i4We India Health Care Cluster Model Impact Evaluation

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Executive Summary

The *Invest for Wellness* (*i4We*) *India Health Care Cluster Model* developed by the Catalyst Group (Bangalore India) is a health care delivery model in which health care delivery is coordinated across factories within an industrial zone. The health care delivered during the course of our study emphasized reproductive health, a healthy diet, diagnosis and education related to hypertension, anemia and diabetes and women's empowerment.

Originally, nine factories enrolled in the study with five to be treatment factories and four to be control factories. The program was significantly disrupted by the 2019-2022 SARS COVID-19 pandemic. Ultimately, the program was undertaken in three factories. A baseline was conducted prior to any factory receiving treatment during March and April 2021. Treatment began in the fall of 2021. The endline was conducted during June and July 2022. Thus, our analysis measures the impact of six to nine months of program exposure. To measure the treatment effect, we employ a difference-in-difference methodology.

Training on health knowledge. Our theory of change posits that treatment begins with knowledge: training on healthy behaviors. When prompted, following treatment, workers were 20 to 37 percent more likely to recall learning about handwashing, healthy foods, menstruation, family planning, hypertension, anemia and diabetes.

Accessing government resources. The next step in improving health outcomes concerns providing workers with resources. Consider first, resources provided by government programs such as a labour card, ration card, etc. Treated workers were not more likely to have heard of government programs but they were more likely to have used them. Treated workers were 5.7 percent more likely to have accessed any government program than untreated workers. For participants who did not use the programs, treated workers were 5.1 percent less likely to identify lack of knowledge as the reason.

Treated workers were also more likely to receive care that they needed and less likely to fail to receive care because it was perceived as too costly. Treated workers were 2.4 percent more likely to receive the care that they needed in the preceding three months. Among workers who were referred for care but did not receive it, treated workers were 7.2 percent less likely to site cost as the reason.

Health knowledge. Our next question is whether workers are retaining accurate information about healthy behaviors. Treated participants had stronger beliefs about the importance of handwashing and avoiding pregnancy shortly after giving birth and were more aware that hypertension may not have symptoms. Treated workers were also more likely to know the symptoms of diabetes and to know how to prevent anemia. Weaker but positive treatment effects emerged for knowing which foods are high in protein. Three important points on which the training could be strengthened concern knowing that dal and rice are high protein foods, knowing that clear water may not be safe to drink and believing that there is value in being screened for diabetes, anemia and hypertension so that these conditions can be treated.

Healthy behaviors. Workers are clearly learning healthy behaviors due to training. The question is whether the training is changing behavior. Treatment promoted health behaviors such as handwashing before eating and taking iron and folic acid.

Treated workers were also using boiled or filtered water more often (0.21 on a 5-point scale). This finding is particularly interesting because treatment did not strengthen knowledge of microscopic water borne pathogens.

Finding a gap between knowledge and behavior is one of the most important of our study. The effectiveness of treatment to increase the practice of healthy behaviors did not rest on knowledge as to why those healthy behaviors are important. In fact, while we did find evidence of the theory of change (knowledge –> behavior change –> improved health), treatment had a direct channel to behavior change and improved health outcomes for workers that was not mediated by knowledge.

Health care access. The next step in achieving improved health outcomes it to provide access to health care. Treated workers were considerably more likely to have been recently screened for diabetes (41.4%), anemia (44.1%) and hypertension (26.2%).

Health outcomes. Our ultimate interest from the health intervention is whether the *i4We* program resulted in improved health outcomes. Treatment improves participant ratings of their overall health by 0.51 on a 5-point scale. We also detect an improvement in the health of young daughters, confidence in staying healthy and lower incidence of missing work due to ill health. We also find a statistically significant improvement in mental health. The probability of sadness and depression is 3.4 percent lower in treated compared to untreated workers.

Health screenings identified illness that needed treatment. Treated workers were 21.5 percent more likely to have been diagnosed with hypertension, 21.0 percent more likely to have been diagnosed with diabetes, 24.8 percent more likely to have been diagnosed with anemia and 12.5 percent more likely to have been diagnosed with COVID-19.

Evidence for an impact specifically on menstrual health and family planning was mixed. The training emphasizes the use of sanitary products during menstruation. Importantly, training reduced the perception that sanitary products are too costly. But workers were resistant to them because of a lack of privacy. Treatment increased the awareness of family planning products such as emergency contraception (6.4%), male sterilization (3.2%), withdrawal (3.1%) and other contraception (22.9%). We were not able to determine what other methods participants might have learned of. Training had little effect on the methods used with the exception, once again, of other (13.8%). Training also had a small effect on where participants were obtaining family planning products from. There is increased use of the ESIC clinic (1.9%), government hospital (6.9%), an NGO (2.4%) and a pharmacy (2%).

Family outcomes and empowerment. Improved health can have a wide impact on household outcomes. Treated workers were 12.2 percent more likely to save money. Treated workers were also less concerned about having enough to eat. Though, curiously, they were also more likely to be worried about having enough money for their family's needs. Diagnoses of Covid and hypertension contributed to the sense of financial stress. However, we were unable to fully determine the source of financial stress.

Treated workers were empowered by the training. They had a greater belief that they could control the number of children they have. Participants also had more internalized locus of control. The effect on locus of control was particularly strong (0.51 on a 5-point scale).

The sense of having control over the number of children one has is an important contributor to the improvement in mental health associated with the *i4We program*. Mental health benefits were also mediated by internal locus of control, overall health and confidence in staying health.

Working conditions and factory environment. Treatment increased knowledge of the procedure for reporting violence or harassment at work (0.27 on a 5-point scale) and strengthened organizational norms deterring sexual harassment. Factories supported some of the training efforts including allowing workers to use the toilet when needed, providing covered bins in the bathrooms for menstrual products and soap for handwashing. However, treated workers noticed the low availability of nutritious foods. Though this belief that the factory does not provide nutritious foods may be a consequence of their not knowing that dal with rice is a high protein food.

The one training outcome that deserves more attention by the *i4We* program is the impact on dehumanizing treatment by supervisors and managers. Treated workers reported greater frequency of dehumanizing treatment by supervisors and were less likely to feel that supervisors and managers care about their health. It may be that treatment is simply making workers more aware of how they are treated. However, it may also be the case that there is insufficient program buy-in by factory managers and supervisors.

Earlier research indicates that workers are strongly affected by the belief that managers and supervisors care about their health. The reach of the program may have been greater if manager and supervisor buy-in had been more thoroughly cultivated.

Some of these ambiguous feelings on the part of workers emerge in their overall perceptions of their jobs. Treated workers have lower job satisfaction but are less likely to think about quitting.

The negative effect of treatment on job satisfaction occurred because workers did not perceive that supervisors and managers cared about their health. Although, some of this adverse effect was offset by finding out that they had anemia or diabetes through the *i4We* program. In fact, if there had been more manager and supervisor buy-in to the *i4We* program, job satisfaction my well have risen.

Impact of COVID. The Covid-19 pandemic significantly affected program delivery. Our question is whether *i4We* tempered the adverse effects of the pandemic. The program was particularly impactful concerning pregnancy. Treated workers were less likely to worry about an unplanned pregnancy (0.48 on a five point scale) and 2.5 percent less likely to become pregnant.

Introduction and Methodology

The *Invest for Wellness* (*i4We) India Health Care Cluster Model* developed by the Catalyst Group (Bangalore India) is a health care delivery model in which health care delivery is coordinated across factories within an industrial zone. The health care delivered during the course of our study emphasized reproductive health, a healthy diet, diagnosis and education related to hypertension, anemia and diabetes and women's empowerment.

The *i4We* model deviates from the standard international buyer-driven factory-based health intervention in that it represents an ongoing commitment to support the healthcare of workers in factories supplying global supply chains. The model deviates from earlier approaches in that it does not depend on a business case for improved healthcare. Rather, the focus of the intervention is to ensure long-term access to healthcare for workers by stakeholders such as international buyers who share a collective concern with the wellbeing of workers in their supply chains.

The complete *i4We* program includes (1) primary care, family planning and reproductive health, (2) mental health screening, professional counseling and referrals, (3) family planning and reproductive health services, (4) promoting workplace relationships and life skills, (4) supervisor and management training, (5) worker life skills training, (6) gender equity and prevention/remediation of sexual harassment and (7) financial inclusion and social protection.

Originally, nine factories enrolled in the study with five to be treatment factories and four to be control factories. The program was significantly disrupted by the 2019-2022 SARS COVID-19 pandemic. Ultimately, the program was implemented in three factories. Two treatment factories did not initiate the program, one of which did not complete the endline. Two control factories did not complete the endline.

A baseline was conducted prior to any factory receiving treatment during March and April 2021. Treatment began in the fall of 2021. The endline was conducted during June and July 2022. Thus, our analysis measures the impact of six to nine months of program exposure.

The final sample is summarized as follows:

Table 1 Sample		
	Number of Survey Participants	
	Baseline	Endline
Factory not treated	446	337
Factory treated	350	263

The specific focus of this report is to measure the treatment effect. To measure the treatment effect, we employ a difference-in-difference methodology. That is, we measure the difference between workers in treatment and control factories prior to treatment and then test to see whether that difference changed after treatment was introduced in the treatment factories. Using the difference-in-difference methodology, in part, addresses the fact that participants are not randomly assigned to treatment.

Our analysis considers a wide range of possible treatment outcomes.

Health Care Training. Topics include handwashing, balanced diet, menstrual care, family planning, hypertension, anemia and diabetes.

Access to Government Health-Related Programs. Trainers provided information about government programs available to workers, and we measured whether workers used them and reasons why they may not have accessed these programs.

Knowledge about Healthy Behaviors and Health Concerns. Training focuses on identifying clean water, foods high in protein, symptoms of diabetes, knowing that hypertension may not have symptoms, strategies for preventing anemia, knowing that it is not safe to get pregnant again right after giving birth, the importance of handwashing and a belief that it is worth getting diagnosed for health issues such as diabetes, hypertension and anemia so that they can be treated. Success includes confidence in using healthy behaviors and practices of healthy behaviors including boiling drinking water, obtaining screening for diabetes, anemia, hypertension, breast cancer, cervical cancer and STIs, taking folic acid, handwashing, eating healthy foods and controlling excess consumption of alcohol.

Healthcare Access. Indicators of healthcare access include affordable screening products for hypertension, anemia and diabetes, getting health care when sick, being referred for health care and health care affordability.

Overall Health. Indicators of health include health status of workers and their children, fatigue, working when sick and symptoms of specific illnesses.

Reproductive Health. Indicators of reproductive health include safe products used during menstruation, missed workdays due to menstruation, knowledge of family planning, knowledge of where to obtain family planning products, family planning products used, knowledge of when pregnancy is most likely to occur and confidence in deciding the number of children to have.

Perceptions of Work. Delivery of healthcare at work and training related to women's empowerment are expected to alter worker perceptions of work. We consider indicators such as comfort using grievance procedures, organizational norms tolerating sexual harassment, thoughts of quitting, job satisfaction, dehumanizing and other abusive treatment by supervisors and managers, ability and comfort voicing concerns at work and whether workers believe that managers and supervisors are concerned with the health and wellbeing of workers.

Occupational Safety and Health. OSH indicators include access to the toilet, covered bins in the restroom and access to nutritious food in the factory canteen.

Family Wellbeing. The wellbeing of workers' families includes the health of children, stress due to money concerns, ability to save and household assets.

Women's Empowerment. Empowering women in the factory includes providing grievance procedures, strengthening organizational norms deterring sexual harassment, reducing sexual harassment, verbal abuse and other dehumanizing treatment, ensuring that women are participating fully in household decision making concerning resource expenditure and accessing health care and overall making a woman's locus of control more internal so that they feel they have control over their lives.

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The Business Case. Business case indicators include pay, work hours, workdays, productivity, bonuses, late coming, absenteeism and promotions. While business case indicators are collected, they are not taken as a measure of program success. The focus of the intervention is worker wellbeing with an expectation that international buyers are making a long-term commitment. Our approach stands in contrast to the more conventional attempt to convince factory managers that maintaining worker health will pay for itself in the form of increased productivity.

Reduced Form Treatment Effects

Our analysis begins estimating a reduced form treatment effect. That is, which indicators of health improved in treated workers relative to workers in the control factories? In the narrative below, the term "treated" refers to whether a worker was in one of the factories in which the *i4We* program was implemented. It is *not* referring to any particular medical treatment.

We use the difference-in-difference empirical strategy for identifying a treatment effect in the reduced form. The analysis first measures the difference between workers in the treatment and control factories prior to treatment. We then measure the same difference after treatment. The analysis seeks to determine whether there has been a statistically significant change in the difference. Any significant change in the difference is attributed to the *i4We* treatment.

For the purposes of analysis, we employ two estimators: fixed effects and random effects. Each has its strengths and weaknesses. The random effects estimator extracts more information from the data but, under certain circumstances, it can over-estimate the treatment effect. We employ a simple rule for choosing between the two estimated effects. If the fixed and random estimates indicate the same sign of a treatment effect, then the estimate with the strongest statistical significance is used. If the fixed and random effects indicate opposite treatment effects, then we use the fixed effects estimate. Additional information on interpreting results will be provided below.

In general, we ask questions with two types of responses. The question could be a binary "yes-no" question. In that case, the treatment effect is the change in the probability of answering "yes" as a consequence of the *i4We* treatment. The second type of question is a "scale" question. Most scales are five points, though a couple of scales are four points. In the case of a "scale" question, the measured treatment effect is the extent to which treatment moves worker responses along the scale. Exceptions will be noted below.

Training related to health knowledge. The first step in improving health outcomes is to provide information to workers about their health. We begin by considering topics covered by worker training. Workers were asked, "Which types of health training or health information have you received at work?" The question was first asked by the enumerator without suggesting topics (unprompted). The participant was then prompted with a list of topics that had been covered during the *i4We* intervention (prompted). Prompted topics were handwashing, balanced diet, menstrual care, family planning, hypertension, anemia and diabetes.

Estimates of treatment effects are reported in Table 2. As noted above, treatment effects are estimated using both a random and fixed effects panel estimator. The panel identifier is whether the participant was in a treatment or control factory. Equations are controlled for demographic characteristics and time.

Consider first, training concerning handwashing. Following treatment, workers in the treatment factories were 1.7 percent more likely to volunteer that they recently learned about handwashing. However, when prompted, treated workers were 34.8 percent more likely to report learning about handwashing. A similar phenomenon emerges for learning about family planning, hypertension, anemia and diabetes. Unprompted treated workers were 3.0 percent and prompted treated workers were 23.5 percent more likely to report learning about family planning. Unprompted treated workers were 7.4 percent and prompted treated workers were 22.2 percent more likely to report learning about hypertension. Unprompted treated workers were 8.9 percent and prompted treated workers were 20.6 percent more likely to report learning about anemia. Unprompted treated workers were 6.6 percent and prompted treated workers were 23.8 percent more likely to report learning about diabetes.

Results for promoted and unprompted participants were less consistent for diet and menstrual health. Treated workers were 37.2 percent more likely to report training on diet and 27.4 percent more likely to have learned about menstrual health but only after prompting.

Table 2 Which types of health training or health information have you received at work?

	Unprompted		Prompted	
	Fixed	Random	Fixed	Random
Handwashing	0.00727	0.0172***	0.348**	0.341***
Diet	-0.0706	-0.0650***	0.372**	0.364***
Menstruation	-0.0931***	-0.0463***	0.268**	0.274***
Family Planning	0.0279**	0.0296***	0.235**	0.234***
Hypertension	0.0566***	0.0738***	0.222**	0.149***
Anemia	0.0344**	0.0885***	0.206**	0.154***
Diabetes	0.0255*	0.0658***	0.238**	0.190***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Accessing Government Resources. *i4We* training also emphasizes helping workers access government-sponsored programs. Workers were asked whether they had heard about and used the following programs: labour card, free land patta, green house, school education, MUDRA Yojana, ration card, Prime Minister Jeevan Jyothi Beema Yojana, Prime Minister Surkasha Bheema Yojana, Atal Pension Yojana and Sukanya Samriddhi Yojana.

Treated workers were uniformly less knowledgeable as reported in Table 3. The only program treated workers were more likely to have heard of is Atal Pension Yojana (APJ). Treated workers were 7.5

percent more likely to have heard of APJ than other workers. In contrast, treated workers were more likely to have accessed government programs. Treated workers were 5.7 percent more likely to have used any of the programs after treatment than workers in the control factories. Treated workers were 12.4 percent less likely to use a labour card, 3.6 percent more likely to use a school or education program and 4.5 percent more likely to use a ration card.

Participants who did not use these schemes were then asked why. Prompted reasons for not using these programs were corruption, request for sexual favors, being asked additional irrelevant queries, too many visits to the departments required, delay in stages of approval, lack of adequate documents, inconvenient government office hours and lack of awareness of government programs. As reported in Table 4, treated workers were less likely to report corruption (-1.7%), being asked too many irrelevant questions (-1.0%), lack of adequate documentation (-1.5%) and lack of awareness (-5.1%).

Table 3 Government Resources

	Which of the following schemes have you heard of?		Which government scheme(s) have you availed?	
	Fixed	Random	Fixed	Random
Government schemes			0.0568***	0.0428***
Labour Card	-0.0798**	-0.149***	-0.103**	-0.124***
Land Patta	-0.0301**	-0.0197***	-0.0309**	-0.0276***
Green House	-0.00589**	-0.00710***	-0.00960***	-0.00996***
School/Education	-0.0141*	-0.0585***	0.0364***	0.00751***
MUDRA	-0.0155*	-0.0222***	-0.00326***	-0.00334***
Ration	0.0160	0.00650***	0.0402***	0.0454***
Prime Minister Jeevan Jyothi Beema Yojana	-0.0658**	-0.0617***	-0.0326**	-0.0287***
Prime Minister Surkasha Bheema Yojana	-0.0365*	-0.0269***	-0.0240***	-0.0154***
Atal Pension Yojana	0.0745**	-0.0316***	-0.000405	0.00952***
Sukanya Samriddhi Yojana	-0.0152*	-0.0753***	-0.0232***	-0.0373***

Notes: Statistical significance indicated by *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Table 4 What has prevented you from accessing schemes?

	Fixed	Random
Corruption	-0.0170**	0.00535***
Being asked additional irrelevant queries	-0.0104***	0.000572
Too many visits to the departments required	0.0393***	0.000567
Delay in stages of approvals	0.0212**	-0.000415**
Lack of adequate documents	-0.0154**	-0.00236***
Inconvenient government office hours	-0.00180	3.17e-05
Lack of awareness	-0.0513**	-0.0439***
Other reasons	-0.0279**	-0.00834***

Health Access. Improved health and healthy behaviors also depend on access to health services. We asked participants several questions about health access and barriers. Treatment effects are mixed, as reported in Table 5.

Consider first whether workers are being referred for medical care. Treated workers were 6.3 percent less likely to have been referred to a medical center or hospital for medical care and 6.4 percent less likely to have received care they were referred for. However, among those who were referred, they were 7.2 percent less likely to have failed to receive care because it was too costly. The *i4We* program also reduced expenses for health care. Treated participants are spending less on health care each month, about 28 rupees.

In contrast, treated participants are more likely to report receiving care that they needed in the preceding three months. Treated participants are 2.4 percent less likely to have failed to receive treatment that they needed. Of those who failed to receive care they needed, treated workers were 6.7 percent more likely to report needed care was too expensive.

We also consider access to affordable screening. Workers were asked whether they considered screening products for hypertension, anemia and diabetes available within a reasonable distance and affordable. Results are reported in Table 6. However, there does not appear to be a consistent effect of treatment on perceptions of screening availability.

Table 5 Health Care Access

	Fixed	Random
Were you referred to a health center or hospital for treatment in the last 3 months?	-0.0257**	-0.0635***
Did you receive health service from the clinic or health center you were referred to?		
Yes	-0.0249**	-0.0640***
No, it was too much money	-0.0717**	-0.0344***
How much money have you spent on health care in the last 30 days? Include money spent on family planning methods (such as condoms, IUDs, pills), sanitary napkins, doctor/clinic fees, medicines, transportation to the doctor, etc.	-0.0717**	-0.0344***
In the last 3 months, was there ever a time you felt you needed health care but didn't get it?	-0.00920***	-0.0239***
Because nobody was available to see/treat me	0.00124	0.00421
Because it was too expensive	0.0667*	-0.0127**
Because there was no one to accompany me	-0.00231	-0.00271***
Because it was too difficult to make an appointment	0.00546*	-0.000489
Because the clinic was too far or it was difficult to get there	-0.00127	-0.0141***
Other	0.00545	0.00879***

Table 6 Which of the following screening products and services are accessible within a reasonable distance and affordable?

	Distance		Affordable	
	Fixed	Random	Fixed	Random
Hypertension	-0.00689	0.0488***	-0.0672**	0.0525***
Anemia	-0.00333	0.0434***	0.00112	0.0929***
Diabetes	-0.0102	0.0625***	-0.0110	0.0589***
None	-0.00319	-0.0509***	0.0135*	-0.0704***

Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Knowledge about health and healthy behaviors. The next step in improving health outcomes is to determine whether workers have knowledge of healthy behaviors.

In most regards, treated workers were more knowledgeable than untreated workers, though there are some important exceptions. When asked whether they agreed with the statement, "I think that if water looks clean, it is probably safe to drink," treated workers agreed more strongly than untreated workers by 0.54 on a 5-point scale, as can be seen in Table 7. Treated participants were also more likely to believe that there was no point in getting a diagnosis for diabetes, anemia or hypertension because there was nothing to be done about it. Treatment effects were quite large, a full point on a 5-point scale.

Treated participants had stronger beliefs that it is important to wash hands with soap and water (0.36 on a 5-point scale), weaker beliefs that it is safe to get pregnant right after giving birth (-0.64 on 5-point scale) and stronger beliefs that it is possible to have hypertension without realizing it (0.19 on a 5-point scale).

Treated workers were only slightly more knowledgeable about which foods are high in protein as compared to untreated workers. Treated workers were 13.1 percent more likely to identify fish, 17.4 percent more likely to identify meat and 7.5 percent more likely to identify wheat as high protein foods. Importantly, treated workers were less likely to know that rice and dal are important sources of protein while more likely to identify fruit as a source of protein.

Treated workers were generally more able to identify symptoms of diabetes, as reported in Table 8. Unprompted, treated workers were more likely to identify feeling very thirsty, feeling hungry even after meals and blurry vision as symptoms of diabetes. Once prompted, treated workers were more likely to

identify all symptoms of diabetes. The treatment effect ranged from a low of 20.4 percent for cuts and bruises that are slow to heal to 36.1 percent for extreme fatigue.

Treated workers were more likely to know how to prevent anemia, as reported in Table 9. They were more likely to know of the benefits of taking iron and folic acid (11.8%) and eating lentils, peas or beans (17.2%).

Table 7 Knowledge of Healthy Behaviors

		Fixed	Random
I think that if water looks clean, it is probably safe to drink.		0.535**	0.450***
I think that it's important to wash your hands with soap and water to prevent disease.		0.356***	0.222***
I think it is fine to get pregnant again soon after giving birth.		-0.640***	-0.542***
There is no point finding out if I have diabetes because I can't do much about it if I do.		0.960***	0.953***
There is no point finding out if I have anemia because I can't do much about it if I do.		1.067**	1.016***
There is no point finding out if I have high blood pressure because I can't do much about it if I do.		1.067***	1.041***
It is possible to have very high blood pressure and not realize it.		0.188**	-0.0684***
Which of the following foods are high in protein?	Fish	0.131**	0.119***
	Fruit	0.0566**	0.0287***
	Meat	0.130**	0.174***
	Rice	-0.0108*	0.0676***
	Vegetables	-0.00523	0.00609
	Wheat	0.0205**	0.0747***
	Dal	-0.0227*	-0.00115
	None	-0.00790*	-0.00804***
	Other	-0.0228**	-0.00796***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Coefficients on questions concerning water are on a 5-point scale. Coefficients on the protein question are marginal probability treatment effects.

Table 8 What are some symptoms of diabetes?

	Unprompted		Prompted	
	Fixed	Random	Fixed	Random
Urinating often	-0.0707*	0.0340***	0.195**	0.148***
Feeling very thirsty	0.0343***	0.0515***	0.311**	0.306***
Feeling very hungry—even when you have enough to eat	0.0547**	0.0349***	0.212***	0.236***
Extreme fatigue	-0.137**	-0.0831***	0.361***	0.322***
Blurry vision	0.0414*	0.0593***	0.256**	0.225***
Cuts/bruises that are slow to heal	-0.0422**	0.0499***	0.204***	0.128***
Weight loss—even when you have enough to eat	-0.00253	0.0160***	0.230***	0.209***
Tingling, pain, or numbness in the hands/feet	0.0252	-0.0113**	0.194**	0.200***

Table 9 Anemia can usually be prevented by which of the following?

	Fixed	Random
Taking iron/folic acid tablets	0.118**	0.0493***
Eating dark green leafy vegetables	-0.0121*	0.0410***
Eating lentils, peas, or beans	0.0982**	0.172***
Eating fruit	-0.0522**	0.0164***
None of the above	0.0347**	0.000355

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Screening for illness. We now turn to whether treatment is affecting access to healthcare. We begin with screening for illness and attitudes about screening. Table 10 provides details on screening and attitudes concerning screening. Workers were asked whether they had been screened for diabetes, anemia, hypertension, breast cancer, cervical cancer and STIs. Response options were "in the last three months," "in the last year," "in the last five years" and "more than five years ago."

Treatment had strong effects on diabetes, anemia and hypertension screening. Treated participants were considerably more likely to report recent screening for these three conditions in the preceding three months than untreated participants. The treatment effect on the probability of diabetes screening is 14.1 percent in the preceding month and 27.2 percent in the preceding three months. The treatment effect on the probability of anemia screening is 17.3 percent in the preceding month and 26.8 percent in the preceding three months. The treatment effect on the probability of hypertension screening is 26.2 percent in the preceding three months.

Table 10 When were you last screened for the following conditions?

	In the last month		In the last three months		In the last year	
	Fixed	Random	Fixed	Random	Fixed	Random
Diabetes	0.101**	0.141***	0.272***	0.217***	-0.0265*	-0.0738***
Anemia	0.130**	0.173***	0.268***	0.263***	-0.0510**	-0.0741***
Hypertension	-0.0255**	-0.0284***	0.262***	0.259***	-0.0697**	-0.0933***
Breast Cancer	-0.00351*	-0.00398***	-0.0192***	-0.00450***	-0.0130**	0.00127
Cervical Cancer	0.00600	0.0101***	-0.00904	0.00244***	0.00729	0.0231***
STIs	-0.0115***	-0.00353***	0.00208	-0.00665***	-0.0107**	-0.00376***

	In the last five years		More than five years ago		Never	
	Fixed	Random	Fixed	Random	Fixed	Random
Diabetes	-0.0517**	-0.0240***	-0.0464**	-0.0252***	-0.248***	-0.236***
Anemia	-0.0968***	-0.0650***	-0.0711**	-0.0329***		

Hypertension	-0.0337**	-0.0109***	-0.0193**	-0.00580***	-0.114**	-0.121***
Breast Cancer	0.00557**	-0.00176**	0.00626**	0.0156***	0.0238***	-0.00665**
Cervical Cancer	0.00683*	0.00400***	0.0195*	-0.00241	-0.0306**	-0.0372***
STIs	-0.0174*	-9.16e-05	0.0242**	-0.000499	0.0134	0.0145***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Heathy Behaviors. The next step in improving health outcomes is healthy behaviors. Treated workers were more likely to use boiled or purified water. The estimated treatment effect is 0.21 on a 5-point scale, as reported in Table 11. This is an interesting finding in light of the fact that treatment was not effective in helping workers identify safe water. Such a finding points to the possibility that improving health outcomes is not necessarily dependent on knowledge. Workers may change unhealthy behaviors following training even if they do not know the reason. In fact, in the SEM analysis conducted below, there is a consistent treatment channel arising directly from treatment that is not mediated by learning.

Knowledge and healthy behaviors were, to some degree, more closely aligned concerning handwashing. Treated participants were more likely to think that handwashing is important to prevent the spread of disease. This knowledge appears to have emerged in handwashing behaviors. Treated workers were 10.5 percent more likely to wash their hands before eating and 1.8 percent more likely after cleaning a child's stool, as reported in Table 12. However, it should be noted that statistically significant negative treatment effects emerge for handwashing before cooking (-7.7%), before feeding a baby (-2.8%) and after using the bathroom (-3.3%). These negative treatment effects are a bit surprising and may be occurring if there is a handwashing training occurring in the control factories at the time of the intervention.

Treatment had a more distinct effect on taking iron and folic acid, as reported in Table 13. Treatment increased the probability of taking iron and folic acid daily (2.8%), most days (0.9%) and every few days (4.4%). Treated workers were 8.7 percent less likely to report that they never took iron or folic acid.

Table 11 How often do you use boiled or purified water?

	Fixed	Random
	0.0336***	0.208***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Coefficients on questions concerning water are on a 5-point scale.

Table 12 When do you regularly wash your hands (using both water and soap)?

	Fixed	Random
Before eating	0.105***	0.102***
Before cooking	-0.0517**	-0.0771***
Before feeding my baby	-0.0283*	-0.0243***
After using the bathroom	-0.0334*	0.00434
After cleaning children's stool	0.0180**	-0.0125***
Other	-0.0260*	-0.0113***
I don't wash my hands regularly with water and soap	-0.000346	-0.00162*

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Coefficients are marginal probability treatment effects.

Table 13 Have you taken iron/folic acid tablets regularly in the last 3 months?

	Fixed	Random
Yes, daily	0.0282***	0.00144***
Yes, most days	0.00877***	0.00212***
Yes, every few days	0.0438*	0.0660***
No, not often or never	-0.0807**	-0.0695***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Health Status. A summary measure of the effect the *i4We* program is health status. The treatment effect on overall health is 0.51 on a 5-point scale, as reported in Table 14. This is a very large treatment effect for a program in place for only a matter of months. Distinct but smaller treatment effects are in evidence across several other measures. Treatment effects emerge for illness of the youngest daughter in the last month (-0.10 on a 5-point scale), confidence in staying healthy (0.12 on a 5-point scale) and lower incidence of missing work due to illness in the preceding month (-0.13 days). The only adverse treatment effect concerns days worked even when sick in the preceding month (0.11 days).

In terms of specific illnesses, workers are reporting fewer symptoms indicative of COVID, as reported in Table 15. Treated workers are less likely to have a runny or stuffy nose, muscle or body aches, fever, diarrhea and loss of taste or smell. However, treated workers report more symptoms associated with diabetes such as feeling very thirsty (0.06%) and cuts or bruises that are slow to heal (5.1%)—though it should be noted that there is reduced incidence of tingling, pain or numbness in hands or feet (-6.4%). Treated workers are also reporting better mental health with lower incidence of sadness or depression (-3.4%). Improved mental health is a particularly nice finding for the *i4We* program.

Diagnoses are reported in Table 16. Screening for illness, not surprisingly, has produced an increase in diagnoses. Treated workers are 21.5 percent more likely to have reported hypertension, 21.0 percent more likely to have diagnosed diabetes, 24.8 percent more likely to have diagnosed anemia and 12.5

percent more likely to have a diagnosis of COVID-19. Note that there is increased diagnosis of COVID-19 following treatment even though treated workers report fewer symptoms of COVID-19 such as loss of tase or smell. Such an outcome indicates that the increase in diagnosis is an indicator of intensive screening rather than more pervasive illness.

Table 14 Health Status

	Fixed	Random
How often has your youngest daughter been sick in the last month?	-0.102**	-0.0889***
How often has your youngest son been sick in the last month?	-0.000510	-0.0460***
How often have you been sick in the last month?	0.00313	-0.0845***
I am confident that I can stay healthy.	0.123*	0.0704***
How often do you feel tired during the day?	0.0314	-0.0933***
How is your overall health?	0.508***	0.502***
In the last month, how many times did you miss work because you were sick?	-0.126**	-0.224***
In the last month, how many times did you go to work even though you were sick?	0.108*	0.108***
In the past month, how many days of work have you missed due to menstruation?	0.102**	-0.00216

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Subjective health items coded on a 5-point scale.

Table 15 Have you experienced any of the following in the last 3 months, including now?

	Fixed	Random		Fixed	Random
Cough	-0.00292	0.0267***	Cuts/bruises that are slow to heal	0.0515***	0.0471***
Sore throat	0.0332*	0.0252***	Tingling, pain, or numbness in the hands/feet	-0.0637***	-0.0595***
Runny or stuffy nose	-0.0510***	-0.0130***	Vomiting	-0.0101**	-0.00714***
Joint pain	0.0684**	0.0724***	Fit/convulsion/seizure	0.00248	0.00353***
Backache	-0.0243**	-0.00269	Fever	-0.0442**	-0.0273***
Muscle or body aches	-0.0299*	-0.0167***	Loose motion/diarrhea	-0.00910**	-0.0137***
Lower abdomen pain	-0.0112*	-0.0151***	Bloody diarrhea (dysentery)	0.0226*	0.0224***
Stomachache	0.0539***	0.0529***	New loss of taste or smell	-0.0171**	-0.0173***
Urinating often	0.00398	-0.00171	Eye problem (e.g., pain and redness in eye, sensitivity to light)	-0.0290**	-0.0352***
Feeling very thirsty	0.00641**	-0.000835**	Sadness or depression	-0.0397***	-0.0397***
Feeling very hungry— even when you have enough to eat	0.0269**	0.0316***	Dark urine	-0.000439	0.000267
Extreme fatigue	0.0350***	-0.00151***	Skin infection	0.00159*	-0.000428***
Blurry vision	0.108***	0.0822***	Menstruation problem	0.0174*	0.00205***

Table 16 Have you been diagnosed with any of the following?

	Fixed	Random
Hypertension/high blood pressure	0.207**	0.215***
Diabetes	0.210**	0.198***
Anemia	0.248***	0.231***
Thalassemia	-0.00283**	-0.00222***
COVID-19	0.124**	0.125***
Breast cancer	-0.0125***	-0.0118***
Cervical cancer	-0.00613***	-0.00551***
None of the above	-0.159***	-0.125***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Reproductive Health. The *i4We* program focuses specifically on reproductive health. Turn first to how women manage menstruation. Treatment focuses on reducing the use of cloths and increasing the use of sanitary pads. Treatment does reduce the use of cloths by 4.2 percent, as reported in Table 17. There is a small increase in the use of cotton pads (1.8%) and another product not listed (3.2%). However, we do not detect a significant effect on sanitary pads. When asked why participants were not using sanitary pads, treatment had the desired effect of reducing the belief that sanitary pads are prohibitively expensive though the effect is a small 1 percent. Treated workers were more likely to report that they do not use sanitary pads due to a lack of privacy (1.5%).

Treatment appears to have had a mixed effect on knowledge of modern family planning methods. There is a large treatment effect on knowledge of the pill. Treated workers are 22.3 percent more likely to know of the pill than untreated workers, as reported in Table 18. Smaller positive effects emerge for the patch (7.7%), emergency contraception (6.4%), male sterilization (3.2%) and withdrawal (3.1%). Treatment had relatively little effect on the types of family planning products used, as reported in the bottom of Table 18. The "other" category shows the largest treatment effect both in terms of knowledge (23.1%) and usage (13.8%).

One interesting aspect of reproductive health is the impact of treatment on the use of the "safe period." The treatment effect is tiny. It is important to note that treatment had an adverse effect on the knowledge needed to use the safe period. Participants were asked if they knew when during the menstrual cycle pregnancy was most likely to occur. Results are reported in Table 19. Treatment increased the probability that a participant thought that pregnancy occurred at the end of the cycle by

11.4 percent. The message that pregnancy is most likely to occur in the middle of their cycle does not appear to have been absorbed.

Treatment also had a small effect on where workers were obtaining family planning products. The training emphasizes obtaining products from an ESIC clinic. Treated workers were 1.9 percent more likely to get family planning products from the ESIC clinic, as reported in Table 20. Treatment had a stronger impact on use of a government hospital (6.9%) and the pharmacy (2.0%).

Table 17 Menstrual Health

	Fixed	Random
What do you use during your menstrual period usually? Select all that apply		
Sanitary pad	0.0234	0.0126***
Cotton pad	0.0154**	0.0175***
Cloths	-0.0420**	-0.0338***
Tampon	-0.00267*	0.000166
Other	0.0316**	-0.000497
Why don't you use sanitary pads? Select all that apply.		
Costly	-0.00892***	-0.00899***
I am happy with what I use now	-0.0485***	-0.0195***
No privacy to use pad	0.0154**	0.00380***
Other reasons	0.0422*	0.00636

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Coefficients for referral are marginal treatment effects on a 5-point scale.

Table 18 Family Planning

	Fixed	Random
Are you aware of some modern family planning methods? Please cite all the ones you know.		
Pill	0.167***	0.223***
Implants (3-5 years)	0.00377*	0.00436***
Injection 3 months	-0.0121	0.0190*
IUD	-0.0193***	-0.0264***
Patch	0.0767**	-0.00285***
Male condoms	-0.192***	-0.00966***
Female condoms	-0.0108*	-0.0302***
Emergency contraceptive pill	0.0644**	0.0424***
Female Sterilization/Tubal ligation	-0.0402**	0.0198***
Male sterilization/vasectomy	0.0321***	0.0111***
Fertility awareness/safe period	0.00232	0.00535***

Withdrawal	0.0307***	0.0244***
Spermicide	0.00445**	-0.000222
Cervical cap	-0.109***	-0.0250***
Birth control sponge	-0.0299**	-0.0269***
Other	0.229***	0.231***
None	0.0330***	0.0250***

If applicable, which of these methods are you/your partner currently using to prevent pregnancy?

Oral pill or injection	-0.00870**	-0.00358***
Condom	0.0178**	0.00564***
Long-lasting method (IUD, implant, female or male sterilization)	-0.0319*	-0.0271***
Withdrawal	0.0160**	0.0121***
Safe period/fertility awareness	-0.00269**	-0.00547***
Other	0.138**	0.120***
None; do not want to prevent pregnancy	-0.103***	-0.0629***
None; other reason	-0.0253*	-0.0387***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Table 19 Do you know when the chance of becoming pregnant is greatest during the monthly menstrual cycle?

	Fixed	Random
During menstruation	-0.0869	-0.104***
In the middle of the cycle	-0.0560	-0.0390***
In the last week of the cycle	0.114**	0.111***
Other	0.0289*	0.0319***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Table 20 Where do/did you receive family planning methods from?

	Fixed	Random
From an ESIC clinic/hospital	0.0115*	0.0190***
From a government hospital	0.0320**	0.0686***
From a private clinic/hospital	0.00948*	0.00521*
From the factory clinic	-0.00411***	-1.74e-05
From the cluster wellness center	0.00514***	0.00518***

From an NGO clinic	0.0334	0.0236***
From a pharmacy	0.0203***	0.0110***
From a village doctor, traditional healer, or religious person	0.00766***	0.00415***
From another provider	-0.00287	-0.00278***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Family Outcomes and Empowerment. Improving health can also have a wide impact on a household. This is particularly the case if improved health and healthcare access reduce uncertainty in costs associated with illness.

Treatment had a significant effect on the need for families to spend all of the income they earned, draw down savings or borrow money. Treated workers were 12.2 percent more likely to save money, as reported in Table 21. Treated workers were also more likely to report having running water in their home (6.1%).

The analysis of subjective measures of financial stress yields a confusing picture. As reported in Table 22, treated workers are less worried about having enough to eat (-0.20 on a 4-point scale) and less worried about their family's finances in the next month (-0.25 on a 4-point scale). However, when asked about the stress associated with having enough money for their family's needs, treatment had a very strong significant effect (0.63 on a 5-point scale). We were unable to determine the source of this increase in financial stress.

Treatment had a positive effect on broader measures of empowerment, as reported in Table 23. Treated workers had a stronger sense that they could control the number of children they have (0.052 on a 5-point scale). The impact on internal locus of control was very strong. When asked whether they can change their life by changing their behavior, treatment increased the strength of agreement by 0.51 on a 5-point scale.

Table 21 Household Savings and Assets

During the past month, did your family	Fixed	Random
Save money	0.0287	0.122***
Spend as much as you earned	-0.157**	-0.257***
Spend some savings	-0.0647**	-0.0854***
Spend savings and borrow money	-0.0672**	-0.0596***
None of the above	0.119***	0.119***
Which of the following does your family have?	Fixed	Random
Running water	0.0606**	0.0272***
Indoor toilet	0.00186	0.0688***
Electricity	-0.00571*	-0.00380***

Television	-0.00837	-0.0222***
Radio	-0.0184	-0.0215***
Refrigerator	-0.0518	-0.0225***
Concrete floor	-0.173**	-0.164***
Mobile phone(s)	-0.00588*	0.00197***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Table 22 Financial Worries

	Fixed	Random
How worried are you about having enough to eat in the next week?	-0.195**	-0.0946***
How worried are you about your household's finances in the next month?	-0.0352	-0.254***
I am frequently under stress because I don't have enough money to cover my family's basic needs and save for emergencies.	0.629**	0.525***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Worry items are coded on a 4-point scale. The Stress item is coded on a 5-point scale.

Table 23 Empowerment

	Fixed	Random
I am confident that I can decide how many children I have.	0.0518*	0.0258***
I can change my life by changing my behavior.	0.509**	0.218***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Items are on a 5-point scale.

The *i4We* Intervention and Working Conditions

Health empowerment interventions can also have far-reaching effects on work experience. Empowerment training may increase awareness of working conditions and knowledge of grievance procedures. An internal locus of control can affect the willingness to use grievance procedures. Factory managers can make the intervention more successful if they share the values of the training and make institutional changes that support workers. Treatment effects on worker perceptions of work are reported in Table 24.

On the positive side, treatment increased knowledge of the procedure for reporting violence or harassment at work (0.27 on a 5-point scale). The perceived riskiness of reporting a case of sexual

harassment went down (-0.086 on a 5-point scale). However, there was a small reduction in the belief that it is appropriate for a woman to speak up at work and a fall in comfort reporting a complaint.

There is significant evidence that participating factories are supporting training in menstrual health. Treated workers have stronger agreement that they can access the toilet when they need to (0.26 on a 5-point scale), that there are covered bins in the rest rooms (0.053 on a 5-point scale) and that there is soap and water in the washrooms (0.063 on a 5-point scale).

However, treated workers report less nutritious food available in the factory (-0.25 on 5-point scale). We also find evidence of increased dehumanization, or at least awareness of dehumanization. Treated workers have more dehumanizing experiences with supervisors (0.285 on a 5-point scale) and greater frequency of yelling (0.22 on a 5-point scale). Treated workers feel less strongly that supervisors and managers care about their health. Curiously, treatment makes workers less satisfied with their job (-0.168 on a 5-point scale), as reported in Table 25, but also less likely to think about quitting (-0.168 on a 5-point scale).

Table 24 Working Conditions

	Fixed	Random
If I wanted to report a case of violence or harassment in the workplace, I would know how to report it.	0.273**	0.0130***
Imagine that a supervisor in this factory has said that he can make life very difficult for a female worker by treating her badly unless she has sex with him. It would be extremely risky for her to make a formal complaint against him.	-0.0857*	0.0574***
I believe it is appropriate for women to speak up if they need something at work.	-0.0276**	0.121**
If I had an issue or complaint at work, I would feel comfortable reporting it.	-0.0800**	0.0697
I can access the factory's toilet facilities as often as I need to	0.255**	0.311***
How often is there a covered bin available for sanitary napkin disposal in the washroom?	0.0527***	0.0508
How often is there soap and water available for handwashing in the factory washroom?	0.0626*	-0.00374
How often is there nutritious food available for workers in this factory?	-0.249**	-0.145***
How often do you feel angry, frustrated, or unimportant after talking to your supervisor?	0.285***	0.0462
How often does your supervisor yell at you?	0.222**	0.00930
My supervisor cares about whether I am healthy.	-0.311***	-0.174***
Managers in this factory care about whether workers are healthy.	-0.313***	-0.152*
Is your supervisor a man or a woman?	0.0637**	0.00546

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. All variables except supervisor gender are coded on a 5-point scale.

Table 25 Perceptions of Work

	Fixed	Random
I often think about quitting.	-0.106**	-0.191***
How satisfied are you with your job overall?	-0.168**	-0.109***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

Impact of Covid

Implementation of the *i4We* intervention was significantly impacted by the COVID-19 pandemic. We took the opportunity to ask questions about COVID and to consider the possibility that *i4We* improved resilience to the pandemic. Results are reported in Table 26.

The most striking impact of *i4We* during the COVID-19 pandemic concerns unplanned pregnancy. It has been widely reported that lock downs during COVID increased the probability of unintended pregnancy. We find that treated workers were less likely to worry about unplanned pregnancy (0.48 on a 5-point scale). Treated workers were also 2.5 percent less likely to become pregnant during the COVID-19 pandemic and the pregnancies of treated workers were less likely to be unplanned.

Table 26 Impact of COVID

	Fixed	Random
Has the COVID-19 (coronavirus) pandemic affected you in any of the following ways?		
I had to delay or cancel visiting my health care provider for sexual or reproductive health care because of COVID-19.	-0.00903***	-0.00894***
I had to delay or cancel visiting my health care provider for sexual or reproductive health care because of COVID-19.	-0.00303***	-0.00323***
I switched to a telemedicine appointment with my health care provider to get my birth control method refilled because of COVID-19.	-0.00306**	-0.000237
Because of the COVID-19, I worry more about having an unplanned pregnancy.	-0.401**	-0.479***
None of the above	0.0429**	0.0441***
Have you or your partner become pregnant since the COVID-19 pandemic started?	-0.0251***	-0.0220***
At the time you or your partner became pregnant, did you yourself actually want to have a(nother) baby at that time?	-0.00501***	-0.00492***

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory.

The Business Case. We did not detect a statistically significant treatment effect on work hours, take home pay or productivity. As reported in Table 27, treated workers were 15.6 percent less likely to report earning a production bonus and the bonuses they did earn were 275 rupees smaller than untreated workers.

The business impact of other indicators was ambiguous. Treated workers were less likely to be late for work (0.12 fewer days per month) but more likely be to be absent (0.19 days per month). Treated workers reported lower job satisfaction but thought less about quitting.

Business effects of the *i4We* program may more subtly affect other aspects of firm performance. We have found in other analyses that health care interventions can create a positive environment in a workplace that make workers receptive to efficiency enhancing innovations. Reducing conflict between

supervisors and workers can also reduce the cognitive load for supervisors and managers. Supervisors and managers who are under less cognitive load have greater ability to consider workplace innovations that make a workplace more productive.

The ambiguous effect on business performance may be because the study period was very short. However, as discussed above, the sustainability of the intervention does not rest on a work performance business case but rather the willingness of stakeholders to protect the health of workers in their supply chains.

Table 27 Pay, Hours and Productivity

	Fixed	Random
Weekly Hours	1.507	0.807***
Take Home Pay	-243.6*	326.6***
Did you receive a productivity bonus last month?		
Yes, I received a productivity bonus	-0.156***	-0.0618***
Yes, productivity bonus amount	-0.688***	-0.425***
In the last month, how many times were you late to work for any reason?	-0.116***	-0.248***
In the last month, how many times were you absent from work for any reason?	0.191**	0.243***
How many times have you been promoted to a new job since starting work at your factory?	-0.188**	-0.244***
How many minutes does it take you to complete your hourly production target?	34.72*	-33.52***

Notes: Statistical significance indicated by *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All equations controlled for age, education, work experience, gender and marital status. Panel estimator with random and fixed effects, treatment factory as the panel identifier and standard errors clustered by treatment factory. Productivity bonus amount is measured in 400 rupee increments.

Testing the Theory of Change

Our next step is to consider how the *i4We* program produced its positive impacts on workers. Our analysis began with a set of theories of change. Most of our theories are based a simple sequence, as depicted below.

Treatment → Improved knowledge or access → Behavior change → Outcome
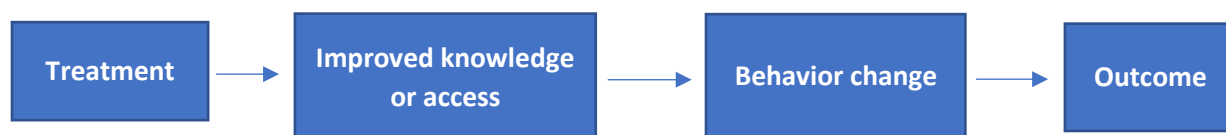
Treatment improves knowledge or provides access to services. Knowledge and access affect worker behavior related to health. Behavior change improves outcomes for workers. To test for the theory of change, we conduct simultaneous equation estimation (or modeling; SEM).

One example concerns handwashing. Workers were trained on the importance of handwashing and some practices concerning handwashing such as appropriate times to wash one's hands and the use of soap and water. Handwashing practices would then be expected to improve overall health, particularly reducing intestinal illness such as diarrhea.

A handwashing SEM is presented in Table 28. The columns are output, outcome and impact measures. The first two columns include the mediating or intervening variables.

According to the theory of the program, workers should have a stronger belief about the importance of handwashing and this, is in fact, the case. Looking at the first column of Table 28, *Handwashing importance,* treated workers report a 0.356 (on a 5-point scale) higher agreement with the importance of handwashing than other workers.

Column 2 reports a test for whether the importance of handwashing is increasing the probability of handwashing before eating. Curiously, while the coefficient on *Handwashing importance* is positive (0.03) it is not statistically significant. However, treated workers are still 9.1 percent more likely to wash their hands before eating than other workers. These results suggest that teaching participants about the importance of hand washing is not as important as teaching participants how and when to wash their hands and understanding the importance of handwashing is not necessary to increase the incidence of handwashing.

Moving to the third column, participants had higher overall health. The treatment effect is 0.48 on a 5-point scale. Yet, once again, handwashing is not a significant contributor to overall health. Handwashing has a positive effect on overall health (0.18 on a 5-point scale) but the effect is not statistically significant. Similarly, treated workers are reporting reduced illness of their youngest daughter (-0.12 on a 5-point scale) and themselves (-0.025 on a 5-point scale) but more frequent handwashing is not the reason. *Handwashing before eating* is not significant in either equation.

The theory of change is in evidence when we consider health indicators that are more closely linked to handwashing such as diarrhea (Figure 1). More frequent handwashing before eating is reducing the probability of diarrhea. For each one-point increase in the frequency of handwashing the probability of diarrhea falls by 0.8 percent. Yet, once again, treatment is also having an independent effect on reducing diarrhea. Treated workers are about one percent less likely to report having diarrhea than untreated workers even if they do not wash their hands more frequently.

Figure 1: Handwashing
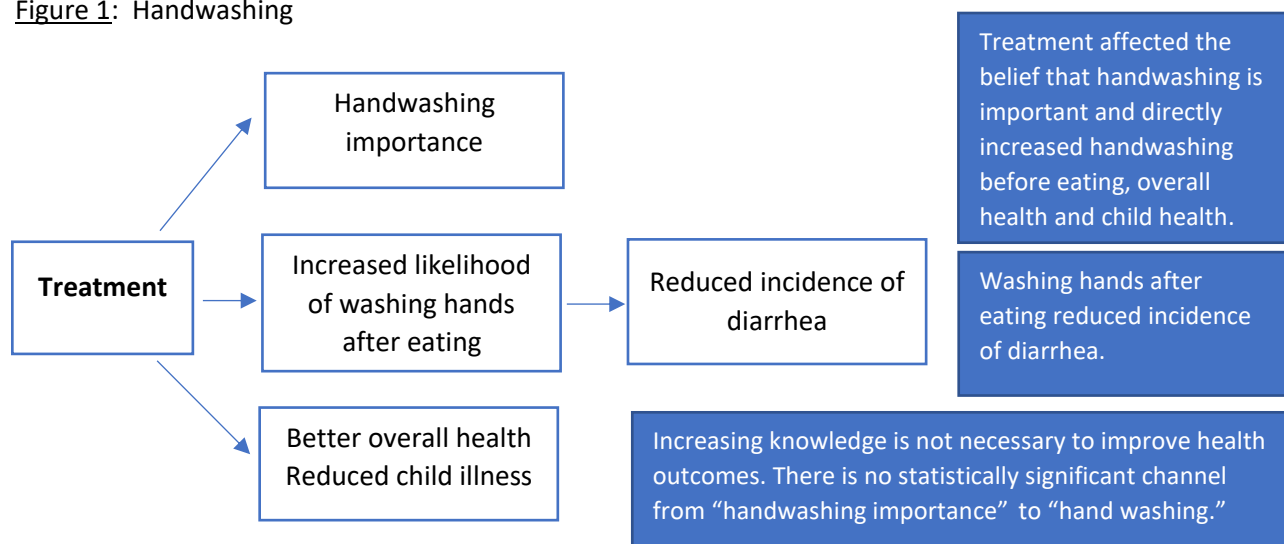
Another possible behavior channel through which treatment might be affecting overall health and family illness is the use of boiled or purified water. Results from a water SEM are presented in Table 29.

The theory of change posits that the training would teach participants that water that looks safe may not in fact be and that boiling or purifying water would kill waterborne pathogens. (Figure 2) Contrary to our expectations, trained participants were more likely to believe that if water looks clean it is probably safe. The treatment effect was 0.535 on a 5-point scale. Curiously, participants who believed that visually clean water is safe were also more likely to boil or purify water. The treatment effect is 0.0554. That is, each one-point increase in a belief that visually clean water is safe to drink increases the frequency with which participants use boiled or purified water 0.05. The use of boiled or purified water does not reduce diarrhea and illness of children. However, the more often a worker uses boiled or purified water the less likely they are to be sick. Each one-unit increase in frequency of use of boiled or purified water reduced the frequency of being sick in the preceding three months by 0.02 on a 5-point scale.
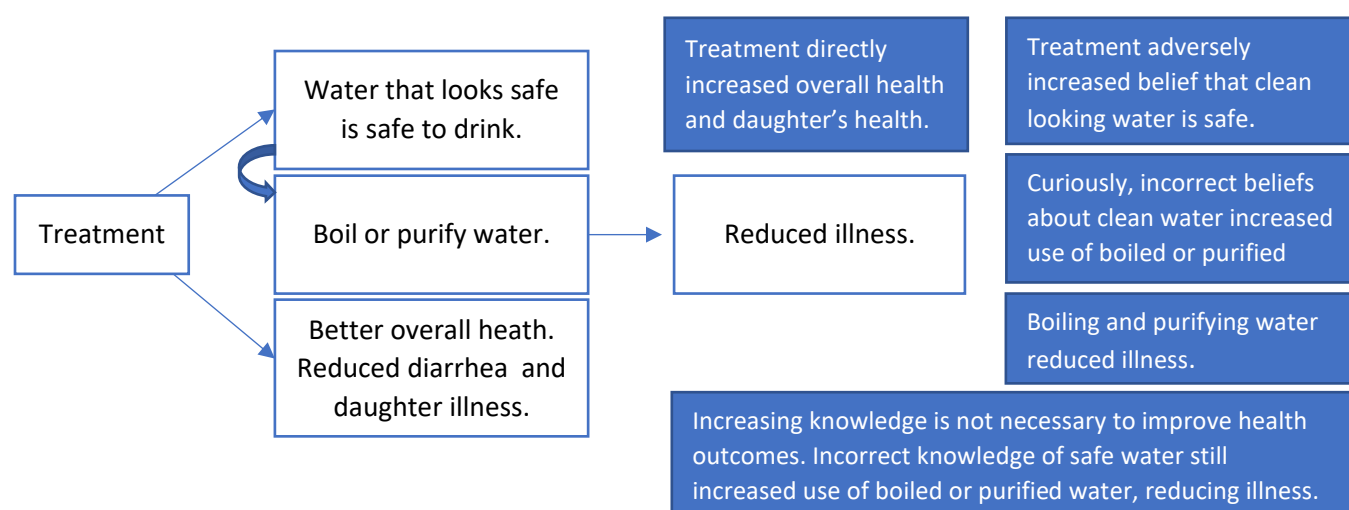
Figure 2: Boiling Water

Table 28 Handwashing and Health

	Handwashing importance	Handwashing before eating	Overall Health	Diarrhea	Daughter Sick	Son Sick	Sick
Treated	0.356***	0.0912***	0.481***	-0.00825***	-0.123***	0.000179	-0.0250***
Handwashing before eating			0.177	-0.00751**	0.205	-0.00359	0.299***
Handwashing importance		0.0292					

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. A system of simultaneous equations is estimated with a Maximum likelihood estimator with treatment factory fixed effects and standard errors clustered by treatment factory.
Most outcome and intervening variables used in the SEM are scored on a 5-point scale. The only exception is Diarrhea, which is a binary variable. Variable definitions are given by the following items.

Handwashing importance: I think that it's important to wash your hands with soap and water to prevent disease.
Handwashing before eating: Do you usually wash your hands before eating?
Overall Health: How is your overall health? Diarrhea: Have you experienced diarrhea in the last 3 months, including now?
Daughter Sick: How often has your youngest daughter been sick in the last month? Son Sick: How often has your youngest son been sick in the last month? Sick: How often have you been sick in the last month?
The first column identifies the independent variables in each equation. Each column represents a single equation where the column heading identifies the dependent variable. The intervening variables are Handwashing importance and Handwashing before eating. The impact variables are Overall Health, Diarrhea, Daughter Sick, Son Sick and Sick.

Table 29 Clean Water and Health

	Water looks safe	Boil or purify water	Overall Health	Diarrhea	Daughter Sick	Son Sick	Sick
Treated	0.535***	0.00403	0.507***	-0.00907***	-0.102***	0.00262	0.00383
Boil or purify water			0.0105	-0.000803	-0.00117	-0.0756	-0.0171*
Water looks safe		0.0554***					

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. A system of simultaneous equations is estimated with a Maximum likelihood estimator with treatment factory fixed effects and standard errors clustered by treatment factory.
Most outcome and intervening variables used in the SEM are scored on a 5-point scale. The only exception is Diarrhea, which is a binary variable. Variable definitions are given by the following items.
Water looks safe: I think that if water looks clean, it is probably safe to drink. Boil or purify water: How often do you use boiled or purified water?
Overall Health: How is your overall health? Diarrhea: Have you experienced diarrhea in the last 3 months, including now?
Daughter Sick: How often has your youngest daughter been sick in the last month? Son Sick: How often has your youngest son been sick in the last month? Sick: How often have you been sick in the last month?
The first column identifies the independent variables in each equation. Each column represents a single equation where the column heading identifies the dependent variable. The intervening variables are Water looks safe and Boil or purify water. The impact variables are Overall Health, Diarrhea, Daughter Sick, Son Sick and Sick.

The theory of change was more successful in explaining the use of government welfare schemes. The SEM for government schemes is reported in Table 30. We test for whether treatment increases the knowledge of schemes and whether knowledge of schemes increases the probability of use.

Treated workers were 1.6 percent more likely to know of a ration card, 7.5 percent more likely to know of Atal Pension Yojana and 5.7 percent more likely to know of any government schemes. Knowledge of schemes is then strongly associated with their use. Knowing of a labour card increases its use by 43.7 percent, knowing of a ration card increases its use by 78.3 percent, knowing of land patta increases use by 71.2 percent, knowing of greenhouse increases the probability of use by 14.6 percent, knowing of schools/education increases use by 44.9 percent and knowing of Sukanya Samriddhi Yojana increases its use by 23.6 percent.

However, it is important to note that the impact of training on a program such as a ration card or schools/education is not limited to teaching workers about these schemes. In each case, there is an independent treatment effect unrelated to learning about the scheme. That is, *i4We* treatment must have prompted the use of the schemes above and beyond simply making workers aware of them.

There is one final nice result that emerges at the bottom of Table 30. We were interested in how accessing government schemes might be affecting workers, such as reducing worry about household finances. As can be seen in the last section of Table 30, treatment increased accessing any scheme by 5.7 percent. For each one percentage point increase in accessing any scheme, worry about household finances fell by 0.21 on a 4-point scale.

Table 30 Knowledge and Access of Government Schemes

	Know of labour card	Access labour card		Know of ration card	Access ration card
Treatment	-0.0798***	-0.0694***	Treatment	0.0160***	0.0172***
Know of labour card		0.437***	Know of ration card		0.783***
	Know of Land patta	Access Land patta		Know of Greenhouse	Access Greenhouse
Treatment	-0.0301***	-0.000159	Treatment	-0.00589***	-0.00940***
Know of Land patta		0.712***	Know of Greenhouse		0.146*
	Know of schools/ education	Access schools/ education		Know of MUDRA	Access MUDRA
Treatment	-0.0141***	0.0295***	Treatment	-0.0155***	-0.00327***
Know of schools/education		0.449***	Know of MUDRA		-0.000592
	Know of APY	Access APY		Know of SSY	Access SSY
Treatment	0.0745***	-0.00627***	Treatment	-0.0152***	-0.0201***
Atal Pension Yojana (APY)		0.0774***	Sukanya Samriddhi Yojana (SSY)		0.236***
	Access any scheme	Finance Worry			
Treatment	0.0568***	-0.0229**			
Access any scheme		-0.206***			

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. A system of simultaneous equations is estimated with a Maximum likelihood estimator with treatment factory fixed effects and standard errors clustered by treatment factory.

Most outcome and intervening variables used in the SEM are binary variables. The exception is Finance Worry which is coded on a 4-point scale. Variable definitions are given by the following items.

Which of the following schemes have you heard of? Which government scheme(s) have you availed? Finance Worry: How worried are you about your household's finances in the next month? The first column identifies the independent variables in each equation. Each column represents a single equation where the column heading identifies the dependent variable. The intervening variables are knowledge of a scheme and Access Any Scheme. The impact variables are Access Any Scheme and Finance Worry.

The SEM analysis also provided some insight into the impact of a health intervention on mental health. As reported in Table 15, treatment is associated with a 3.5 percent decline in the probability of sadness and depression. It is an interesting question to consider which aspect of the treatment might have led to an improvement in mental health. Results are reported in Table 31.

We first consider the collective contribution of empowerment, overall health and family finances. Empowerment indicators include internal locus of control (I can change my life by changing my behavior) and confidence in controlling the number of children and staying healthy. Family finances are indicated by whether a family was able to save money. (Figure 3)

In the SEM, treatment increased internal locus of control by 0.51, confidence in deciding the number of children by 0.052, overall health by 0.51, and confidence in staying healthy by 0.12, all on a 5-point scale. Treatment also increased the probability that a family saves money by 2.9 percent. These figures appear in the top row of Table 31.

The final column of Table 31 reports the impact of each of the intervening variables on the probability of sadness and depression. In the SEM, only confidence in deciding the number of children is statistically associated with sadness and depression. Each one-point increase in confidence on a 5-point scale lowers the probability of depression by 2.0 percent. Note further that there is an independent treatment effect on mental health that is not mediated by the empowerment and health variables. Treatment lowers the probability of sadness and depression by 4.1 percent even if there is no change in internal locus of control, confidence or health.

It is important to note that these intervening variables are correlated. Workers with an internal locus of control may also have confidence choosing the number of children. To address this issue, we considered each one of the intervening variables individually. These results are reported in the second set of results in Table 31. The disaggregated analysis indicates that an internal locus of control is the key mediator in the positive mental health effects of treatment.

Recall that treatment strengthens internal locus of control by 0.51 on a 5-point scale. Each unit increase in internal locus of control is associated with a 0.2 percent decline in the probability of sadness and depression. While locus of control improves mental health, there remains an independent treatment effect on the order of 4 percent.

Figure 3: Mental Health

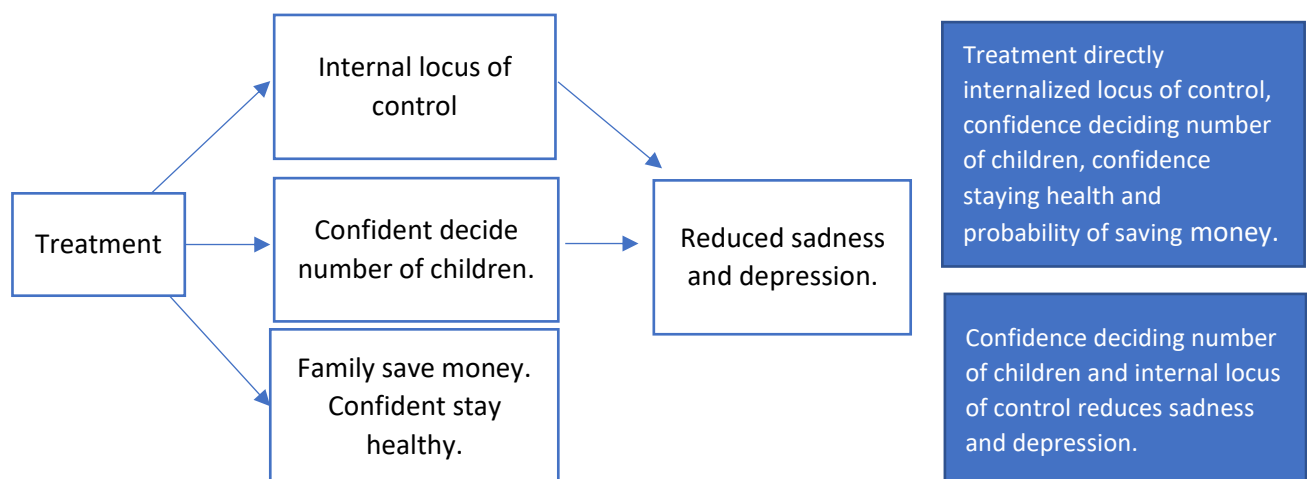Treatment directly internalized locus of control, confidence deciding number of children, confidence staying health and probability of saving money.

Confidence deciding number of children and internal locus of control reduces sadness and depression.

Table 31 Empowerment and Mental Health

	Change life by changing behavior	Confident decide number of children	Overall health	Confident stay healthy	Family save money	Sadness Depression
Treated	0.509***	0.0518***	0.508***	0.123***	0.0287***	-0.0406***
Change life by changing behavior						-0.00152
Confident decide number of children						-0.0155***
Overall health						-0.00203
Confident stay healthy						-0.00505
Family save money						-0.000693

	Change life by changing behavior	Sadness Depression
Treated	0.509***	-0.0396***
Change life by changing behavior		-0.00179***

	Overall health	Sadness Depression
Treated	0.508***	-0.0365***
Overall health		-0.00630

	Confident stay healthy	Sadness Depression
Treated	0.123***	-0.0393***
Confident stay healthy		-0.00283

	Family save money	Sadness Depression
Treated	0.0287***	-0.0396***
Family save money		-0.00180

Notes: Statistical significance indicated by *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All equations controlled for age, education, work experience, gender and marital status. A system of simultaneous equations is estimated with a Maximum likelihood estimator with treatment factory fixed effects and standard errors clustered by treatment factory.

Most outcome and intervening variables used in the SEM are scored on a 5-point scale. The only exceptions are Family saves money and Sadness/Depression which are binary variables. Variable definitions are given by the following items.
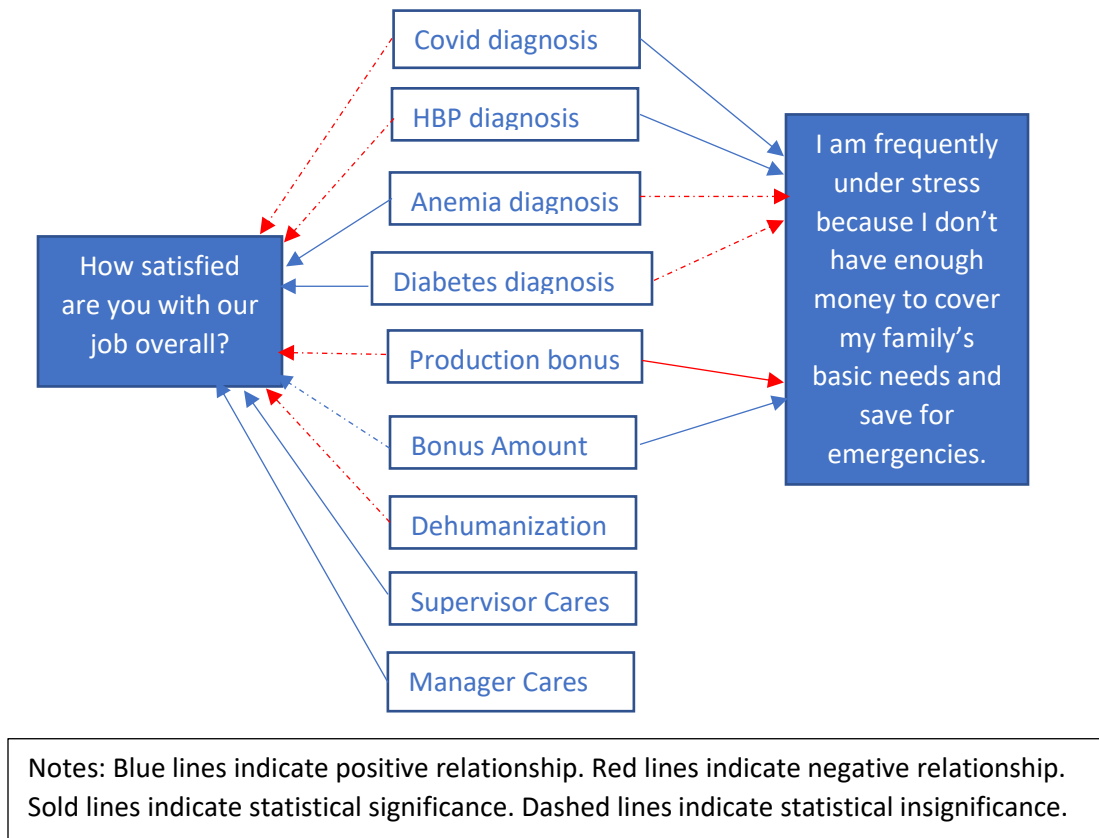
Change life by changing behavior: I can change my life by changing my behavior. Confident decide number of children: I am confident that I can decide how many children I have.

Overall Health: How is your overall health?

Family save money: During the past month, did your family save money. Sadness/Depression: Have you experienced sadness or depression in the last 3 months, including now? The first column identifies the independent variables in each equation. Each column represents a single equation where the column heading identifies the dependent variable.   The intervening variables are Change life by changing behavior, Confident decide number of children, Overall health and Family save money. The impact variable is Sadness or Depression.

Finally, we consider the contribution of treatment on job satisfaction. Our theory is that financial stress is driven by illness and pay. Job satisfaction is driven by illness, pay and dehumanizing treatment by managers and supervisors. Results from the SEM are reported in Table 31 and depicted in Figure 4.

Figure 4: Treatment, Money Worries and Job Satisfaction

Notes: Blue lines indicate positive relationship. Red lines indicate negative relationship. Sold lines indicate statistical significance. Dashed lines indicate statistical insignificance.

In Figure 4, solid blue arrows indicate a statistically significant positive relationship between the intervening and outcome variables. Dashed blue lines also indicate a positive relationship but which is statistically insignificant. Job satisfaction is positively and significantly increased by a perception that supervisors and managers care about worker health. It is also positively affected by a diagnosis of anemia and diabetes. Job satisfaction is also affected by bonus amount but the relationship is statistically insignificant.

The job satisfaction SEM helps us understand why job satisfaction declined with treatment. Help with illness improved the job experience. However, as a consequence of treatment, workers developed an increased feeling that their supervisors and managers did not care about their health. This perceived lack of caring translated into reduced job satisfaction.

Treatment is also associated with increased sense of feeling under financial stress. As depicted in figure 4, financial stress was increased by a COVID or hypertension diagnosis while receiving a production bonus reduced financial stress.

Table 32 Job Satisfaction and Financial Stress

	Treatment Effect on Intervening Variables, Money Stress and Job Satisfaction	Intervening Variable Effect on Money Stress	Intervening Variable Effect on Job Satisfaction
Intervening Variables			
Diagnosis COVID	0.110***	0.889***	-0.0581
Diagnosis HBP	0.190***	0.234***	-0.101
Diagnosis Anemia	0.226***	-0.00252	0.176***
Diagnosis Diabetes	0.196***	-0.124	0.0890***
Receive Production Bonus	-0.156***	-0.283***	-0.0127
Bonus Amount	-0.688***	0.0674***	0.0135
Dehumanization	0.285***		-0.0997
Manager Cares	-0.313***		0.128***
Supervisor Cares	-0.311***		0.0610***
Outcome Variables			
Money Stress	0.509***		
Job Satisfaction	-0.0882***		

Notes: Statistical significance indicated by *** p<0.01, ** p<0.05, * p<0.1. All equations controlled for age, education, work experience, gender and marital status. A system of simultaneous equations is estimated with a Maximum likelihood estimator with treatment factory fixed effects and standard errors clustered by treatment factory. Coefficients in column 1 indicate the direct treatment effect on the intervening variables and the outcome variables. Diagnosis Covid, Diagnosis HBP, Diagnosis Anemia, Diagnosis Diabetes and Receive Production Bonus are binary variables. The coefficients indicate the marginal treatment effect on receiving a diagnosis or a production bonus. Each unit of Bonus Amount is 400 rupees. The coefficient indicates the marginal impact of treatment on a 400 rupee increase in the production bonus. Dehumanization, Manager Cares, Supervisor Cares, Money Stress and Job Satisfaction are measured on a 5-point scale. Coefficients indicate the marginal effect of treatment on the participant's rating. Coefficients in Column 2 indicate the marginal treatment effect of each intervening variable on Money Stress. Coefficients in Column 3 indicate the marginal treatment effect of each intervening variable on Job Satisfaction.

Conclusions

Our impact evaluation and the implementation of the *i4We* program was limited by the 2019 COVID pandemic. Nevertheless, several key findings emerge from our study.

First, the program had a strong impact on worker health, even in the limited time of implementation. We measure improvements in both physical and mental health, detection of illness and indicators of empowerment.

Second, and a bit surprising, the positive impact of the program did not turn on whether workers understood the reason for the healthy behaviors they were being taught. The analysis indicates a strong treatment effect that is independent of any knowledge about the cause of illness. Teaching a worker when and how to wash their hands can be an effective treatment even if the worker does not understand why. Similarly, screening for illnesses such as hypertension, diabetes and anemia can be critical in providing needed care even if the participant does not believe that screening is important and that treatment exists for their health conditions.

Third, the program may have lacked adequate buy-in from supervisors and managers. Past analysis has found that providing a health care intervention in a factory can significantly reduce tension related to working conditions. However, the benefit is only fully realized if workers also believe that managers and supervisors care about their health. When workers perceive a misalignment between the services provided in the factory and priorities of managers and supervisors, job satisfaction can fall.

Evidence of the importance of alignment was quite pronounced in this study. Workers who received a diagnosis of an illness also reported higher job satisfaction. But this positive effect was offset by a perception that managers and supervisors do not care about worker health. Thus, on balance, job satisfaction declined. Simply improving alignment could have produced a positive job satisfaction impact.

Fourth, and finally, we do not detect a positive treatment impact on productivity. Protecting the health of workers in global supply chains may turn, then, on a long term commitment by international buyers to the workers who make their products.