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Nutrition, information and household behavior: Experimental evidence from Malawi

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ABSTRACT

Incorrect knowledge of the health production function may lead to inefficient household choices and thereby to the production of suboptimal levels of health. This paper studies the effects of a randomized intervention in rural Malawi that, over a six-month period, provided mothers of young infants with information on child nutrition without supplying any monetary or in-kind resources. A simple model first investigates theoretically how nutrition and other household choices including labor supply may change in response to the improved nutrition knowledge observed in the intervention areas. We then show empirically that the intervention improved child nutrition, household food consumption and consequently health. We find evidence that labor supply increased, which might have contributed to partially fund the increase in food consumption. This paper is the first to study whether non-health choices, particularly parental labor supply, might be affected by parents' knowledge of the child health production function.

1. Introduction

Since Becker's (1965) seminal contribution, economists have recognized that many goods are not directly bought in the market, but are produced at home using a combination of market and non-market goods. The home production framework has been particularly fruitful in studying the production of health, in particular child health (Gronau, 1986, 1997; Grossman, 1972; Rosenzweig and Schultz, 1983). An important implication of such models is that households make choices given their knowledge of the (child) health production function. Consequently, deficiencies in knowledge lead to suboptimal household choices and thereby distorted levels of child health. Establishing empirically the consequences of deficiencies in knowledge on household behavior has, however, been challenging because knowledge is endogenous and is usually either unobserved or proxied by education, which also affects child health through other channels including earnings.

In this paper, we overcome this challenge by exploiting an intervention, implemented through a cluster randomized trial, aiming to improve mothers' knowledge of the child health production function in rural Malawi. The intervention solely provided information on child nutrition to mothers, thus yielding a clean source of identification. Our contribution is twofold. First, we assess whether the intervention improved child nutrition and consequently health. Second, drawing on a simple theoretical model, we investigate how other household choices change to accommodate the improved knowledge of the production function. In so doing, we assess whether non-health choices, particularly parental labor supply, might be affected by parents' knowledge of the child health production function.

In the context we study, rural Malawi, mothers have many misconceptions about child nutrition. To take some examples, it is common practice to give porridge diluted with unsterilized water to infants as young as one week; the high nutritional value of groundnuts, widely available in the area, is not well known; and widespread misplaced beliefs include that eggs are harmful for infants as old as 9 months and that the broth of a soup contains more nutrients than the meat or vegetables therein. This evidence suggests that important changes can be expected if these misconceptions are corrected.

The intervention we study delivered information in an intense manner: trained local women visited mothers in their homes once before the birth of their child and four times afterwards and provided information on early child nutrition on a one-to-one basis. Moreover, the fact that the intervention had been running for at least three years when outcome data were collected allows a sufficient time frame for practices to change. This lapse also allows us to measure medium-term impacts, which is important since interventions often perform much better in the short rather than medium term (Banerjee et al., 2008; Hanna et al., 2016).

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Consistent with gains in knowledge, we find evidence of improvements in infants' diets and household food consumption, particularly an increase of protein-rich foods and of fruit and vegetables. We also find that household food consumption increases and there is suggestive evidence that this might have been partially financed through increased labor supply. Overall, the findings are consistent with households learning that some relatively costly foods are more nutritious than they previously believed and adjusting their labor supply so as to facilitate increases in their children's intake of them. Indeed, we show that households adjust their behavior on several margins including child diet inputs and labor supply, making their response more complex than simply changing the composition of consumption while keeping total consumption constant.

We find that the intervention improved children's physical growth, particularly height, a widely used indicator of long-term nutritional status. This finding is particularly important for policy: child malnutrition is a severe and prevalent problem in developing countries (de Onis et al., 2000) and leads to poor health and excess child mortality (Bhutta et al., 2008; Pelletier et al., 1994) and is also linked to poor human capital outcomes later on in life.[1]

The paper deals carefully with the increasingly important issue of inference in cluster randomized trials when the number of clusters is small. It is well known that in this situation, standard statistical formulae for clustered standard errors based on asymptotic theory (cluster-correlated Huber–White estimator) provide downward-biased standard error estimates (Bertrand et al., 2004; Cameron et al., 2008; Donald and Lang, 2007; Wooldridge, 2004). We use two leading methods for inference in this case – randomization inference (Fisher, 1935; Rosenbaum, 2002) and wild-cluster bootstrap-t (Cameron et al., 2008). Furthermore, we assess their performance in our data using Monte Carlo experiments and find that both methods perform relatively well. Presenting the performance of these two methods side-by-side is of interest for many empirical applications, given the increasing trend in randomized trials with a small number of clusters.

Lewycka et al. (2013) study the effect of the intervention we study on exclusive breastfeeding and infant mortality. Our paper addresses a different question: whether improving knowledge of the health production function affected consumption, labor supply, nutritional practices and child nutrition to the age of around 5 years. We also use a different dataset; they interview mothers until their child is 6 months old, while we rely on a representative sample of women of reproductive age and their households. More details about the design of the intervention can be found in Lewycka et al. (2010).

Our work contributes to a number of strands of literature. First, it adds to the discussion on the effects of health information on behavior (Dupas, 2011a).[2] The evidence is mixed: Dupas (2011b); Jalan and Somanathan (2008) and Madajewicz et al. (2007) find that providing information on, respectively, the risks of contracting HIV and the arsenic and fecal concentration of water improves associated practices, while Kamali et al. (2003); Kremer and Miguel (2007) and Luo et al. (2012) find that health behaviors relating to, respectively, HIV, deworming and anemia do not respond to health education. This paper departs from these studies by not only considering a multifaceted information intervention, but also by studying household responses on a wider range of margins than those directly targeted by the intervention. In doing so, this is one of the first papers to investigate how behaviors not directly related to the topic of an information campaign adjust to it.

Second, this paper contributes to the literature evaluating the effects of nutrition information interventions on nutrition practices and child health. Haider et al. (2000) and Morrow et al. (1999) find increased rates of exclusive breastfeeding within small-scale randomized control trials in Bangladesh and Mexico respectively, while Alderman (2007); Galasso and Umapathi (2009) and Linnemayr and Alderman (2011) find improvements in child weight-for-age, an indicator for medium-term health status, using non-experimental methods. Our paper builds on these by studying the effects on a range of measures of child health, health practices and other margins of household behavior, all identified through a randomized control trial.

Finally, it relates to the literature investigating the causal effects of parental education on child health. In developed countries, Currie and Moretti (2003) and McCrary and Royer (2011) find, respectively, decreased incidence of low birth weight and modest effects on child health of increased maternal schooling in the US, while Lindeboom et al. (2009) find little evidence that parental schooling improves child health in the UK. For developing countries, Breierova and Duflo (2004) and Chou et al. (2010) find that parental schooling decreases infant mortality in Indonesia and Taiwan respectively. However, it is difficult to disentangle whether the effect of education is working through changes in knowledge of the child health production function, or through increased income and hence access to more and better-quality care. Related to this, Glewwe (1999) and Thomas et al. (1991) find that almost all of the impact of maternal education on child's height in Morocco and Brazil can be explained by indicators of access to information and health knowledge.

The rest of the paper is structured as follows. Section 2 provides background information on rural Malawi and describes the experimental design and data, Section 3 describes the theoretical framework and Section 4 sets out the empirical model. Our main results are presented in Section 5. Section 6 rules out alternative potential explanations behind our findings, while Section 7 concludes.

2. Background and intervention

2.1. Background

Malnutrition in the early years (0–5) is one of the major public health and development challenges facing Malawi, one of the poorest countries in sub-Saharan Africa. The 2004 Malawi Demographic and Health Survey (DHS) Report indicates an under-5 mortality rate of 133 per 1000, and under-nutrition is an important factor driving this: Pelletier et al. (1994) estimate that 34% of all deaths before age 5 in Malawi are related to malnutrition (moderate or severe). Moreover, 48% of Malawian children aged under 5 suffer from chronic malnutrition, a rate that is the second highest in sub-Saharan Africa.

Poor feeding practices are at least partly responsible for these extreme malnutrition indicators. Over half of all infants aged under 6 months are given food and/or unsterilized water (2004 DHS Report), which can lead to gastrointestinal infections and growth faltering (Haider et al., 2000; Kalanda et al., 2006) and is contrary to the World Health Organization (WHO) recommendation of exclusive breastfeeding for the first 6 months of an infant's life. Furthermore, porridge diluted with unsterilized water is often given in large quantities to infants as young as 1 week (Bezner-Kerr et al., 2007). In terms of nutrition for infants aged over 6 months, their diets – rich in staples such as maize flour – frequently lack the necessary diversity of foods to provide sufficient amounts of energy, proteins, iron, calcium, zinc, vitamins and folate: in our sample, 25% of children aged 6–60 months did not consume any proteins over the three days prior to the survey, with a further 30% consuming just one source of protein. Poor nutritional practices are likely to be related to a lack of knowledge: for instance, only 15% of mothers in our sample knew how to best cook fish combined with the local staple so as to maximize nutritional value.

It is against this background that, in 2002, a research and development project called MaiMwana (Chichewa for 'Mother and Child') was

[1] See, among others, Alderman et al. (2001); Almond and Currie (2011); Banerjee et al. (2010); Barham (2012); Behrman (1996); Behrman and Rosenzweig (2004); van den Berg et al. (2006, 2009, 2010), Bhalotra et al. (2015); Currie (2009); Currie et al. (2010); Glewwe et al. (2001); Hoddinott et al. (2008); Lindeboom et al. (2010); Maccini and Yang (2009); Maluccio et al. (2009); Schultz (2005) and Strauss and Thomas (1998).

[2] For the case of education, see for instance Jensen (2010).