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# Do Behavioral Drivers Matter for Healthcare Decision-Making in Times of Crisis? A Study of Low-Income Women in El Salvador During the COVID-19 Pandemic

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## Abstract

Understanding health-seeking behaviors and their drivers is key for governments to manage health policies. There is a growing literature on the role of cognitive biases and heuristics in health and care-seeking behaviors, but little is known of how they might be influenced during a context of heightened anxiety and uncertainty. This study analyzes the relationship between four behavioral predictors – the internal locus of control, impatience, optimism bias, and aspirations – and healthcare decisions among low-income women in El Salvador. We find positive associations between 'internal locus of control and preventive health behaviors during the COVID-19 pandemic (use of masks, distance, hand washing, and COVID-19 vaccination) and in general (prenatal checkups, iron-rich diets for children and hypertension tests). Measures of impatience negatively correlate with COVID-19 prevention behaviors and mothers' micronutrient treatment adherence for children, and optimism bias and educational aspirations with healthcare-seeking behaviors during the COVID-19 pandemic. Some associations were more robust during the pandemic, suggesting that feelings of uncertainty and stress could enhance behavioral drivers' influence on health-related behaviors, a novel and relevant finding in the literature relevant for the design of policy responses for future shocks.

**JEL Codes:** I12, D10, D91, I30.
**Keywords:** healthcare decision-making, behavioral economics, COVID-19, low-income setting, Latin America, El Salvador

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## 1. Introduction

Health-seeking decision making is usually determined by need factors (such as chronic disease status and having a poor health perception) but also by key drivers such as education, health education, income, insurance status and ability to pay by oneself (Abuduxike, et al. 2020). However, the complex nature of healthcare decision-making has made the typical neoclassical economics framework insufficient for its analysis and factors that go beyond observable variables might need to be examined (Frank 2007, Mullainathan y Thaler 2001). For instance, people might delay or avoid seeking preventive medical care in the present because they are myopic to the future gains of these interventions (Bradford 2010). Others, by being overly optimistic, might underestimate their chances of contracting a disease despite it being seriously contagious (Gassen, et al. 2021).

While these are general features of decision-making around healthcare, less is known about them in the context of a pandemic, an environment of heightened anxiety and uncertainty. Would people be less rational and rely more on heuristics and their cognitive biases for making decisions? Or, on the contrary, due to the do-or-die nature of the context, would they prioritize "System 2 thinking" (Kahneman 2011), which is more rational and deliberate, but slower and more cognitive resource-intensive. So far, evidence seems mixed in this regard, and almost inexistent in low-income settings or when decisions are made for third parties (like when mothers make decisions on behalf of their children). For instance, while some studies have found no discernible differences between economic preferences and decision making in times of crisis vs. normal times (Drichoutis y Nayga 2021), others report significant changes in risk tolerance and patience (Aragon, et al. 2022, Harrison, et al. 2022).

This paper is thus an attempt at bridging that gap in the literature in a low-income setting in a Central American country. We explore four types of behavioral drivers and their associations with the healthcare decisions of a cross-section of women (and, for some, their children) in low-income communities in El Salvador during the COVID-19 pandemic. Specifically, we rely on survey measures of impatience (how people value future versus present), internal locus of control (the belief that one's life is contingent on own decisions), optimism bias (belief that chances of positive events are higher for us than for our peers), and educational aspirations (for women's children) which relates to aspirations for the future. We test their predictive power comparing healthcare decisions directly related to COVID-19, and those concerning general healthcare. The former include compliance with COVID-19 non-pharmaceutical preventive measures (masking, social distancing, and hand washing), COVID-19 vaccination, and avoidance of healthcare services for fear of the pandemic. The latter include preventive services for women such as screening for chronic conditions (hypertension and diabetes), and use of health services and nutrition for their children, such as prenatal care check-ups and feeding and supplementation practices.

Several key findings emerge from our analysis. First, locus of control is positively associated with multiple COVID-19-related and general health behaviors. For instance, a women's internal locus of control is positively associated with non-pharmaceutical COVID-19 preventive measures, COVID-19 vaccination, as well as receiving preventive care services (hypertension check-ups) and for their children (prenatal checkups). Interestingly, locus of control has the highest magnitude of its correlation with daily behaviors, for which adherence might be more challenging, such as non-pharmaceutical COVID-19 preventive

measures and providing children with an iron-rich diet. This finding, which to the extent of our knowledge has not been reported previously in the literature, is not surprising as those who believe their fate is in their hands will likely take measures to avoid disease in the future. Second, most behavioral drivers are relevant for the most novel behavior such as non-pharmaceutical COVID-19 preventive measures, as impatience, locus of control and optimism bias are all significant and have a meaningful correlation magnitude. This is the only outcome in which all three behavioral drivers are jointly significant. Third, optimism bias and educational aspirations for children, are the only behavioral drivers relevant for health service avoidance during the pandemic. Those with higher optimism bias are less likely to have avoided health services due to fear of the pandemic, as they might have been overconfident of not contracting COVID-19 while receiving health services. In the same vein, mothers with higher educational aspirations for their children were less likely to avoid health care services for their children. This result is probably explained by a positive cost-benefit assessment regarding the risks of detecting children's health needs and acting on time, even in the context of a pandemic. Finally, in line with the literature, those with higher impatience are less likely to engage in healthy behaviors such as non-pharmaceutical COVID-19 prevention measures, prenatal check-ups, and micronutrient adherence. These results provide evidence of the relevance of certain behavioral traits in healthcare decision-making in times of a crisis.

The paper is structured as follows. In the next section, we provide definitions a brief literature review on the behavioral predictors we use in this study and their relationship with decision-making in general and related to health. In Section 3, we described the data used for the estimations. In Section 4, we present the econometric specifications and the main results. Finally, Section 5 provides a brief discussion and a conclusion.

## 2. Behavioral drivers and their relevance in the health literature

In this section we provide a brief overview of the behavioral predictors we use to study healthcare decision-making in the context of the COVID-19 pandemic in El Salvador. We provide definitions and contextualize them in the healthcare decision-making literature.

### 2.1 Internal Locus of control

A person with a high internal locus of control believes that life events are contingent on their own decisions and behaviors instead of other forces like fate or luck (Rotter 1966). Several studies have demonstrated its positive relationship with different human capital investments, such as educational, job-seeking, and labor markets decisions and outcomes (Heckman, Stixrud, and Urzua 2006; Caliendo et al. 2022; McGee and McGee 2016). In the health domain, the evidence shows that individuals with a higher internal locus of control prefer to be more present in the decision-making process and have a more active and collaborative role with the doctors (Marton et al. 2021; Nazareth 2016). Likewise, empirical research supports positive associations with healthy living and well-being and negative associations with risky behavior such as tobacco, alcohol, and drug use (Cobb-Clark, Kassenboehmer and Schurer 2014, Heckman, Stixrud and Urzua 2006, Lassi, et al. 2019). They also exhibit better physical and mental health and are less likely to suffer long-term health conditions (Kesavayuth et al. 2020). In the prenatal and maternal health field, a recent study in Nigeria shows that having a higher internal locus of control was a significant predictor of

utilization of antenatal care, skilled birth care, and completion of child vaccination (Aikpitanyi et al. 2022). According to this evidence, individuals with a higher locus of control are more likely to follow preventive health-related behaviors.

### 2.2 Impatience

Impatience measures how an individual values the future relative to the present, and this preference affects inter-temporal decision-making. The positive association between patience, human capital investments, and healthy lifestyles is well-stated in the literature (Hunter et al. 2018). Further, impatience has been positively associated with obesity (Courtemanche, Heutel and McAlvanah 2015), and negatively with preventive health checkups such as fewer mammograms, pap and prostate examinations, dental visits, and flu shot usage (Bradford 2010). In sum, more impatient individuals should be associated with less desirable health-related decisions since most preventive e health investments are realized in the future.

### 2.3 Optimism Bias

Optimism bias occurs when people think their chances of experiencing positive (negative) events are higher (lower) than that of their peers or of the public (Weinstein 1980). A typical example is that a majority of people claim they are less likely than the average driver to be involved in an automobile accident, which is mathematically unfeasible. This behavioral feature is also present in the health domain. Individuals with optimism bias tend to believe they are less likely to experience negative health outcomes (Nezlek and Zebrowski 2001), which may hinder efforts to promote preventive, risk-reducing behaviors (Weinstein 1989). This is especially true among the youth and among those with no active medical symptoms (Sandroni and Squintani 2004). Moreover, in the context of the pandemic, this bias may help explain why many people refused to wear masks in health facilities and continued to attend large gatherings (Lehmann y Lehman 2021, Sassano, y otros 2020). However, evolutionary models suggest that individuals with optimism bias could have higher chances to survive if benefits of optimism outweigh the cost of inaccurate risk estimation (Johnson and Fowler 2011, Gassen, et al. 2021). In this line, there is a wide body of literature finding that optimistic individuals had lower probabilities to suffer blood pressure and cardiovascular, explained by increased physical activity and better diet (Rozanski, et al. 2019, Räikkönen, et al. 1999).

### 2.4 Aspirations

Parental aspirations about their children's future play an important role in overall human capital investments. For example, mothers´ aspirations are important determinants of their daughter´s schooling decisions (Attanasio y Kaufmann 2014) and in their children´s aspirations, achievements, and overall well-being (Lekfuangfua y Odermatt 2022). Further, parental educational aspirations might lead adolescents to participate in health-promoting activities, like exercise or healthy eating (Whitehead et al. 2015). According to this evidence, we expect mothers in our sample to engage in pro-healthy behaviors for their children if they show high levels of educational aspirations for them.

## 3. Data

Our main data source comes from a household and facility survey conducted in June 2021 in low-income areas in El Salvador. At the time, the country was rolling out COVID-19 vaccinations and about one in five had received at least one dose while restrictions were being eased, and COVID-19 cases and mortality had stabilized after the Delta variant surge in January 2021.[3] The main respondents for the household survey were women aged 15 to 49 years old and the questionnaire focused on utilization of health services for them and their children (for those that had children younger than 60 months) as well as other health-related behaviors during the COVID-19 pandemic. The survey is unique in that it also includes measures on four behavioral predictors that could be relevant for healthcare decision-making in this context: impatience, internal locus of control, optimism bias, and the mother's educational aspirations for their own children. In addition to the household survey, a facility survey was conducted to the coordinator of the public primary care facility which served women in our sample[4]. Results from the facility survey were merged to the household survey. Overall, we collected information on 848 women, which are representative of 14 of the poorest municipalities in El Salvador.[5]

### 3.1 Main covariates

Covariates in our dataset are categorized in two groups, as we show in Table 1. Panel A includes individual characteristics of the women and children, as well as proxies for their socioeconomic status. In our sample, women are on average around 31 years old. The majority (68.27%) are either married or live in a de facto union, 27.94% have secondary or tertiary education, 57.43% perceive they had good health, only around 15% are first-time mothers and 2.95% of them lived in a household were someone had been diagnosed with COVID-19 previously.[6] The children in our sample are approximately 1.87 years old on average and are equally distributed by gender. Further, less than half of them (42.53%) were or are still breastfed, and their mothers are highly optimistic about their health status. Finally, we use adequate housing conditions (i.e., access to electricity, owning a restroom, roof and floor materials, etc.) and access to treated water as proxies for socioeconomic status. In our sample, around 21% of households have three or less adequate housing conditions present, and only 34.67% have access to treated water, which underscores the low-income setting of the population in our sample.

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[3] The statement is based on data compiled in a COVID-19 Situational Update report for Latin American and the Caribbean by the Inter-American Development Bank as of June 15, 2021 which can be accessed at http://www.iadb.org/document.cfm?id=EZSHARE-2024879176-650.

[4] Sampling for the facility survey was conducted on two stages. First facilities were selected and then a random sample of dwellings in the catchment area of the facility were selected to interview women. Women were interviewed regardless of whether they received services in the facility. Public health facilities are the main provider in the locations of the survey. For example, according to UNICEF's Multiple Indicator Cluster Survey (2014), in 2014, the MoH provided around 93 percent of postnatal care services in rural areas, which are the main type of areas captured in our survey.

[5] The survey is representative of women living in 14 municipalities in El Salvador: Chiltiupán, Tacuba, El Sauce, Sociedad, Ilobasco, Sensuntepeque, Monte San Juan, San Cristóbal, San Antonio Masahuat, Santa María Ostuma, Apastepeque, San Esteban Catarina, San Ildefonso, and Tecoluca.

[6] It refers only self-reported COVID-19 diagnosis of woman or someone in the household wither by test or health personnel prior to the survey. If a household had a member with COVID-19 at the time of the survey, it was not include in the sample due to the health security protocol.

**Table 1: Descriptive statistics of covariates**

| | Mean | SD | N |
|---|---|---|---|
| **Panel A. Household Survey** | | | |
| **Woman** | | | |
| Age | 30.89 | 8.67 | 848 |
| Married / De facto union (0 - 1=married or de facto union) | 68.27% | 0.47 | 848 |
| Secondary or Tertiary Education (0 - 1=secondary or tertiary education) | 27.95% | 0.45 | 848 |
| Self-report of good health (0 – 1=good health) | 57.43% | 0.49 | 848 |
| First-time mother (0 - 1=first time mother) | 15.09% | 0.36 | 848 |
| Prior COVID-19 diagnosis for woman or household member | 2.95% | 0.17 | 848 |
| **Children** | | | |
| Age | 1.87 | 1.38 | 537 |
| Female (0 – 1=female) | 50.09% | 0.50 | 537 |
| Mother confidence in child's health (0=not likely children healthy - 10=very likely children healthy) | 9.08 | 1.47 | 537 |
| Breastfed (0 – 1=breastfed) | 42.54% | 0.49 | 536 |
| **Socio-economic** | | | |
| Access to 3 or less assets in household (0 – 1=3 or less assets) | 21.11% | 0.41 | 848 |
| Households that treat water (0 – 1=treated water) | 34.67% | 0.48 | 848 |
| **Panel B. Facility Survey Data[1/]** | | | |
| **Health Services during 2020** | | | |
| Health service suspension (0 – 1=if suspended during 2020) | 44.33% | 0.50 | 848 |
| Suspension of child well-check visits (0 – 1=if suspended during 2020) | 16.16% | 0.37 | 848 |
| Staff reduction (0 – 1=if reduction of staff during 2020) | 35.26% | 0.48 | 848 |
| Reduction of business hours (0 – 1=if reduction of business hours during 2020) | 4.36% | 0.20 | 848 |
| Shortage of supplies (0=no shortage - 10=shortage of 10 elements) | 1.88 | 1.93 | 848 |

Notes: Own calculations based on survey data.

[1/] The facility survey collects responses from coordinators of the main public primary care facility that women are assigned to. The responses from this survey were then merged to the household survey. As such, the statistics from Panel B reflect the status of this facilities as reported from their coordinator, but the percentages represent the percent of women living in the catchment area of these facilities.

In Panel B we describe how the provision of health services during the pandemic affected the women and children in our sample. We find that just under 45% of women live in the catchment area of a facility that experienced health services suspension at some point during 2020. However, child health care services were not as affected, as only 16% of women experienced services suspension. Finally, despite that over 35% of women lived in the catchment area of facilities that experienced staff reductions during 2020, only 4.36% experienced reduced hours. Overall, facilities serving these women had a limited shortage of key supplies[7] (on average, shortages are just under 2 supplies).

[7] Medical supplies include oral hydration salts, zinc, antibiotics for respiratory infections and vaccines (BCG, polio, measles, mumps, rubella, rotavirus, pneumococcal conjugate, or influenza), for example.

### 3.2 Explanatory variables: behavioral predictors

#### a. Locus of control

We use a survey measure of locus of control based on Caliendo, Cobb-Clark, and Uhlendorff (2015). The survey questions used for this measure are detailed in Table 2. We find that the population in our sample has an average internal locus of control score of 3.77 (out of 5, with 5 being the highest degree of agreement with each statement) with a standard deviation of 0.51. This means they tend to agree more with statements that give themselves a higher degree of responsibility and agency over events. Although we did not find many differences across demographic groups, married women and those who completed high school education or higher have a slightly higher internal locus of control score (Table A1). This finding is partially similar to Germany, where married individuals have a lower locus of control and higher educational attainment is associated with higher scores[8] (Caliendo, Cobb-Clark, and Uhlendorff 2015).

Comparing internal locus of control scores with other populations is challenging because of measurement invariance, especially considering different interpretations of the construct and scales. However, the average in our sample is similar to those found in the literature. For instance, a sample of unemployed individuals in Germany showed a slightly lower score of 3.58[9] in a similar instrument (Caliendo, Cobb-Clark, and Uhlendorff 2015). Other locus of control instruments implemented in household surveys in Australia (Kesavayuth et al. 2020) and Ethiopia (Abay, Blalock, and Berhane 2017) where relatively similar to our average when rescaled to a 5 point scale (3.92 for the former, and 3.45[10] for the latter).

**Table 2: Internal locus of control**

| Item No. | Components of Internal locus of control | Mean | SD | Median |
|---|---|---|---|---|
| 1 | It is completely up to you what happens in your life | 4.41 | 0.96 | 5.00 |
| 2 | Compared to others, you have achieved what you deserve | 4.06 | 1.09 | 4.00 |
| 3 | What you achieve in your life depends, first, on fate or luck* | 2.39 | 1.43 | 2.00 |
| 4 | Most of the time, others make decisions about your life* | 3.80 | 1.39 | 4.00 |
| 5 | Success is obtained by working hard | 4.77 | 0.64 | 5.00 |
| 6 | When you encounter difficulties in your life, most of the time you doubt your abilities* | 2.96 | 1.43 | 3.00 |
| 7 | The opportunities you have in your life depend on the resources you have | 4.20 | 1.05 | 5.00 |
| 8 | Your effort is more important than your skills | 4.23 | 1.03 | 5.00 |
| 9 | You have little control over the things that happen in your life* | 3.11 | 1.40 | 3.00 |
| | **Internal locus of control (total score)** | **3.77** | **0.51** | **3.77** |

Note*:* Own calculations based on survey data. Individuals were asked the following question: "The following statements refer to attitudes towards life and the future. Please answer to what extent you agree with each of them on a scale of 1 to 5, where 1 is completely disagree and 5 is completely agree." * We inverted questions the scores for Q3, Q4, Q6 and Q9 in this table so that the final index can be interpreted as Internal locus of control The Internal locus of control total adds answers in the following way: Q1 + Q2 + Q5 + Q7 + Q8 – (Q3 + Q4 – Q6 + Q9).

[8] They also find that women, immigrants, and older workers have lower internal locus of control.
[9] Author's calculation based on the procedure described in Table 2 footnote and converting scores as a proportion of 5 instead of 7, which is the scale used for the study.
[10] This score was calculated reversing the items associated with external locus of control.

### b. Impatience

Impatience is measured based on Falk et al (2022). We ask 5 questions following the staircase (or unfolding brackets) method, in which subjects choose between a payment today or a larger payment in twelve months. The amount of the hypothetical payment today is the same in each of the situations, but the payment in 12 months increases if answered "today" and decreases if answered "in 12 months". In all cases, it is assumed that there is no inflation, therefore future prices will be the same as current prices. Each person has a score according to their preferences. We find a highly skewed distribution, with a great majority of women in our sample reporting a high level of impatience: 78% of them answered they would prefer to receive 10 USD today, instead of 21.5 USD in 12 months.

We find significant temporal discounting levels and this is aligned with previous related research, given the lower income setting in which the sample was drawn[11] (Falk et al. 2018). For larger and more heterogeneous populations, previous studies found that patience is positively associated with higher cognitive ability, and it varies with age: middle-aged individuals are more patient than young and elderly. However, probably due to the homogeneity of the sample, we did not found differences by demographic variables (Table A1).

### c. Optimism bias

Our survey module on optimism bias measures women's degree of confidence about future life events, based on Weinstein (1980). This indicator reflects their estimation about how much their chances of experiencing 5 life events would differ from someone of similar characteristics in a scale of 0 (not likely at all) to 10 (extremely likely). As with the locus of control scale, we inverted questions 2 and 5 to gauge a pure measure of optimism bias. In general, we find the women in our sample to be overoptimistic on average. They tend to rate their own likelihood of experiencing a specific life event above the 'equally likely as my neighbor' cutoff for positive events (items 1, 3, and 4), and below and just around it for negative events (items 2 and 5). Concretely, they are optimistic regarding their economic situation (family having more income next year) and they think they are equally likely to get robbed than their neighbors. This finding is in line with previous research related to automobile accidents, crime, and disease (Weinstein 1980; Boruchowicz and Lopez Boo 2022).

In the health domain, women seem to be relatively overconfident regarding their own health (living more than 76 years, and *not* getting sick of something in the following months), and the health of their children (children growing up healthy and strong). This finding is also in line with the literature related to health problems[12] (Weinstein 1982). In our sample, married women and those with children show higher optimism, especially regarding health-related outcomes. On the contrary, women with high school education or higher show lower health-related optimism levels than others with lower education levels (Table A1).

[11] Previous research found that countries with lower incomes usually have greater temporal discounting (Falk et al. 2018), although economic inequality and broader financial circumstances are important (Ruggeri et al. 2022).
[12] It is possible that health-related optimism varies considerably depending on more specific health-related risks (Nezlek and Zebrowski 2001).

**Table 3: Optimism bias**

| Item No. | Components of Optimism bias | Mean | SD | Median |
|---|---|---|---|---|
| 1 | Live more than 76 years | 5.52 | 3.01 | 5.00 |
| 2 | That they rob me or someone in my family | 5.12 | 3.35 | 5.00 |
| 3 | May my family have more income next year | 6.81 | 2.78 | .00 |
| 4 | That in the next few months I get sick of something | 3.93 | 2.81 | 5.00 |
| 5 | That my children grow up strong and healthy | 8.62 | 2.16 | 310 |
| | **Optimism bias total** | **6.00** | **1.44** | **6.00** |
| | **Optimism bias health-related** | **6.02** | **1.62** | **6.33** |

Note: Own calculations based on survey data. Individuals were asked the following question: "Below I will list events one by one. For each of them, I am going to ask you to tell me how likely you think it is that this event will happen to you in the future, compared to other women of similar age to yours in your community, where 0 is not at all likely, 5 is equally likely and 10 is very likely". We invert questions 3 and 6 so that the final index can be interpreted as an Optimism bias Index.

### d. Educational aspirations

Based on Beaman et al. (2012) we measure educational aspirations as an indicator variable that takes a value of 1 if the mother aspires their children to achieve high school education or higher[13]. The variable takes a value of 0 if her aspirations are for their children to achieve complete secondary education or less, and 1 if incomplete superior education or more. We find that around 73% would like their children to pursue more than high school education. These percentages are higher than those reported in a rural and poor district in India, where 32% and 18% of parents want their male and female children to graduate from high school education (Beaman et al. 2012); but lower than 81% of parents, who report in a nationally representative surveys in 2012 in the United States that they would like their children to complete superior education (NCES 2019). Within our sample, poorer households and women with lower levels of education showed lower aspirations for their children (Table A1).

In general, our population shows moderate levels of locus of control and high levels of impatience. It is overly optimistic about general future events, and even more so for health-related events. A majority of women want their children to pursue educational paths, although this percentage is low compared to representative samples in industrialized countries. In table A5, we show that there are positive correlations between internal locus of control and educational aspirations, as well as a weaker correlation between internal locus of control and general optimism bias.

[13] We ask mothers: "What is the highest level of completed education you would like for your child to achieve?"

**Table 4: Summary of behavioral drivers**

| | Mean | SD | N |
|---|---|---|---|
| Internal Locus of Control | 3.77 | 0.51 | 848 |
| Impatience | 28.23 | 8.50 | 848 |
| Optimism Bias Total | 5.99 | 1.44 | 848 |
| Optimism Bias Health | 6.02 | 1.62 | 848 |
| Educational Aspirations | 73.37% | 0.44 | 537 |

Note: Own calculations based on survey data. Internal locus of control was measured on a scale from 1 to 5, where 5 is a high internal locus of control; impatience was measured on a scale from 1 to 32, being 32 with high impatience; optimism bias was measured on a scale from 0 to 10 being scores higher than five more optimistic; finally, educational aspirations were measured with a binary variable that takes a value of 1 if the mother aspires their children to have more than complete secondary education..

### 3.3 Outcome variables: healthcare decision-making

We classify the outcome variables in our study into two categories: healthcare decision-making related to the COVID-19 pandemic, and what we consider to be general health behaviors (i.e., check-ups, preventive health services, and diet/nutrition among others). The former reflects novel behaviors that became relevant during the COVID-19 pandemic, whereas the latter are usual health behaviors in the population of interest. Table 5 contains descriptive statistics of both types of behavior. We find that among COVID-19 related behaviors (Panel A of Table 5) 6.01% of the women in our sample report having avoided health services for fear of contracting COVID-19, either for themselves or for some household member, while 8.22% of women with children less than 5 years old avoided health services for their children because of that same reason. On average women in our sample had on average a COVID-19 non-pharmaceutical prevention index of 3.05, which indicates that women complied with at least 3 prevention measures (whether they "always" used the mask, practiced social distancing, disinfected their hands, and disinfected objects around them in the last seven days). Finally, 83.84% of them declared having been vaccinated against COVID-19 or willing to do so.

**Table 5: Descriptive data of outcome variables**

| | Mean | SD | N |
|---|---|---|---|
| **Panel A. COVID-19-related Health Behaviors** | | | |
| **Women** | | | |
| Avoidance of health services for self or household member for fear of contracting COVID-19 | 6.01% | 0.24 | 848 |
| Number of COVID-19 non-pharmaceutical prevention measures undertaken (out of 4) | 3.05 | 1.26 | 848 |
| % of women willing to get vaccinated or who already got vaccinated for COVID-19 | 83.84% | 0.37 | 848 |
| **Children (0–5-year-old)** | | | |
| Avoidance of health services for children for fear of contracting COVID-19 | 8.33% | 0.27 | 518 |

| **Panel B. General Health Behaviors** | | | |
|---|---|---|---|
| **Women** | | | |
| Had blood pressure (BP) taken in the last 6 months (0 – 1=had BP taken) | 30.31% | 0.46 | 848 |
| Had a blood glucose level test in the last 6 months (0 – 1=had test) | 16.98% | 0.38 | 848 |
| **Children (0–5-year-old)** | | | |
| At least 4 prenatal visits (0 – 1=at least 4 visits) | 89.14% | 0.31 | 534 |
| % Children having consumed micronutrients for more than 60 days, in the last 6 months | 10.45% | 0.31 | 536 |
| Total number of iron-rich food items consumed by child in the last day (out of 7) | 2.28 | 1.02 | 425* |

Note: Own calculations based on survey data. The number of observations for the first outcome was 823 because we filtered by the women being the primary respondent. All percentage measures are binary variables that take the value of one if the described behavior existed. For iron-rich food items, we excluded children aged less than 1-year-old because they are usually not introduced to some of these food items at this age.

Panel B of Table 5 shows that in our sample, around 30% of women had their blood pressure taken in the last six months, and 17% of them had a blood glucose level test in that same period, suggesting a relatively low take-up of these preventive services. Conversely, for women that have children less than five, they are extremely compliant with prenatal visits, as almost 90% of them report having gone to at least four during their most recent pregnancy in the last five years. Regarding feeding practices, only 10.44% of mothers gave their children the recommended dosage of micronutrients in the last 6 months, and, on average, they gave only 2.28 out of 6 iron-rich food items in the last day.

## 4. Econometric specification and results

To assess the relationship between our four behavioral predictors and decision-making around healthcare in the context of the COVID-19 pandemic, in the following section we estimate a series of analogous OLS regressions. We divide the analysis by the nature of outcomes. In 4.1, we focus on novel healthcare decisions related to the COVID-19 pandemic. In 4.2, the emphasis is on general healthcare decisions independent of the pandemic (such as using preventive health services). The main specification for these regressions is as follows:

$$\text{(i)} \quad y_{ifj} = \beta_0 + \beta_1 Locus_{ifj} + \beta_2 Impatience_{ifj} + \beta_3 Optimism\ bias_{\ ifj} + \delta W_{ifj} + \omega H_{fj} + \gamma_j + \varepsilon_{ifj}$$

Where $y_{ifj}$ is one of our selected health outcomes for respondent *i* in facility *f* in municipality *j;* $Locus_{ifj}$ is the internal locus of control measure for respondent *i* in facility *f* in municipality *j;* $Impatience_{ifj}$ is the impatience measure for respondent *i* in facility *f* in municipality *j;* $Optimism\ bias_{ifj}$ is the optimism bias measure at the individual level *i;* $W_{ifj}$ are individual controls for women; $H_{fj}$ are health services controls; $\gamma_j$ are municipality fixed effects; and $\varepsilon_{ifj}$ is the error term. The coefficients of interest are $\beta_1$, $\beta_2$ and $\beta_3$, which measure the degree of association of each behavioral predictor with the specific health outcome. For child specific outcomes we modify the equation (i) by adding child individual controls, and include a

fourth behavioral predictor, $Aspirations_{ifj}$. We use the same base specification for both outcomes related to COVID-19 and general health behaviors, except that we do not include health facility controls for general health behaviors given that their time frame is different: our health facility controls focus on how services were affected during 2020, whereas the reference period for the general health behaviors is 2021. We conduct robustness checks of results for the first set of outcomes without these controls (Table A2) and clustering standard errors at the municipality level (Tables A3 and A4[14]).

### 4.1 COVID-19-related health behaviors

Our dataset contains the following COVID-19-related outcomes: i) avoidance of health services (for the women, child, or another household member) for fear of the pandemic; ii) compliance with COVID-19 non-pharmaceutical prevention measures; and iii) having been vaccinated against COVID-19 or willingness to do so. All women in the sample responded to the avoidance of health services for the woman or another household member and the vaccination and compliance with prevention methods survey items. However, only women who are mothers of children between the ages of 0 and 5 responded to the question related to the avoidance of health services for the child.

Table 6 presents the results of this first set of estimations. All behavioral predictors (impatience, internal locus of control, optimism bias, and educational aspirations) are standardized with mean 0 and standard deviation of 1 to make their association with the outcome variables comparable. We start by looking at impatience. The literature predicts that more impatient individuals tend to show lower adherence to health care guidelines. Indeed, we find that a one standard deviation increase in impatience is associated with 0.118 fewer points in the number of COVID-19 non-pharmaceutical prevention measures, which ranges from 0 to 4 (0 meaning no prevention at all). Internal locus of control, on the other hand, is positively associated with COVID-19 non-pharmaceutical prevention measures, COVID-19 vaccination status, and healthcare avoidance: a one standard deviation increase in internal locus of control predicts 0.277 more points in preventive behaviors, a 0.034 rise in the likelihood of having gotten vaccinated or willing to be vaccinated, and an increase of 0.020 in the likelihood of avoiding health services for fear of the pandemic. These results also go in line with the predictions made by the literature: a higher degree of internal locus of control should be associated with believing everyone is more in control of their destiny and thus that their health status is mainly their responsibility.

Optimism bias negatively predicts whether a woman or a household member avoided attending a healthcare facility for themselves or their child for fear of COVID-19. We interpret these results as women overly optimistic about not contracting COVID-19 during their health visit. If they suffer from optimism bias about maintaining a healthy status despite the COVID-19 associated risk of infection, they might still decide to go to the health center. Moreover, the aim of optimistic people in maintaining a healthy status might help explain why optimism bias is positively associated with non-pharmaceutical prevention measures compliance. This surprising result might also be related to different types of behaviors for novel sources of risk, such as the COVID-19 pandemic. Finally, the educational aspirations a mother has for their children are negatively associated with avoiding health services for the latter because of fear of COVID-19. Mothers

[14] Overall, our results hold when conducting these robustness checks. Only the negative association between impatience and having at least four prenatal visits, which is predicted by the theory is now significant, at a 99% level of confidence.

with higher aspirations for their children are 0.032 less likely to avoid or postpone healthcare services for their children, which is in line with the literature.

**Table 6: Behavioral predictors of COVID-19-related health behaviors**

| | COVID-19-Related Health Behaviors | | | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| | **Women avoided health care for herself or someone in the household for fear of COVID-19** | **Women followed COVID-19 non-pharmaceutical prevention measures** | **Women got the COVID-19 vaccine or is willing to get it** | **Mothers avoided health care for their children for fear of COVID-19** |
| Impatience (z score) | 0.001 | -0.118*** | 0.005 | 0.008 |
| | (0.008) | (0.038) | (0.013) | (0.013) |
| Internal locus of control (z score) | 0.020** | 0.277*** | 0.034** | -0.014 |
| | (0.009) | (0.043) | (0.014) | (0.014) |
| Optimism bias (z score) | -0.031*** | 0.089** | 0.001 | -0.025* |
| | (0.009) | (0.044) | (0.013) | (0.014) |
| Educational aspirations (z score) | | | | -0.032** |
| | | | | (0.015) |
| Individual Controls | YES | YES | YES | YES |
| Household Controls | YES | YES | YES | YES |
| Health Services Controls | YES | YES | YES | YES |
| Municipality FE | YES | YES | YES | YES |
| Observations | 848 | 848 | 848 | 518 |
| $R^2$ | 0.059 | 0.138 | 0.058 | 0.124 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. OLS estimations with robust standard errors in parentheses. In column (1), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports herself or any member of the household having avoided access to health services because of fear of contracting COVID-19. In column (2), the outcome of interest is the number (out of 4) of taken actions related to COVID-19 non-pharmaceutical prevention measures. In column (3), the outcome variable of interest is an indicator variable that takes a value of 1 if the mother is willing to get vaccinated against COVID-19 or if she already did get vaccinated. In column (4), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports having avoided access to health services for her children because of fear of contracting COVID-19. The behavioral explanatory variables of interest are described as follows. Impatience is the standardized measure of the Present bias Index; Internal locus of control is the standardized measure of the adapted Locus of control Index; optimism bias is the standardized measure of the general Optimism bias Index; and Educational aspirations is the standardized measure of the Educational aspirations Index.

### 4.2 General health behaviors

We use the following general health outcomes as general health behaviors: i) test for hypertension in the last six months; ii) test for diabetes in the last six months; iii) at least four prenatal visits; iv) children's consumption of micronutrients in the last 6 months; and v) amount of iron-rich food items consumed by children. Again, it is worth noting that, while the survey is responded by women in general, the number of

observations in each regression will depend on the type of outcome. The hypertension and diabetes survey items are responded by women in general. The rest of the outcomes (child-related) are responded by women who are mothers of children between the ages of 0 and 5, except for the question related to an iron-rich diet, which was restricted to mothers of children older than 1 year.

**Table 7: Behavioral predictors of general health behaviors**

| | General Health Behaviors | | | | |
|---|---|---|---|---|---|
| | Children | | | Women | |
| | (1) | (2) | (3) | (4) | (5) |
| | At least 4 prenatal care visits | Micronutrients adherence | Iron-rich diet | Hypertension screening | Diabetes screening |
| Impatience (z score) | -0.019 | -0.035** | -0.045 | 0.023 | 0.015 |
| | (0.013) | (0.017) | (0.044) | (0.015) | (0.012) |
| Internal locus of control (z score) | 0.028* | -0.007 | 0.124** | 0.058*** | -0.008 |
| | (0.016) | (0.014) | (0.048) | (0.016) | (0.013) |
| Optimism bias (z score) | -0.010 | 0.008 | 0.040 | -0.009 | 0.012 |
| | (0.016) | (0.015) | (0.053) | (0.016) | (0.013) |
| Educational aspirations (z score) | 0.020 | 0.019 | 0.062 | | |
| | (0.015) | (0.013) | (0.051) | | |
| Individual Controls | YES | YES | YES | YES | YES |
| Household Controls | YES | YES | YES | YES | YES |
| Municipality FE | YES | YES | YES | YES | YES |
| Observations | 534 | 536 | 425 | 848 | 848 |
| $R^2$ | 0.133 | 0.136 | 0.181 | 0.071 | 0.061 |

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. OLS estimations with robust standard errors in parentheses. In column (1), the outcome of interest is an indicator variable that takes a value of 1 if the mother had at least 4 prenatal visits to the doctor. In column (2), the outcome of interest is an indicator variable that takes a value of 1 if the child has consumed micronutrients more than 60 days in the last 6 months. In column (3), the outcome of interest is the number of iron-rich food items the child has consumed (out of 7). In column (4), the outcome variable of interest is an indicator variable that takes a value of 1 if hypertension has been detected in the mother during the last 6 months. In column (5), the outcome of interest is an indicator variable that takes a value of 1 if diabetes has been detected in the mother during the last 6 months. The behavioral explanatory variables of interest are described as follows. Impatience is the standardized measure of the Present bias Index; Internal locus of control is the standardized measure of the adapted Locus of control Index; Optimism bias is the standardized measure of the general Optimism bias Index; and Educational aspirations is the standardized measure of the Educational aspirations Index.

Table 7 presents the results of this second set of estimations. Starting with impatience, we observe it negatively predicts feeding the child with micronutrients for 60 days in a space of 6 months. Internal locus of control, on the other hand, positively predicts having gone to at least 4 prenatal visits, an increased number of iron-rich food items consumed by children and having been tested for hypertension in the last 6 months. Especially salient is that one standard deviation increase in internal locus of control is associated with consuming 0.124 additional iron-rich food items, which are measured in a scale of 0 to 6. What these

correlations are likely indicating is that women who believe their destiny is in their own hands might try to guarantee the best possible health status for their children and themselves[15].

This time we find no significant associations between optimism bias and educational aspirations for the child and the outcome variables of interest. All associations were more robust in behaviors related to COVID-19, suggesting that feelings of uncertainty and stress could enhance the predictive power of our chosen behavioral predictor and that they may play an important role in novel behaviors.

## 5. Conclusions

Decision making about the utilization of healthcare historically shows evident disparities by socio-economic status and have always been shaped by need factors and observable drivers such as education, income, insurance status and ability to pay. This study aims to go beyond traditional determinants and analyzes four types of behavioral predictors – impatience, internal locus of control, optimism bias, and aspirations – and their associations with the decisions around healthcare among low-income women in El Salvador in the context of the COVID-19 pandemic. Our results provide some novel insights. First, we find that our behavioral predictors show more significant associations with healthcare decisions when these are related to the pandemic. For example, impatience and locus of control have higher magnitudes and significance for COVID-19 prevention measurements, and especially salient is the case of optimism bias: it seems to predict the lack of avoidance of health services for fear of the pandemic but exhibits no significant correlations with other healthcare decisions related to general health services attendance. It is possible that the scale and nature of the event could have enhanced the influence of behavioral predictors on healthcare decisions to the detriment of a more rational approach to decision-making, something worth considering for future shocks—e.g., due to natural disasters, health emergencies or situations of social unrest.

Second, most of the correlations found in this paper go in the direction of what theory would have predicted. Still, additional evidence is needed to support this, especially in a low-income setting. For instance, on average higher internal locus of women is associated with healthier behaviors for them and their children. Likewise, women with optimism bias were less likely to avoid attending health facilities for fear of COVID-19, signaling overconfidence of not contracting the disease. Moreover, impatience negatively predicts prevention measures, which denotes the tension between present costs and future health benefits. Finally, we find significant correlations between mothers having educational aspirations for their children and behaviors intending to improve their health status during the pandemic. However, there is a lack of significant correlation between this behavioral driver and general health decisions. Even though all our coefficients have the expected sign, we do not find statistical significance. The literature predicts that mothers have incentives to invest in their children's human capital, especially when educational aspirations are high, but the connection between health services decision making and future human capital might not be as clear as for educational decisions.

[15] Although we do not find any significant association between internal locus of control and diabetes detection. Perhaps this might be because of the disease being less frequent than hypertension.

In sum, understanding reasoning processes behind healthcare decision-making is key to improving policy design. Our study aims at adding to the evidence on this topic with data from disadvantaged women in a developing country context. To the best of our knowledge, it is also one of the first to compare healthcare decisions related to COVID-19 pandemic with those deemed as general health behaviors. In addition, we contribute to the literature by analyzing how these behavioral predictors affect third parties: the children of some of the women in our sample. Our results emphasized the necessity of further research providing specific strategies informed by behavioral sciences to improve health seeking behaviors and establish causal associations, which is one of the limitations of this study. Our findings also shed light play on the potential effective role of behavioral strategies to improve the healthcare-seeking behaviors for the most vulnerable populations, whose locus of control, impatience, optimism, and aspirations might differ from the general population.

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## Appendix.

### Table A1: Behavioral drivers' distribution by demographic characteristics

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Mean | | p-value | Mean | | p-value |
| | Value=0 | Value=1 | | Value=0 | Value=1 | |
| | **Locus of control** | | | **Impatience** | | |
| Married / De facto union | 3.71 | 3.80 | 0.00 | -0.06 | 0.02 | 0.32 |
| Secondary or Tertiary Education | 3.73 | 3.88 | 0.03 | 0.01 | -0.04 | 0.75 |
| Self-reported good health | 3.73 | 3.80 | 0.26 | 0.06 | -0.06 | 0.74 |
| Three or less household assets | 3.79 | 3.70 | 0.44 | 0.00 | -0.02 | 0.43 |
| Woman has children | 3.70 | 3.81 | 0.33 | 0.00 | -0.01 | 0.73 |
| | **Optimism bias total** | | | **Optimism bias health** | | |
| Married / De facto union | 5.89 | 6.05 | 0.10 | 5.82 | 6.11 | 0.06 |
| Secondary or Tertiary Education | 6.02 | 5.95 | 0.14 | 6.04 | 5.98 | 0.01 |
| Self-reported good health | 5.84 | 6.12 | 0.23 | 5.83 | 6.17 | 0.13 |
| Three or less household assets | 5.99 | 6.02 | 0.69 | 6.03 | 6.00 | 0.71 |
| Woman has children | 5.83 | 6.11 | 0.00 | 5.76 | 6.20 | 0.02 |
| Total observations=848 | | | | | | |
| | **Educational aspirations** | | | | | |
| Married / De facto union | 0.74 | 0.74 | 0.97 | | | |
| Secondary or Tertiary Education | 0.65 | 0.95 | 0.00 | | | |
| Self-reported good health | 0.70 | 0.76 | 0.14 | | | |
| Three or less household assets | 0.76 | 0.67 | 0.07 | | | |
| Woman has children | - | 0.73 | - | | | |
| Total observations=507 | | | | | | |

Notes: Columns (1) and (4) report the mean of the behavioral driver if the demographic variable is equal to 0; and Columns (2) and (5) report the mean when the demographic variable is equal to 1. Columns (3) and (6) report Pearson's chi squared test of the difference. The behavioral explanatory variables of interest are described as follows. Internal locus of control was measured on a scale from 1 to 5, where 5 is a high internal locus of control; impatience was measured on a scale from 1 to 32, being 32 with high impatience, its standardized version with mean 0 and standard deviation of 1 is reported; optimism bias was measured on a scale from 0 to 10 being scores higher than five moreoptimistic; finally, educational aspirations were measured with a binary variable that takes a value of 1 if the mother aspires their children to have a educational career such as medical doctors, lawyers, engineers, architects, or educators.

**Table A2: Behavioral predictors of COVID-19-related health behaviors – without Health Services Controls**

| | COVID-19-Related Health Behaviors | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | **Women avoided health care for herself or someone in the household for fear of COVID-19** | **Women followed COVID-19 non-pharmaceutical prevention measures** | **Women got the COVID-19 vaccine or is willing to get it** | **Mothers avoided health care for their children for fear of COVID-19** |
| Impatience (z score) | 0.000 | -0.126*** | 0.005 | -0.002 |
| | (0.009) | (0.039) | (0.014) | (0.018) |
| Internal locus of control (z score) | 0.024** | 0.300*** | 0.031** | -0.013 |
| | (0.010) | (0.042) | (0.014) | (0.020) |
| General optimism bias (z score) | -0.030*** | 0.089** | 0.000 | -0.035* |
| | (0.009) | (0.044) | (0.013) | (0.019) |
| Educational aspirations (z score) | | | | -0.029 |
| | | | | (0.019) |
| Individual Controls | YES | YES | YES | YES |
| Household Controls | YES | YES | YES | YES |
| Health Services Controls | NO | NO | NO | NO |
| Municipality FE | YES | YES | YES | YES |
| Observations | 848 | 848 | 848 | 528 |
| $R^2$ | 0.006 | 0.125 | 0.058 | 0.119 |
| F | 1.89 | 5.28 | 2.12 | - |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. OLS estimations with robust standard errors in parentheses. In column (1), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports herself or any member of the household having avoided access to health services because of fear of contracting COVID-19. In column (2), the outcome of interest is the number (out of 4) of taken actions related to COVID-19 non-pharmaceutical prevention measures. In column (3), the outcome variable of interest is an indicator variable that takes a value of 1 if the mother is willing to get vaccinated against COVID-19 or if she already did get vaccinated. In column (4), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports having avoided access to health services for her children because of fear of contracting COVID-19. The behavioral explanatory variables of interest are described as follows. Impatience is the standardized measure of the Present bias Index; Internal locus of control is the standardized measure of the adapted Locus of control Index; optimism bias is the standardized measure of the general Optimism bias Index; and Educational aspirations is the standardized measure of the Educational aspirations Index.

**Table A3: Behavioral predictors of COVID-19-related health behaviors – 'standard errors clustered at the municipality level**

| | COVID-19-Related Health Behaviors | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | **Women avoided health care for herself or someone in the household for fear of COVID-19** | **Women followed COVID-19 non-pharmaceutical prevention measures** | **Women got the COVID-19 vaccine or is willing to get it** | **Mothers avoided health care for their children for fear of COVID-19** |
| Impatience (z score) | 0.001 | -0.118** | 0.005 | 0.008 |
| | (0.011) | (0.041) | (0.009) | (0.015) |
| Internal locus of control (z score) | 0.020* | 0.277*** | 0.034** | -0.015* |
| | (0.009) | (0.046) | (0.012) | (0.007) |
| Optimism bias (z score) | -0.031** | 0.089* | 0.001 | -0.025 |
| | (0.010) | (0.048) | (0.012) | (0.017) |
| Educational aspirations (z score) | | | | -0.032*** |
| | | | | (0.007) |
| Individual Controls | YES | YES | YES | YES |
| Household Controls | YES | YES | YES | YES |
| Health Services Controls | YES | YES | YES | YES |
| Municipality FE | YES | YES | YES | YES |
| Observations | 848 | 848 | 848 | 528 |
| $R^2$ | 0.059 | 0.138 | 0.058 | 0.119 |
| F | - | - | - | - |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. OLS estimations with standard errors clustered at the municipality level in parentheses. In column (1), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports herself or any member of the household having avoided access to health services because of fear of contracting COVID-19. In column (2), the outcome of interest is the number (out of 4) of taken actions related to COVID-19 non-pharmaceutical prevention measures. In column (3), the outcome variable of interest is an indicator variable that takes a value of 1 if the mother is willing to get vaccinated against COVID-19 or if she already did get vaccinated. In column (4), the outcome of interest is an indicator variable that takes a value of 1 if the mother reports having avoided access to health services for her children because of fear of contracting COVID-19. The behavioral explanatory variables of interest are described as follows. Impatience is the standardized measure of the Present bias Index; Internal locus of control is the standardized measure of the adapted Locus of control Index; optimism bias is the standardized measure of the general Optimism bias Index; and Educational aspirations is the standardized measure of the Educational aspirations Index.

**Table A4: Behavioral predictors of general health behaviors**
**standard errors clustered at the municipality level**

| | General Health Behaviors | | | | |
|---|---|---|---|---|---|
| | Children | | | Women | |
| | (1) | (2) | (3) | (4) | (5) |
| | At least 4 prenatal care visits | Micronutrients adherence | Iron-rich diet | Hypertension screening | Diabetes screening |
| Impatience (z score) | -0.019*** | -0.035* | -0.045 | 0.023 | 0.015* |
| | (0.006) | (0.017) | (0.047) | (0.016) | (0.007) |
| Internal locus of control (z score) | 0.028* | -0.007 | 0.124*** | 0.058*** | -0.008 |
| | (0.014) | (0.021) | (0.033) | (0.015) | (0.011) |
| Optimism bias (z score) | -0.010 | 0.008 | 0.039 | -0.009 | 0.012 |
| | (0.016) | (0.015) | (0.058) | (0.013) | (0.011) |
| Educational aspirations (z score) | 0.020 | 0.019 | 0.062 | | |
| | (0.012) | (0.011) | (0.036) | | |
| Individual Controls | YES | YES | YES | YES | YES |
| Household Controls | YES | YES | YES | YES | YES |
| Municipality FE | YES | YES | YES | YES | YES |
| Observations | 534 | 536 | 425 | 848 | 848 |
| $R^2$ | 0.133 | 0.136 | 0.181 | 0.071 | 0.061 |
| F | - | - | - | - | - |

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. OLS estimations with standard errors clustered at the municipality level in parentheses. In column (1), the outcome of interest is an indicator variable that takes a value of 1 if the mother had at least 4 prenatal visits to the doctor. In column (2), the outcome of interest is an indicator variable that takes a value of 1 if the child has consumed micronutrients more than 60 days in the last 6 months. In column (3), the outcome of interest is the number of iron-rich food items the child has consumed (out of 7). In column (4), the outcome variable of interest is an indicator variable that takes a value of 1 if hypertension has been detected in the mother during the last 6 months. In column (5), the outcome of interest is an indicator variable that takes a value of 1 if diabetes has been detected in the mother during the last 6 months. The behavioral explanatory variables of interest are described as follows. Impatience is the standardized measure of the Present bias Index; Internal locus of control is the standardized measure of the adapted Locus of control Index; Optimism bias is the standardized measure of the general Optimistic bias Index; and Educational aspirations is the standardized measure of the Educational aspirations Index.

## Table A5: Correlation Matrixes between behavioral predictors

| Pearson's Correlations | | | | |
|---|---|---|---|---|
| Variables | (1) | (2) | (3) | (4) |
| (1) Optimism bias | 1.000 | | | |
| (2) Internal locus of control | 0.067* | 1.000 | | |
| (3) Present bias | -0.028 | -0.061 | 1.000 | |
| (4) Educational aspiration for offspring | 0.072 | 0.117* | 0.009 | 1.000 |

A. Correlation Matrix of behavioral predictors using General optimism bias as one of the predictors. (*) denotes $p < 0.05$.

| Pearson's Correlations | | | | |
|---|---|---|---|---|
| Variables | (1) | (2) | (3) | (4) |
| (1) Health-related optimism bias | 1.000 | | | |
| (2) Internal locus of control | 0.039 | 1.000 | | |
| (3) Present bias | 0.005 | -0.061 | 1.000 | |
| (4) Educational aspiration for offspring | 0.068 | 0.117* | 0.009 | 1.000 |

B. Correlation Matrix of behavioral predictors using Health-related optimism bias as one of the predictors. (*) denotes $p < 0.05$.