.10	1	0	1	<b>98</b>	0.86	0.26	1	16	8	<b>75</b>	0.01***

*Notes:* Means, standard deviations and percent of respondents with the following responses on a 4-point Likert scale: (--) very rare, (-) rather rare, (+) rather frequent, and (++) very frequent. The means are normalized to a range between 0 and 1. Panel A reports the elicited responses before and after the information intervention. Panel B reports the elicited responses for private and public elicitation pooled before and after the information session. The p-value of the Kolmogorov–Smirnov test for the equality of distributions between different elicitation times (Panel A) and elicitation modes (Panel B) is reported in the last column. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table 4: Normative Expectation

			Percent of Respondents						Percent of Respondents				K-S <i>test</i>
	Mean	SD	--	-	+	++	Mean	SD	--	-	+	++	
<i>Panel A</i>	<i>Before Information</i>						<i>After Information</i>						
Praying	0.05	0.21	<b>93</b>	2	2	4	0.01	0.05	<b>98</b>	2	0	0	1.00
Cooking	0.86	0.28	6	5	15	<b>74</b>	0.97	0.13	1	0	7	<b>92</b>	0.05**
Market	0.74	0.33	11	7	31	<b>51</b>	0.96	0.14	1	0	10	<b>89</b>	0.00***
Work	0.89	0.26	5	6	6	<b>83</b>	0.96	0.19	4	0	0	<b>96</b>	0.36
Cloth use	0.77	0.32	9	8	26	<b>57</b>	0.81	0.29	6	8	26	<b>61</b>	1.00
Pad use	0.88	0.26	5	2	16	<b>77</b>	0.98	0.07	0	0	5	<b>95</b>	0.05***
Pad purchase	0.76	0.34	13	4	28	<b>56</b>	0.97	0.09	0	0	8	<b>92</b>	0.00***
Drying	0.23	0.37	<b>67</b>	10	10	14	0.83	0.33	10	6	9	<b>75</b>	0.00***
Mother	0.95	0.17	2	1	9	<b>88</b>	0.99	0.10	1	0	1	<b>98</b>	0.67
Husband	0.95	0.19	3	1	6	<b>90</b>	0.99	0.06	0	0	3	<b>97</b>	0.95
<i>Panel B</i>	<i>Private elicitation</i>						<i>Public elicitation</i>						
Praying	0.02	0.15	<b>97</b>	0	1	2	0.04	0.16	<b>93</b>	4	1	2	1.00
Cooking	0.92	0.21	3	4	7	<b>86</b>	0.90	0.24	5	1	15	<b>79</b>	0.94
Market	0.85	0.26	5	4	25	<b>67</b>	0.84	0.30	8	4	16	<b>72</b>	0.99
Work	0.97	0.14	1	2	3	<b>94</b>	0.88	0.29	8	5	3	<b>85</b>	0.72
Cloth use	0.79	0.28	5	9	31	<b>55</b>	0.78	0.33	10	7	21	<b>62</b>	0.96
Pad use	0.92	0.19	2	2	15	<b>81</b>	0.94	0.20	4	6	0	<b>90</b>	0.73
Pad purchase	0.86	0.26	5	4	20	<b>72</b>	0.86	0.29	8	0	17	<b>75</b>	1.00
Drying	0.52	0.45	36	11	13	<b>40</b>	0.53	0.48	42	5	6	<b>47</b>	0.94
Mother	0.97	0.12	1	0	6	<b>94</b>	0.96	0.16	2	1	5	<b>92</b>	1.00
Husband	0.98	0.13	1	1	3	<b>95</b>	0.96	0.16	2	0	7	<b>92</b>	1.00

*Notes:* Means, standard deviations and percent of respondents with the following responses on a 4-point Likert scale: (--) very socially inappropriate, (-) rather socially inappropriate, (+) rather socially appropriate, and (++) very socially appropriate. The means are normalized to a range between 0 and 1. Panel A reports the elicited responses before and after the information intervention. Panel B reports the elicited responses for private and public elicitation pooled before and after the information session. The p-value of the Kolmogorov-Smirnov test for the equality of distributions between different elicitation times (Panel A) and elicitation modes (Panel B) is reported in the last column. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table 5: Expectations - Menstrual Health Management

	(1) Index	(2) Cloth Use	(3) Pad Use	(4) Pad Purchase	(5) Dry Cloth
<i>Panel A: Empirical Expectations</i>					
Info	0.21*** (0.03)	0.02 (0.07)	0.12*** (0.04)	0.23*** (0.05)	0.49*** (0.07)
Public	-0.04 (0.04)	0.00 (0.07)	-0.07 (0.06)	-0.06 (0.07)	-0.02 (0.07)
Info*Public	-0.00 (0.05)	-0.02 (0.10)	0.04 (0.07)	-0.06 (0.08)	0.04 (0.10)
Mean of dep. var	0.63	0.65	0.83	0.73	0.29
<i>Panel B: Normative Expectations</i>					
Info	0.21*** (0.03)	-0.00 (0.05)	0.11*** (0.03)	0.22*** (0.04)	0.53*** (0.07)
Public	-0.03 (0.03)	-0.05 (0.06)	0.03 (0.05)	-0.00 (0.07)	-0.08 (0.07)
Info*Public	0.05 (0.04)	0.09 (0.08)	-0.01 (0.05)	-0.01 (0.07)	0.13 (0.10)
Mean of dep. var	0.67	0.79	0.87	0.76	0.27
Observations	108	108	108	108	108

*Notes:* Difference-in-differences estimation (OLS) on menstrual health management practices. Panel A: Dependent variables are measures of empirical expectations for 2) using cloth, 3) using pads, 4) buying pads, and 5) drying cloth outside, based on the 4-point Likert scale (very rare, rather rare, rather frequent, and very frequent) normalized to a range between 0 and 1. Panel B: Dependent variables are measures of normative expectations for the same behaviors based on the 4-point Likert scale (very socially inappropriate, socially inappropriate, socially appropriate, and very socially appropriate) normalized to a range between 0 and 1. The index reported in column 1 is the average of the elicited empirical and normative expectations. Mean ratings are reported at baseline before the information intervention and for the private elicitation. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 6: Knowledge on Menstruation

	(1) Index	(2) Cause	(3) Curse	(4) Illness	(5) Natural	(6) Toxic
Info	0.11 (0.20)	0.06 (0.06)	-0.0 (0.03)	0.21*** (0.05)	0.02 (0.02)	0.31*** (0.05)
Mean of dep. var.	0.59	0.24	0.98	0.73	0.97	0.03
Observations	104	104	104	104	104	104
R-squared	0.11	0.00	0.01	0.07	0.00	0.17

*Notes:* Simple difference estimation (OLS) on whether menstruation is (2) a body function that happens for no reason, (3) a curse, (4) an illness, (5) a normal and natural process for all women worldwide or, (6) a process for the elimination of toxic or bad blood from the body. Dependent variables are binary variables equal to one if the question has been answered correctly and zero otherwise. The index reported in column 1 is the average of the knowledge questions reported in columns 2 to 6. Mean share of correctly answered questions is reported for all knowledge questions at baseline before the information intervention. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 7: Expectations - Mobility Limitations and Communication

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Index	Pray	Work	Prepare Meal	Go to Market	Visit Newborn	Talk with Mother	Talk with Husband
<i>Panel A: Empirical Expectations</i>								
Info	0.10*** (0.02)	-0.07** (0.03)	0.06* (0.03)	0.11*** (0.04)	0.29*** (0.05)	0.21*** (0.05)	0.05** (0.02)	0.02 (0.02)
Public	-0.04 (0.02)	-0.02 (0.04)	0.03 (0.04)	0.08* (0.04)	0.02 (0.07)	0.06 (0.06)	-0.22*** (0.05)	-0.19*** (0.05)
Info*Public	0.02 (0.03)	0.08 (0.05)	-0.06 (0.04)	-0.10** (0.05)	-0.03 (0.08)	-0.03 (0.07)	0.17*** (0.06)	0.13** (0.05)
Mean of dep.var	0.74	0.07	0.94	0.88	0.66	0.74	0.95	0.98
<i>Panel B: Normative Expectations</i>								
Info	0.08*** (0.01)	-0.05* (0.03)	0.06** (0.03)	0.13*** (0.04)	0.23*** (0.04)	0.15*** (0.03)	0.04* (0.02)	0.05** (0.02)
Public	-0.01 (0.02)	0.02 (0.04)	-0.10* (0.05)	-0.01 (0.05)	0.01 (0.06)	0.03 (0.05)	-0.02 (0.03)	-0.02 (0.04)
Info*Public	-0.01 (0.02)	-0.00 (0.04)	0.02 (0.06)	-0.04 (0.06)	-0.03 (0.07)	-0.06 (0.06)	0.00 (0.04)	-0.00 (0.04)
Mean of dep. var	0.76	0.05	0.94	0.86	0.74	0.82	0.95	0.95
Observations	108	108	108	108	108	108	107	107

*Notes:* Difference-in-differences estimation (OLS) on mobility limitations and communication during menstruation. Panel A: Dependent variables are measures of empirical expectations for (2) praying, (3) working, (4) cooking for the family, and (5) going to the market, (6) visiting a newborn, (7) talking to mother about menstruation and (8) talking to husband about menstruation on the 4-point Likert scale (very rare, rather rare, rather frequent, and very frequent) normalized to a range between 0 and 1. Panel B: Dependent variables are measures of normative expectations for the same behaviors based on the 4-point Likert scale (very socially inappropriate, socially inappropriate, socially appropriate, and very socially appropriate) normalized to a range between 0 and 1. The index reported in column 1 is the average of the elicited empirical and normative expectations. Mean ratings are reported at baseline before the information intervention for the private elicitation. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



Table 8: Expectations - Measured only after the Information Session

	Percent of Respondents						Percent of Respondents					
	Mean	SD	--	-	+	++	Mean	SD	--	-	+	++
	<i>Empirical Expectations</i>						<i>Normative Expectations</i>					
Cook for ill relative	0.96	0.12	0	1	10	<b>89</b>	0.97	0.09	0	0	8	<b>92</b>
Cook for newborn	0.99	0.06	0	0	3	<b>97</b>	0.97	0.10	0	0	9	<b>91</b>
Cook different food	0.97	0.09	0	0	8	<b>92</b>	0.97	0.10	0	1	7	<b>92</b>
Participate in Ramadan	0.00	0.00	<b>100</b>	0	0	0	0.01	0.05	<b>98</b>	2	0	0
Go to school	0.97	0.10	0	1	6	<b>93</b>	1.00	0.03	0	0	1	<b>99</b>
Buy pads from female clerk	0.93	0.17	0	5	11	<b>84</b>	0.98	0.08	0	1	3	<b>96</b>
Ask husband to buy pads	0.86	0.25	3	7	20	<b>71</b>	0.94	0.17	2	0	13	<b>85</b>
Wash menstrual cloth public	0.66	0.43	25	9	10	<b>56</b>	0.50	0.47	<b>44</b>	4	12	40

*Notes:* Mean, standard deviations and percentage share of respondents for empirical and normative expectations. Responses are measured on a 4-point Likert scale. For empirical expectations, responses range from (--) very rare, (-) rather rare, (+) rather frequent, and (++) very frequent. For normative expectations, responses range from (--) very socially inappropriate, (-) rather socially inappropriate, (+) rather socially appropriate, and (++) very socially appropriate. The 4-point Likert scale is normalized to a range between 0 and 1 for the mean.

Table 9: Menstrual Health Expectations Split by Level of Agency

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cloth Use		Pad Use		Pad Purchase		Dry Cloth	
	High	Low	High	Low	High	Low	High	Low
<i>Panel A: Empirical Expectations</i>								
Info	-0.06 (0.08)	0.15 (0.11)	0.14** (0.05)	0.08 (0.07)	0.28*** (0.06)	0.14** (0.07)	0.64*** (0.08)	0.27** (0.13)
Public	0.03 (0.09)	-0.01 (0.12)	-0.00 (0.08)	-0.16* (0.10)	0.05 (0.09)	-0.21** (0.10)	-0.02 (0.09)	-0.04 (0.13)
Info*Public	0.07 (0.13)	-0.15 (0.15)	-0.05 (0.09)	0.15 (0.11)	-0.19* (0.10)	0.11 (0.12)	-0.06 (0.11)	0.20 (0.16)
<i>Control mean</i>	<i>0.65</i>		<i>0.83</i>		<i>0.73</i>		<i>0.29</i>	
<i>Panel B: Normative Expectations</i>								
Info	-0.04 (0.07)	0.05 (0.09)	0.14*** (0.05)	0.06 (0.04)	0.24*** (0.05)	0.20*** (0.07)	0.61*** (0.08)	0.42*** (0.12)
Public	-0.02 (0.08)	-0.07 (0.10)	0.09 (0.07)	-0.07 (0.07)	0.08 (0.08)	-0.10 (0.11)	-0.09 (0.09)	-0.05 (0.11)
Info*Public	0.09 (0.11)	0.07 (0.13)	-0.08 (0.07)	0.10 (0.07)	-0.11 (0.08)	0.11 (0.11)	0.08 (0.12)	0.20 (0.16)
<i>Control mean</i>	<i>0.79</i>		<i>0.87</i>		<i>0.76</i>		<i>0.27</i>	
Observations	56	46	62	46	62	46	62	46

*Notes:* Difference-in-differences estimation (OLS) on menstrual health management practices split by level of agency of the respondents. The sample was split at the sample mean of the agency index measure. Panel A includes the dependent variables measures of empirical expectations based on the 4-point Likert scale (very rare, rather rare, rather frequent, and very frequent) normalized to a range between 0 and 1. Panel B includes the dependent variables measures of normative expectations based on the 4-point Likert scale (very socially inappropriate, socially appropriate, rather socially appropriate, and very socially appropriate) normalized to a range between 0 and 1. Mean ratings are reported at baseline before the information intervention and for the private elicitation. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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