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Does Conditionality Matter for Adults' Health? Evidence from a Randomized Experiment

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Abstract
We present evidence on how the requirement to attend health and nutrition sessions affects the health behaviour of adults living in households targeted by a nutritional programme in rural Mexico. The evaluation sample of the Programa de Apoyo Alimentario (PAL) is unique in having four different treatment types, which are randomly assigned to four different groups of localities, with one group designated to receive transfers but without any requirement to attend health and nutrition courses. We find that attendance at educational sessions does not affect drinking and smoking behaviour, but significantly reduces the probability of having a large waist circumference among women. We provide evidence that attending health and nutrition related courses determines a large drop in the probability that adult women have excessive calorie intake. The results suggest that lack of information can explain, at least in part, the impressive rise in female obesity in developing countries.

Keywords: Adult Health, Conditional Cash Transfers, Information, PAL

JEL Classification: I12, O12

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1 Introduction

Drawing on the experience of PROGRESA,[1] conditional cash transfer (CCT) programmes have been introduced widely in many developing countries and careful evaluations show that they have been extremely effective in improving the well being of poor households.[2] However, there is limited evidence on how individual CCT components contribute to the combined effect.[3] In this paper we exploit the unique evaluation design of the *Programa de Apoyo Alimentario* (PAL) nutritional programme implemented in rural Mexico, to disentangle the effect of educational requirements on the prevalence of health risk factors, i.e. smoking, heavy drinking and obesity, among adults.

In order to receive the transfer, household members have to engage in a set of activities, including prenatal care, well-baby care and immunization, nutrition monitoring and supplementation, preventive checkups and participation in educational sessions covering health and nutrition topics. *A priori* there are strong arguments in favour of making transfers conditional. Conditionalities, among other reasons, could help to screen for families that are in less need and might help governments to overcome information asymmetries about the benefits of immunization and screening programmes. However, some have stressed that such programmes can have disadvantages (see De Brauw and Hoddinott (2007) for a summary). First, it has been documented that they contribute to significantly increased administration costs. Caldes et al. (2006) show that monitoring conditionalities represents approximately 18% of PROGRESA's administrative costs and 2% of total programme costs. Second, the opportunity costs for households to fulfil these conditionalities may be very high and, as noted by Molyneux (2006), these costs will not necessarily be shared equally among household members. In fact, the burden of taking children to health clinics or attending informational courses falls primarily on mothers. Third, some households may find the conditions too difficult to meet: if these households are among the poorest households, imposing conditions might affect compliance by those who are actually the primary targets of the programme.

[1] This national programme started in 1997. In its first three years its benefits were extended to approximately 2.6 m families, which is about 40% of all Mexican families. Under the Fox Administration the programme was renamed *Oportunidades*.

[2] Among others, see Skoufias (2005) for a review of the impact of PROGRESA on a variety of welfare indicators. Attanasio and Mesnard (2006) document on the effect of *Familias en Accion* on household consumption in Colombia.

[3] Paxson and Schady (2007) find that an unconditional cash transfer programme implemented in Ecuador had a positive and beneficial effect on the physical, cognitive and socio-emotional development of children. De Brauw and Hoddinott (2007) exploit the fact that some PROGRESA beneficiaries who received transfers did not receive the forms needed to monitor their children's attendance at school, to test how the conditionality affects school enrolment and attendance.

If the actual or perceived benefits of conditionalities do not outweigh the additional costs, imposing conditions on the receipt of transfers may not be worthwhile.

There is well established evidence that documents the positive effect of CCT programmes on health outcomes.[4] However, the evaluation designs implemented so far do not allow researchers to distinguish to what extent improvements in health related indicators are due to increases in available resources and the behavioural requirements. Moreover, since most of these programmes target women as transfer recipients, part of the combined effect of CCTs on health outcomes might be related to the increased bargaining power of women in the household. Attanasio and Lechene (2002) shows that as the share of household income brought by the wife increases, expenditure on tobacco and alcohol falls, while the expenditure on child clothing increases.[5]

In this paper we investigate how attendance at health and nutrition sessions as one of the conditionalities for receiving a transfer, affects the health related behaviour of adults in beneficiary households, as measured by their propensity to smoke, drink to excess and become obese. It is crucial to disentangle the effects of information from the increased resources due to the programme on these outcomes. On the one hand, higher income allows individuals better access to health inputs (e.g. medical care and food). On the other hand, people with greater resources can buy more goods, including cigarettes, alcohol and unhealthy food. Ruhm (2000, 2005) finds that recessions improve adult health, arguably because individuals engage in healthier lifestyles during downturns - they take more exercise, and drink and smoke less. Moreover, income might also be correlated with a third factor, i.e. education, which is positively correlated with good health.[6] Traditionally, undernourishment and infectious diseases have been the main health related burdens in developing countries. However, many of these countries are witnessing dramatic increases in the incidence of obesity (Popkin (2001)) and its related morbid and comorbid conditions. Fernald et al. (2004) using the 2000 National Health Survey find that in Mexico the combined prevalence

[4] Gertler and Boyce (2003) finds that PROGRESA determined significant improvements in child as well as adult health, as measured by a reduction in the number of days of difficulty in conducting daily activities and in the number of days in bed due to illness. Gertler (2004) provides evidence on the effect of PROGRESA on child health including morbidity, height and anemia. Lagarde et al. (2007) provides a recent review on the effect of six CCT programmes on health outcomes in Latin America and Africa.

[5] Rubalcava et al. (2009), drawing on direct measures of inter-temporal preferences collected in the Mexican Family Life Survey (MxFLS), suggest that women have longer planning horizons.

[6] While the causal effect of income on health status in adult age is still debated, there is compelling evidence on the effect of parental income on child health (see, e.g., Case et al. (2002) and Currie and Stabile (2003)). Cutler and Lleras-Muney (2008) provides an exhaustive review of the relationship between education and health.

of being overweight and being obese is nearly 60% in women and more than 50% in men.[7]

The PAL is a nutritional programme that operates in very poor rural localities in Mexico. According to its initial design, the four different treatment types in the evaluation sample are assigned randomly across localities based on following criteria: 50 localities selected as control localities; 51 localities receive the transfer in kind; 52 localities receive the transfer in kind conditional on nutrition and health education; 53 localities are entitled to cash benefits conditional on nutrition and health education.[8] The nutrition and health education is delivered, through organized sessions, by local organizers who receive appropriate training. However, in the localities designated to receive the food basket without any educational requirement[9] local administrators decided autonomously to provide nutrition and health courses, determining a contamination of the evaluation design.

In order to identify the effect of the information received as a result of the programme, we first restrict our analysis to only two of the four groups of localities included in the evaluation sample: the group for which transfer in kind is conditional on attending health and nutrition sessions and the group for which transfer in kind is not subject to this requirement. These two groups were supposed to receive identical treatment except for the educational component. We exploit variations in the intention-to-treat (ITT) and in the average distance to the PAL centre in the locality to address potential endogeneity in the number and type of sessions attended.

My results show that providing health and nutrition information as part of the programme has a not significant effect on the probability of smoking and heavy drinking. We find also that the educational requirement strongly reduces the probability of a large waist circumference among women. Exploiting unique information on individual energy intake, we show that attending classes that cover health and nutrition topics determines a large and significant drop in the probability that an adult woman has an excessive calorie intake: a 10 percentage point increase in the probability of attending a nutrition related session reduces the probability that the daily calorie intake exceeds the one recommended by nutritional guidelines, by 3.3 percentage points.

This work contributes to two strands of the literature. First, it provides some guidelines

[7] Case and Menendez (2007) reports that in 138 out of 194 countries for which WHO obesity statistics are available women are more than 50% more likely to be obese than men.

[8] Skoufias et al. (2008) find that the programme determines a large increase on food and total consumption and a significant reduction of poverty, irrespective of whether the transfer is in cash or in-kind.

[9] Since sessions on organizational and logistical aspects are compulsory for the three treatment groups, from hereon in referring to the obligation to attend sessions that cover health and nutrition topics this refers to the educational requirement.

for the design of CCTs. As Gertler (2004) emphasizes, a better understanding of how the different components of a programme contribute to their overall effect would improve their cost-effectiveness. Second, we provide experimental evidence about the role of health information as an important determinant of health behaviour, which should give greater scope to specific public policies addressed to improving health related knowledge. The paper is organized as follows. Section 2 provides details on PAL and its evaluation design. Section 3 discusses our empirical strategy. The results are presented in Section 4 and Section 5 concludes.

2 PAL: description and evaluation design

The PAL is an intervention aimed at reducing poverty and improving the nutritional status of target households, which are in rural localities of Mexico not covered by PROGRESA or *Liconsa*. The programme rules do not specify that it is the woman in the household who will be the recipient of the food transfer, although, in practice, more than 75% of beneficiaries are women (Skoufias et al. (2008)). PAL operates in small (population less than 2,500) localities, which are very marginalized (according to the National Council for Population (CONAPO) criteria), are accessible (not more than 2.5 km from a road) and close enough (not more than 2.5 km) to a DICONSA store, because food distribution was implemented by DICONSA.[10] The programme also includes a household level criterion. The household level criterion was not applied to the localities in the evaluation sample, making all households in the 'treated localities' potentially eligible for the programme.

PAL provides in-kind transfers (food baskets) to most of the 150,000 target households. However, an alternative cash transfer was available for communities that DICONSA did not reach regularly. Approximately 5% of PAL beneficiaries receive cash as opposed to in-kind goods. The value of both types of transfer is 150 Mexican pesos or about US$13 every month.[11] The benefits that are distributed through DICONSA to rural poor communities consist of non-perishable foods and household goods. PAL includes educational sessions (*platicas*) that cover health, nutrition and hygiene related topics, as well as participation in programme-related logistic activities. Local community leaders, chosen from among those with an adequate level of education and some basic knowledge of health and nutrition issues, are given specific training and are in charge of delivering the courses. While, in principle, the

[10]DICONSA is the Mexican government agency that manages the supply of food (through its stores) to rural poor localities. Prices on average are lower than in local stores.

[11]The mean share of transfer in pre-programme consumption is 11.5%.

platicas are a requirement for receiving a transfer,[12] Skoufias et al. (2008) report that since the start of PAL no household has been denied benefits on the grounds of not attending educational sessions. These courses are meant to help empower individuals by allowing them to acquire knowledge, habits, attitudes and practices that will encourage them to consume enough food to avoid or prevent nutritional problems, such as malnutrition, anaemia, vitamin A deficiency, diabetes, obesity and hypertension.[13]

The evaluation design is an experimental community trial and the data were collected on two occasions two years apart: at baseline in October 2003 through April 2004, and a follow up in October through December 2005.[14] The evaluation sample consists of 206 localities from 8 Mexican states (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatan). These localities were randomly assigned to a 'control' group (50 localities hereon referred to as `T1`) and three treatment groups: one assigned to receive 'in-kind transfer without education' (52 localities referred to as `T2`), 'in-kind transfer and education' (51 localities referred to as `T3`), and 'cash transfer and education' (53 localities referred to as `T4`). In each locality 33 households were chosen randomly for interviews. The original intention was to make monthly deliveries of the food baskets to beneficiary households; however, for logistical reasons delivery became two baskets every two months. The basic food basket contains: powdered fortified milk (8x240 gm packages), beans (2kg), rice (2kg), cornflour (3kg), soup pasta (6x200gm packets), vegetable oil (1lt), cookies (1kg), corn starch (100gm), powdered chocolate drink (400gm), ready-to-eat cereal (200gm), and sardines.[15] The basket represents approximately 400 calories per day for an average household of 4.2 equivalent adults.

We have information on 5,851 households for both waves. We have extensive information on household and individual level outcomes. In addition to the household food (based on 7 day recall) and non-food consumption module, individual nutritional intakes are available for all children aged under 5, and their mothers (based on 24 hour recall). Anthropometric measures and haemoglobin levels (only for the follow-up survey) are available for children under 5, women, and male adults above 30. Each household respondent is asked detailed questions about the number, content and timing of the *platicas* attended.

[12] Households are supposed to be excluded from the programme if they miss more then two *platicas* in a row or four in one year.

[13] Among other things, beneficiaries receive recipe book (with ingredients based on the food basket items) and posters showing the *Plato del Bien Comer*. Every year, beneficiaries nutritional knowledge is tested.

[14] Further details about the sampling procedure can be found in Skoufias et al. (2008).

[15] This basket has been distributed between June and October 2004. After November 2004 cereals were replaced by dried meat (100gm) and corn starch by lentils (500gm).

The original design of the evaluation sample was contaminated: as mentioned above, sessions on health and nutrition topics were provided in localities T2. According to González-Cossío et al. (2006) and Skoufias et al. (2008), this was a spontaneous decision made by the local programme administrators.

3 Empirical Analisis

3.1 Descriptives

Table 1 presents descriptive baseline statistics for the four different types of localities (villages). Consistent with the randomized design of the evaluation sample, there are no significant differences in the main demographic characteristics across the four groups of localities. Around 80% of respondents were literate, though less than 30% had secondary level education or above.

All respondents aged 12 or above were asked whether or not they smoked, even occasionally. At baseline, the smoking rate in the age group 18-60 is 7.6% with dramatic differences between men (14.8%) and women (1%). The pattern was similar for the follow-up survey (see cols. 4 to 6 in Table 2). Individuals were asked whether they drank alcohol, even occasionally, and the number of drinks they had consumed in the week before the interview. According to the WHO, a woman (man) should not exceed 1 (2) units of alcohol per day. We therefore classify as heavy drinkers those women (men) who consumed 7 (14) or more drinks the week before the interview. Both the baseline and the follow-up data show an extremely low percentage of heavy drinkers (3.6%), almost null for women (see cols. 2 and 5 in Table 2). These results, while potentially biased by severe underreporting, are in line with those in the National Survey of Addictions (ENA) 2002, which reports that 0.27% (2.45%) of women (men) aged 18-65 living in rural areas drink daily or almost daily.

In the first wave, information on body mass index (BMI) was collected only for children, and women under 52. At baseline 25.8% of the women aged 18-51 have a BMI equal to or above 30 and are therefore classified as obese.[16] In the follow-up survey we measured the waist circumferences (WC) of women, and men aged 31 or over. Women (men) with a WC over 88 (102) cm are classified as obese. Medical evidence suggests that body fat distribution is a more important determinant of disease risk than body mass.[17] Therefore,

[16] Using data from the Social Welfare Survey (2003), for a sample of low-income rural Mexicans, Fernald et al. (2004) find that 22.2% (13.6%) of adult women (men) have a BMI equal to or above 30.

[17] Individuals with a high proportion of abdominal fat have a greater risk of developing diabetes

waist circumference is being accepted as a more sensitive measure of relative disease risk, especially among menopausal and post menopausal women.[18] 48.6% (17.2%) of the adult women (men) in the sample have a WC above 88 (102) cm. Although the two measures of obesity are not directly comparable, there are two implications from these findings. First, consistent with the results in Case and Menendez (2007) for South Africa, the prevalence of obesity is much higher among women than men. Second, measures based on BMI might severely underestimate the burden of obesity, especially for women.

At the baseline there are no significant differences in the propensity to smoke and drink heavily in the four groups, with a slightly higher number of smokers in the control localities. Table 3 shows an increase in the prevalence of smoking over time at a rate that is steeper in villages belonging to the group of localities supposed to receive the transfer in kind with no educational requirement. Drinking also increases over time and both `T2` and `T3` villages have 4.2% of heavy drinkers. There are no significant differences in the probability that the BMI is equal to or above 30 across the four groups at the baseline. In the follow-up the proportion of individuals with a large WC is on average lower in the group that were supposed to receive the food basket with health and nutrition sessions.

In order to separately identify the effects of the educational component we focus on the two groups of localities which, according to the original design, were supposed to receive the food basket without conditionalities, and those where beneficiaries are required to attend the health and nutrition sessions in order to receive the food basket. Since there is no information either on the number of courses attended or the distance from the PAL centre for 3 villages, we restrict our analysis to 100 villages. In the follow-up survey detailed information on the number, the topic[19] and the date of the first session attended is available at household level. Table 4 shows that there are no significant differences between the two groups in take up of the programme and average number of baskets received.

The average number of sessions attended by the beneficiary households in group `T2` is not significantly different from that for group `T3`. Classes that illustrate the organizational features of the programme (the type of benefit and the required criteria) were supposed to be taken in both groups of localities. Consistently, we did not detect any significant difference in the proportion of households that had attended at least one session on the organization

mellitus type 2, coronary artery and cardiovascular diseases.

[18] During the menopause there is an increase in abdominal adiposity that is countered by an accelerated loss of lean mass, such that body weight should not change significantly (see Pelt et al. (2001)).

[19] Respondents are asked to indicate up to 5 topics from the following: 1) organization of PAL, 2) nutrition, 3) health, 4) hygiene, 5) other topics.

of the programme. Due to contamination of the evaluation sample, households in group T2 exhibited a probability of attending health and nutrition related classes significantly different from zero. However, beneficiaries in the group T3 are significantly more likely to attend classes that cover health and nutrition topics. As mentioned above, the educational sessions were delivered by previously trained local community leaders. The observed differences are consistent with the hypothesis that, because of the original design of the programme, programme administrators in localities T2 were either not trained to deliver the health and nutrition topics or were not provided with related teaching materials.

3.2 Empirical Model

In order to estimate the effect of the educational component of PAL, we use the following specification:

$$Y_{ijk} = \beta_0 + \beta_1 Inf_{jk} + \beta_2' X_{ijk} + u_{ijk} \tag{1}$$

where Y_{ijk} is the health risk related behaviour of individual i in household j in locality k recorded in the follow-up survey. Inf_{jk} is the proxy for information received through the programme by household j in locality k. X_{ijk} is a full set of individual and household characteristics, including the number of food baskets received by the household, age, square of age, a dummy for the household head status, marital status, dummies for educational attainments and ability to speak the indigenous language, or not, a vector of the dummies for asset holding (e.g. house, land) and dummies for the receipt of any additional welfare programme by household j. All regressions control for state fixed effects.

The parameter of interest is β_1, which measures the effect of the information provided by the programme on the propensity to smoke, drink heavily and be obese. We estimate the model in eq. 1 using three different proxies for information received via the programme (Inf_{jk}): the total number of sessions attended, a dummy for attendance at at least one health related session and a dummy for attendance at at least one nutrition related session. Although in the majority of cases courses are attended by women, we estimate the model in eq. 1, for adult males and females, with the purpose of assessing the existence of within household externalities.

Two potential sources of endogeneity might affect the identification of the parameter β_1. Individual unobserved characteristics might be correlated with both attendance at the educational sessions and health behaviour. Moreover, both the number and the type of sessions attended might be misreported, either intentionally or unintentionally, by the respondents.

In order to address the potential endogeneity issues, we take two steps. First, we restrict the sample to the two groups of localities that were supposed to receive the food basket (`T2` and `T3`). According to the original design these two groups were supposed to be treated identically except for the requirement to attend health and nutrition classes. We therefore use an Instrumental Variables (IV) strategy. Our IV strategy exploits three exclusion restrictions: the assignment dummy for living in a locality `T3`, the locality average (in logs) of individual responses to the number of minutes away from the closest PAL centre, and the interaction of the two variables. The validity of the treatment status assigned in the experiment (the intention to treat, or ITT)[20] as an exclusion restriction for the IV strategy relies on the assumption that living in locality `T3` rather than `T2` only affects individual health risk factors in terms of changing the available health/nutrition related information. By excluding individuals who live in localities `T4` we rule out the possibility that treatment status is correlated with differential changes in the prices of unhealthy goods: in localities where the transfer was distributed in cash there might have been a higher demand for cigarettes, alcohol, etc.

In principle, distance from the PAL centre might proxy for the distance to other facilities, i.e. the health centre and the food market, accessibility to both of which might affect the prevalence of health risk factors.[21] While in section 4.5 we provide evidence to bolster confidence in the validity of our instruments, we should emphasize that all PAL localities were chosen from a set of accessible (less than 2.5km from a main road) localities with a DICONSA shop in the proximity (no more than 2.5km). These features of the design support the assumption that our measure of distance reflects only the cost of attending an extra educational session.

The IV specification using the number of sessions attended as a proxy for Inf_{jk} is estimated using the a two stage least squares (2SLS) method. The specifications with the dummies for attending at least one health and one nutrition session are estimated using a two step IV method suggested by Wooldridge (2002) and Angrist and Pischke (2009). In the first stage we estimate a probit model and the fitted probabilities are used as exclusion restriction in the IV estimation of the structural equation.[22] In all specifications standard errors are heteroskedasticity robust and adjusted for clustering at the locality level.

[20] See Angrist et al. (2009) for a recent application of the use of the ITT in an IV setting.

[21] The median distance is 10 minutes and the standard deviation 21 minutes.

[22] This estimator is asymptotically efficient and the standard test statistics are asymptotically valid (see Wooldridge (2002))

4 Results

4.1 First Stage Results

We consider first how the three instruments described above are correlated to the proxies for information acquired through the programme. Table 5 shows the results for the first stage regressions. The average number of sessions is higher in T3, even though not significantly, than in T2 localities (see col. 1 in Table 5). The marginal effects of the probit estimates (see cols. 2 and 3 in Table 5) show that the probability of attending at least one health (nutrition) related session is significantly higher in those localities where, according to the original design, the transfer was conditional on attendance at health and nutrition sessions. A 10 percentage point increase in the probability of living in a T3 locality rather than in a T2 one increases the probability of attending at least one health talk by 1.56 percentage points. The results are very similar for the probability of attending at least one nutrition session: a 10 percentage point rise in the probability of living in a locality T3 increases the probability of attending a nutrition talk by 1.73 percentage points. These results can be seen as evidence that community leaders in group T2 have not managed to mimic the functioning of the programme in group T3 in terms of topics covered in the educational sessions. Distance from the PAL centre has a small, positive effect on the probability of attending at least one health related session. However, the effect is marginally significant only on the probability of attending at least one nutrition session.

For individuals living in T3 localities the cost associated with the requirement to attend health and nutrition sessions increases with the distance they have to cover to reach the PAL centre. This explains the negative and significant marginal effect on the interaction terms in cols. 1 to 3 of Table 5.

4.2 Smoking and Heavy Drinking

In this section we discuss how the quantity and the quality of information provided through the programme affects the propensity to smoke and drink heavily. Table 6 presents the results for smoking. The ordinary least squares (OLS) estimates presented in the top panel show that the number of sessions attended has a very small and not significant effect on the probability of smoking. Attending at least one health or one nutrition session has a negative although not a significant effect on smoking behaviour.

The IV estimates show that after controlling for potential endogeneity, the number of classes attended has a negative but not significant effect on the probability of smoking. The

size of the marginal effect is larger for men than women. While the number of courses attended might be a proxy for the quantity of information received through the programme, there are other explanations for this negative correlation. WHO statistics report that tobacco consumption in Mexico dropped by more than 50% between 1970 and 2000. Franco-Marina (2007) using three waves of the ENA finds that the percentage of those that have never smoked increased by 26% between 1988 and 2002 for the sample of men aged 18-65 versus a 2% increase among women. This suggests increased stigmatization related to tobacco consumption, especially among males. Individuals exposed to the programme might feel a stronger pressure to change (or lie about) their smoking habits. Alternatively, the number of sessions attended might be positively correlated with the bargaining power of the woman in the household. The results of the IV estimates for the effects of the topics covered in the sessions (see cols. 4-9 in Table 6) are in line with those for the number of sessions attended. Attending at least one health or one nutrition specific course reduces the probability of smoking, especially among men, but the effect is never statistically significant.

In Table 7 we present the results for the effect of information on heavy drinking. Consistent with the evidence for smoking, the OLS results show very small and not significant effects of number and the topic of educational courses attended, on the propensity to consume alcohol. After controlling for potential endogeneity, number of courses attended has a negative and not significant effect. In line with results for smoking, we find that higher exposure of the household to health and nutrition talks has a bigger impact on the sample of men than women. However, the marginal effect of attending at least one session on a health (nutrition) related topic is never statistically significant.

It is well documented (see Stock and Yogo (2002)) that F tests on the exclusion restrictions with values below 10 provide strong evidence of weak instruments. The results of the F tests in Tables 6 and 7 suggest that the set of exclusion restrictions perform much better when controlling for the endogeneity of the dummies for attending at least one health and nutrition related session than for the number of sessions attended.

In summary, our results show that the effect of the education component of PAL on the propensity to smoke and drink heavily is not significantly different from zero. There are two potential explanations for these results. First, smoking and heavy drinking are not common among women, and it is the women who comply with the educational requirement. Second, the existing evidence, although limited, suggests that smoking and heavy drinking might not be emphasized in the sessions.

4.3 Obesity

Table 8 presents the results for obesity. The OLS estimates suggest a small, negative although not statically significant effect of the number of courses attended on the probability of having a large WC. Similarly, attending sessions on either health or nutrition has a negative effect on WC with an effect that is marginally significant in the case of nutrition related topics.

The results are completely different if we control for potential endogeneity in both number and topic of the educational courses. The IV results show that the number of courses attended significantly reduces the prevalence towards obesity among women: an extra session attended reduces the probability of having a large WC by 3.6 percentage points. The effect of the number of sessions attended is not statistically significant for men. These results are subject to two caveats. The first relates to the bias in the IV estimate in the presence of weak instruments as the F test on the excluded instruments is well below 10 both for the sample of men and women.[23] The second caveat concerns interpretation: as is the case for smoking, the number of sessions attended could be a proxy for the intensity of social interactions. Women who achieve more active social lives as a result of the participation in the programme might be more concerned about their body size.[24] In order to document whether PAL contributes to a reduction in obesity by increasing knowledge on health and nutrition issues, we next investigate the effect of the topics covered in the sessions.

We find that attending at least one session that covers health and nutrition topics has a large negative effect on the probability of having a large WC. The marginal effect of attending at least one health related session is significantly different from zero only for women: a 10 percentage point increase in the probability of attending at least one health session reduces the probability of having a large WC by about 2 percentage points. The results are similar for the probability of attending at least one nutrition related course: among women, a 10 percentage point increase determines a statistically significant reduction of 1.8 percentage points in the probability of being obese. In both cases, the F tests on the excluded instruments provide strong evidence against weak instruments. It should be stressed that it is difficult to compare the results for men and women as the sample of males includes only individuals aged 31 or above.[25]

[23] However, at least for women, we can reject the hypothesis that the maximum bias in the IV estimate is more than 30% of the bias in the OLS estimate.

[24] However, this might not be the case if, as suggested by Case and Menendez (2007) for South Africa, social norms induce women to aspire to a large body size.

[25] In our sample 29.5% of the women aged 18-31 have a WC above 88cm, while the percentage is 59% for women in the 32-60 age group.

Our results are consistent with the hypothesis that a high prevalence of female obesity can be explained, at least in part, by the fact that women have poor knowledge about health and nutrition. Another important implication can be drawn from these findings. There is not significant evidence of knowledge externalities within household as men do not appear to benefit from the health and nutrition information acquired by their wives.

4.4 Information and Calorie Intake

Above, we have shown that both number and type of classes attended may significantly reduce the propensity for a large WC for women. Here, we try to provide evidence on the mechanisms that drive these results. A reduction in WC may be due to a reduction in calorie intake or increased calorie expenditure. Cutler et al. (2003) argue that the impressive rise of obesity observed in the US is due primarily to increased calorie intake and that calories expended have not changed significantly.

In the follow-up survey of PAL we collected individual information, based on a 24 hour recall method, on the nutritional intake of children aged under 5, and their mothers. We exploit the information on mothers' intake to test whether better health and nutrition knowledge determines a change in calorie consumption.[26] Although calorie requirements might change depending on metabolism and level of physical activity, nutritional guidelines on calorie intake provide recommendations that vary with age and gender. In Mexico the National Institute of Public Health (INSP) advises women under 20 to not consume more than 2,300 kcal per day. Women between 21 and 34 should not exceed 2,000 kcal per day, women between 35 and 54 not more than 1,850, while women over 55 are advised not to consume more than 1,700 kcal per day.[27] Based on this information, we construct a binary variable for whether a woman consumes more than the recommended amount of calories.

Formally, we use the model in eq. 1 to test whether the number and type of sessions attended can affect the probability that a woman has an excessive calorie intake. Columns 1-3 in Table 9 report the results of the OLS estimates, cols. 4-6 present the IV estimates. The OLS estimates display a small and not significant effect for each of our three measures for information.

When we control for potential endogeneity, we find that three measures for information received through the programme are negatively correlated with the probability of an exces-

[26] Because of the randomized design, our results are unlikely to be affected by the presence of under-reporting bias.

[27] Based on a 24 hour dietary recall system in a representative sub-sample of 2,630 Mexican women aged 12-49 from the National Nutrition Survey 1999, Barquera et al. (2003) find that the median energy consumption is 1,471 kcal.

sive calorie intake. While the effect of the number of sessions attended is not significantly different from zero, health and nutrition topics significantly affect calorie consumption. A 10 percentage point increase in the probability of attending at least one health session reduces the probability of excessive intake by almost 3.8 percentage points (statistically significant at 10%). Similarly, a 10 percentage point increase in the probability of attending at least one nutrition talk reduces the probability by around 3.3 percentage points (significant at 5%).

Interestingly, there is a positive and significant association between the number of food baskets and the propensity to consume a higher than recommended calorie intake. After controlling for the endogeneity of the dummy for attending at least one nutrition session, an extra food basket increases the probability of an excessive calorie intake by 0.5 percentage points.

Attending health and nutrition sessions might also affect the propensity to burn calories. As stressed by Cutler et al. (2003), there are two components to calorie expenditure: voluntary exercise and involuntary expenditure associated with employment. Attendance at health related sessions might result in an appreciation of the benefits of physical activity. Unfortunately, the survey does not collect any information on time usage. With respect to involuntary calorie expenditure, it is unlikely that being better informed about health and nutrition affects the decision to work in more energy intensive jobs. Moreover, Skoufias et al. (2008) find that the effect of the PAL on labour outcomes does not show any significant changes for beneficiaries living in localities `T2` and `T3`.

In summary, our results suggest that the information conveyed through the educational component of the programme determines a significant improvement in mothers' eating habits.

4.5 Econometric Concerns

In this section we provide evidence to support the validity of our instruments. The identifying assumption is that both the ITT dummy and the average distance from a PAL office (plus the interaction term) can affect the propensity to smoke, drink heavily and be obese only in its effect on the number and topic of the sessions attended. The first concern is that the exclusion restrictions might be correlated with the quality of health provisions in the locality.

While educational courses are mostly delivered by local inhabitants, better qualified health staff and/or educational material might be deployed in localities where according to

the initial design it was a requirement that eligible households would receive health and nutrition courses. Of more concern is that average travel time to a PAL centre might be a proxy for the average distance from a health centre. In order to study whether our instruments are correlated with differences in health supply, we test whether they are correlated with measures of health status that are unlikely to be affected (at least in the short term) by information received via the programme. We do not find any significant correlation between our exclusion restrictions and the number of days of incapacity or morbidity (see cols. 1 and 2 in Table 10). We also check whether the instruments are correlated with a direct measure of healthcare quality, such as probability of being advised to undertake treatment for hypertension once the disease has been diagnosed. Also in this case the correlation is not significant.

Beneficiary households in localities belonging to group `T2` and `T3` receive a food basket with the same composition. Therefore, we do not expect any differential change of prices between the two groups of localities. If the distance from a PAL centre is correlated with the distance from stores and food market, our instrument might be correlated with the prices of goods, such as cigarettes, alcohol and food. The locality questionnaire collects information about prices of a large set of goods. Therefore, we test whether our instruments are significantly correlated with the average price of 4 categories of goods: alcohol (*aguardiente*), chocolate, candies and fish. Out of the 100 localities used in the main specification, we measures prices for 99. Table 11 shows that none of our exclusion restrictions is significantly correlated with the prices of goods that are likely to be related with the drinking and eating habits of programme beneficiaries.

5 Conclusions

It has been well documented that CCT programmes have strong positive effects on the well-being of beneficiary households, but little is know about how the individual components of these programmes contribute to the combined result. This paper assesses the impact of the educational component of a nutrition programme implemented in rural Mexico, on the health behaviour of adults living in beneficiary households. We exploit the randomized evaluation design of PAL to study how the requirement to attend sessions on health and nutrition affects the propensity to smoke, drink heavily and be obese, in male and female adults.

After controlling for potential endogeneity in the different measures, we find not significant evidence that the educational component can affect smoking and drinking behaviour.

Our findings do provide evidence that both the number and the topics of the sessions attended contribute to a large and significant reduction in the probability among women of having a large WC. In order to shed light on the mechanisms that drive this effect we study whether the number and the type of sessions attended affect the calorie intakes of mothers with at least one child aged less than 5. We find that attending health and nutrition sessions significantly reduces the probability that an adult woman consumes an amount of calories that is higher than the age-gender specific threshold recommended by the INSP in Mexico. These results support the hypothesis that the requirement to attend health and nutrition sessions, by increasing women's knowledge about nutritional issues, can improve their eating habits.

This study contributes to the current debate on whether transfers should or should not be conditional. Our results suggest that improvements in nutrition related outcomes, especially among adult women, are driven by the requirement to attend health and nutrition sessions. It has been documented that, by targeting women as the transfer recipients, CCTs reduce the consumption of unhealthy goods and increase food and child related expenditure. However, providing specific information is essential to achieve an effective improvement in the nutritional outcomes of all household members. While women seem to take advantage of the information they acquire through the sessions, men do not display any significant behavioural changes. Therefore, future design of transfer programmes should address explicitly this lack of within household spillovers.

More generally, our results show that lack of information plays a key role in explaining the dramatically high prevalence of female obesity in developing countries. Policies addressed to improving health knowledge can have large and significant effects.

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Table 1: Descriptives at the Baseline

Treatment Type	T1	T2	T3	T4
Male	0.464	0.480	0.484	0.474
	(0.499)	(0.500)	(0.500)	(0.499)
Age	35.890	35.976	35.466	36.447
	(12.802)	(13.015)	(12.860)	(13.195)
Head of Household	0.395	0.382	0.392	0.380
	(0.489)	(0.486)	(0.488)	(0.486)
No Insurance	0.854	0.812	0.884	0.873
	(0.353)	(0.391)	(0.321)	(0.334)
Literacy	0.796	0.797	0.791	0.787
	(0.403)	(0.403)	(0.406)	(0.409)
No Schooling	0.185	0.179	0.182	0.192
	(0.388)	(0.383)	(0.386)	(0.394)
Primary	0.516	0.515	0.555	0.539
	(0.500)	(0.500)	(0.497)	(0.499)
Secondary	0.193	0.197	0.160	0.175
	(0.395)	(0.398)	(0.367)	(0.380)
Tertiary	0.098	0.104	0.097	0.086
	(0.298)	(0.305)	(0.296)	(0.280)
Indigenous Language	0.181	0.209	0.140	0.142
	(0.385)	(0.407)	(0.347)	(0.349)
Spanish Language	0.154	0.144	0.107	0.108
	(0.361)	(0.351)	(0.310)	(0.311)
Last week worked	0.476	0.479	0.471	0.465
	(0.499)	(0.500)	(0.499)	(0.499)
Own House	0.837	0.849	0.834	0.833
	(0.369)	(0.358)	(0.372)	(0.373)
Own Land	0.736	0.764	0.718	0.741
	(0.441)	(0.425)	(0.450)	(0.438)
Observations	3768	3756	3834	3986

Note: T1 denotes the control localities; T2 denotes the localities that according to the original design receive the transfer with no requirement of attending health and nutrition sessions; T3 denotes the localities that receive the transfer in kind subject to the educational requirement; T4 denotes the localities that receive the transfer in cash subject to the educational requirement.

Table 2: Prevalence of Health Risks by Gender

	Baseline			Follow-Up		
	Full Sample	Women	Men	Full Sample	Women	Men
Smoking	0.076	0.010	0.148	0.088	0.012	0.175
	(0.264)	(0.100)	(0.355)	(0.284)	(0.108)	(0.380)
Heavy Drinking	0.021	0.002	0.042	0.036	0.003	0.073
	(0.143)	(0.047)	(0.200)	(0.187)	(0.061)	(0.261)
BMI≥30		0.258				
		(0.437)				
WC≥ 88(102)				0.381	0.486	0.164
				(0.486)	(0.500)	(0.370)

Note: The sample includes individuals in the age group 18-60. Heavy drinking takes the value 1 if a woman (man) reported drinking at least 7 (14) units of alcohol in the week before the interview. Individuals with a BMI equal to or above 30 are considered at risk. Women (men) with WC equal to or above 88 (102) cm are considered at high risk of obesity related diseases. At baseline, the BMI is collected only for women younger than 52. In the follow-up, data on WC are collected for all adult women and for men aged 31 or over.

Table 3: Prevalence of Health Risks by Treatment Type

Treatment Type	T1	T2	T3	T4
			Baseline	
Smoking	0.086	0.068	0.073	0.075
	(0.281)	(0.252)	(0.260)	(0.263)
Heavy Drinking	0.022	0.023	0.020	0.018
	(0.148)	(0.150)	(0.141)	(0.134)
BMI≥30	0.273	0.248	0.246	0.263
	(0.446)	(0.432)	(0.431)	(0.440)
			Follow-Up	
Smoking	0.091	0.095	0.085	0.083
	(0.287)	(0.293)	(0.280)	(0.276)
Heavy drinking	0.042	0.042	0.033	0.030
	(0.200)	(0.200)	(0.178)	(0.171)
WC≥88(102)	0.372	0.388	0.366	0.397
	(0.483)	(0.487)	(0.482)	(0.489)

Note: The sample includes individuals in the age group 18-60. At baseline the BMI is collected only for women younger than 52. In the follow-up data on WC are collected for all adult women and for men aged 31 or over.

Table 4: PAL Compliance

	Program Take Up	Food Baskets	Sessions Attended	At least 1 Organiz. sess.	At least 1 Health sess.	At least 1 Nutrit. sess.
T3	0.915	13.477	4.973	0.360	0.470	0.700
	(0.280)	(5.166)	(3.945)	(0.480)	(0.499)	(0.461)
T2	0.930	13.016	4.160	0.405	0.344	0.557
	(0.256)	(5.007)	(4.022)	(0.491)	(0.475)	(0.497)
Diff	-0.015	0.461	0.813	-0.046	0.125**	0.143***
	(0.031)	(0.481)	(0.523)	(0.045)	(0.050)	(0.051)

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors on the Diff coefficients are clustered at locality level. The sample includes households living in localities `T2` and `T3`.

Table 5: First Stage Regressions

	Sessions	Health Session (Y/N)	Nutrition Session (Y/N)
T3	0.686	0.156***	0.173***
	(0.522)	(0.052)	(0.051)
Log Distance	0.094	0.082	0.092*
	(0.508)	(0.053)	(0.053)
T3*Log Distance	-1.166*	-0.215***	-0.202***
	(0.613)	(0.077)	(0.075)
Observations	5507	5850	5848

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are clustered at locality level. The sample includes individuals in the age group 18-60 living in localities `T2` and `T3`. *Log Distance* is the logarithm of the average number of minutes respondents have to cover to reach the locality's PAL office. Additional controls include the number of baskets, age, age squared, a dummy for the head of household status, marital status, dummies for educational attainment, dummies for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 6: The Effect of Information on Smoking

	Full Sample	Women	Men	Full Sample	Women	Men	Full Sample	Women	Men
					OLS				
Sessions	0.001	-0.000	0.002						
	(0.001)	(0.000)	(0.003)						
Health Session (Y/N)				-0.011	-0.007	-0.014			
				(0.009)	(0.004)	(0.018)			
Nutrition Session (Y/N)							-0.011	-0.003	-0.017
							(0.011)	(0.005)	(0.022)
Baskets	-0.000	0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)
Observations	5480	2892	2588	5874	3099	2775	5872	3098	2774
					IV				
Sessions	-0.012	-0.004	-0.019						
	(0.010)	(0.003)	(0.020)						
Health Session (Y/N)				-0.032	-0.025	-0.023			
				(0.062)	(0.019)	(0.118)			
Nutrition Session (Y/N)							-0.033	-0.019	-0.037
							(0.061)	(0.019)	(0.121)
Baskets	0.001	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.001
	(0.002)	(0.001)	(0.003)	(0.001)	(0.000)	(0.002)	(0.001)	(0.000)	(0.002)
Observations	5480	2892	2588	5874	3099	2775	5872	3098	2774
F Test Excluded Instr	4.009	3.680	4.012	18.124	15.705	19.271	24.535	22.495	25.263

Note: The dependent variable is the dummy for whether the individual smokes or not.
*** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample includes individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for the head of household status, marital status, dummies for educational attainments, dummy whether she speaks the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 7: The Effect of Information on Heavy Drinking

	Full Sample	Women	Men	Full Sample	Women	Men	Full Sample	Women	Men
					OLS				
Sessions	-0.000	-0.000	0.000						
	(0.001)	(0.000)	(0.001)						
Health Session (Y/N)				-0.008	-0.001	-0.015			
				(0.006)	(0.002)	(0.012)			
Nutrition Session (Y/N)							0.004	-0.001	0.010
							(0.007)	(0.003)	(0.014)
Baskets	0.000	-0.000	0.000	0.000	-0.000	0.001	0.000	-0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Observations	5478	2889	2589	5872	3096	2776	5870	3095	2775
					IV				
Sessions	-0.002	-0.002	-0.001						
	(0.007)	(0.002)	(0.013)						
Health Session (Y/N)				-0.029	-0.013	-0.032			
				(0.035)	(0.013)	(0.065)			
Nutrition Session (Y/N)							-0.029	-0.012	-0.039
							(0.037)	(0.012)	(0.070)
Baskets	0.000	0.000	0.000	0.000	-0.000	0.001	0.000	-0.000	0.001
	(0.001)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	5478	2889	2589	5872	3096	2776	5870	3095	2775
F Test Excluded Instr	3.980	3.754	3.897	17.951	15.991	18.545	24.519	22.719	24.871

Note: The dependent variable is the dummy for whether a woman (man) had 7 (14) or more drinks the week before the interview.

*** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample is restricted to individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include age, age squared, dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 8: The Effect of Information on Obesity

	Full Sample	Women	Men	Full Sample	Women	Men	Full Sample	Women	Men
					OLS				
Sessions	-0.002	-0.001	-0.004						
	(0.002)	(0.002)	(0.003)						
Health Session (Y/N)				-0.021	-0.022	-0.018			
				(0.015)	(0.019)	(0.024)			
Nutrition Session (Y/N)							-0.036*	-0.036	-0.037
							(0.018)	(0.022)	(0.029)
Baskets	-0.001	-0.002	0.000	-0.001	-0.002	-0.000	-0.001	-0.002	0.000
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Observations	3393	2280	1113	3606	2424	1182	3604	2423	1181
					IV				
Sessions	-0.033	-0.036*	-0.042						
	(0.024)	(0.022)	(0.130)						
Health Session (Y/N)				-0.187**	-0.204**	-0.168			
				(0.085)	(0.100)	(0.142)			
Nutrition Session (Y/N)							-0.191**	-0.180**	-0.220
							(0.089)	(0.087)	(0.170)
Baskets	0.003	0.003	0.005	-0.000	-0.001	0.001	0.001	-0.000	0.002
	(0.004)	(0.004)	(0.015)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Observations	3393	2280	1113	3606	2424	1182	3604	2423	1181
F Test Excluded Instr	2.550	3.310	1.327	13.609	12.034	13.369	19.129	19.107	15.210

Note: The dependent variable is the dummy for whether a woman (man) has a WC equal to or above 88 (102) cm.
*** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample is restricted to women (men) in the age group 18-60 (31-60) living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 9: Information and Excessive Caloric Intake

	OLS			IV		
Sessions	-0.001			-0.041		
	(0.004)			(0.033)		
Health Session (Y/N)		0.029			-0.376*	
		(0.028)			(0.226)	
Nutrition Session (Y/N)			0.010			-0.324**
			(0.036)			(0.165)
Baskets	0.005	0.004	0.004	0.009**	0.006*	0.005*
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)
Observations	878	935	935	878	935	935
F Test Excluded Instr				1.760	9.779	19.604

Note: The dependent variable is the dummy for whether a woman has a calorie intake higher than recommended (see text for explanation).
*** denotes significance at 1%, ** at 5% and * at 10%. The sample includes mothers with at least 1 child aged under 5 living in localities `T2` and `T3`. Additional controls include age, age squared, a dummy for head of household status, marital status, dummies for educational attainment, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 10: Alternative measures of health

	Morbidity Days	Incapacity Days	Advised Hypert. Treatment
`T3`	-0.270	-0.514	-0.049
	(0.224)	(0.363)	(0.055)
Log Distance	-0.112	-0.215	-0.032
	(0.263)	(0.363)	(0.068)
T3*Log Distance	-0.175	-0.359	0.059
	(0.375)	(0.448)	(0.116)
Observations	5817	1300	473

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Standard errors are adjusted for clustering at locality level. The sample includes individuals in the age group 18-60 living in localities `T2` and `T3`. Additional controls include the number of food baskets, age, age squared, a dummy for head of household status, marital status, dummies for educational attainments, dummy for ability to speak the indigenous language or not, dummies for household assets and dummies for any additional welfare programme. All regressions control for state fixed effects.

Table 11: Locality Prices

	Price Alcohol	Price Chocolate	Price Candies	Price Fish
T3	-7.206	-0.658	9.078	0.413
	(5.391)	(7.116)	(6.610)	(6.015)
Log Distance	-2.667	-7.806	-9.547	1.047
	(6.202)	(8.187)	(7.605)	(6.920)
T3*Log Distance	-4.928	-0.785	8.376	5.363
	(8.368)	(11.045)	(10.260)	(9.336)
Observations	99	99	99	99

Note: *** denotes significance at 1%, ** at 5% and * at 10%. Regressions at locality level. Remaining controls include locality averages for the variables: age, gender, marital status, educational attainments, use of the indigenous language, household assets and additional welfare programme. All regressions control for state fixed effects. Prices are expressed in *pesos*.