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World Institute for Development Economics Research

Working Paper No. 2012/70

# Costly Posturing: Relative Status, Ceremonies and Early Child Development in China

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August 2012

**Abstract**

Presenting gifts at funerals, weddings, and other ceremonies held by fellow villagers have been regarded as social norms in Chinese villages for thousands of years. However, it is more burdensome for the poor to take part in these social occasions than for the rich. Because the poor often lack the necessary resources, they are forced to cut back on basic consumption, such as food, in order to afford a gift to attend the social festivals. For pregnant women in poor families, such a reduction in nutrition intake as a result of gift-giving can have a lasting detrimental health impact on their children. Using a primary census-type panel household survey in 18 villages in rural China, this paper first documents the fact that child health status has barely improved in the past decades despite more than double digit of annual per capita income growth. We show that social squeeze plays an important role in explaining this phenomenon. The toll of participating in social events is heavy for the poor—doubling the number of prenatal exposures to social ceremonies in a village would lower the height-for-age z-score of children …

Keywords: relative social status, squeeze effects, food consumption, stunting, underweight
JEL classification: D13, I32, O15



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This study has been prepared within the UNU-WIDER project 'New Approaches to Measuring Poverty and Vulnerability', directed by Markus Jäntti and Jukka Pirttilä

UNU-WIDER gratefully acknowledges the financial contributions to the research programme by the governments of Denmark (Royal Ministry of Foreign Affairs), Finland (Ministry for Foreign Affairs), Sweden (Swedish International Development Cooperation Agency—Sida) and the United Kingdom (Department for International Development—DFID).

ISSN 1798-7237 ISBN 978-92-9230-533-8

born to poor families This finding sheds some light on the 'food puzzle' raised by Deaton as to why the nutritional status of the poor tends to be stagnant amid rapid income growth in developing countries.

**Acknowledgements**

We are grateful to Douglas Almond, Terri Ballard, Abhijit Banerjee, Christopher Barrett, Andrew E. Clark, Alan de Brauw, Oliver Ecker, Francisco Ferreira, Robert Frank, Ravi Kanbur, Daniel Lichter and David Sahn for helpful comments and discussions. We also thank the audiences at the Allied Social Science Associations Annual Meetings (2012), FAO Symposium (2012), National Bureau of Economic Research China Group Meeting (2011), UNU-WIDER's Poverty and Behaviour Economics Conference (2011), International Food Policy Research Institute Seminar (2011), Leibniz Institute of Agricultural Development in Central and Eastern Europe Forum (2011), Cornell Population Center Encore Conference (2011) and Hong Kong Economics Association Meeting (2010) for useful comments. Funding supports from the Natural Science Foundation of China (Approval number 70828002) and Ministry of Education of China (approval number 08JJD840206) are also gratefully acknowledged. The views expressed herein and any remaining errors are the authors' and do not represent those of any official agency.

Figures and tables are at the end of the paper.



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## 1 Introduction

It is common wisdom that the best way to cut hunger and malnutrition is through income growth. However, Deaton (2010) uncovers a famous food puzzle: despite rapid economic growth in the past several decades in India and China, calorie consumption per capita has declined and the rate of improvement in nutritional status has been relatively slow. Surprisingly, when given more resources, the poor tend to eat less basic staple food but consume greater amounts of tastier, albeit less nutritious, food (Jensen and Miller 2008). Moreover, the poor are more likely to spend their extra income on entertainment and social festivals (Banerjee and Duflo 2007). A question arises: why, amid income growth, do the poor prefer to consume less food at the potential high cost of nutritional status?

Of course, there are many potential explanations to the puzzle. Reductions in physical activities and thus the need for calories associated with economic growth is one representative explanation (Deaton 2010). However, this channel alone cannot explain why the child malnutrition rate in India has barely improved in the past several decades, considering that children's physical activities might not have declined as much as adults. In this paper, we offer an alternative explanation: due to social pressures and concerns for status, the poor are forced to cut basic necessities in order to afford gifts for social events in their communities.

In many low income countries, rural people live in closely knit communities. It is a social norm that people are compelled to attend weddings, funerals, and other social festivals in their communities and present a gift. In a recent book (2011), Banerjee and Duflo provide the following insightful observation on the phenomenon of 'keeping up with the Joneses':

> Poor people in the developing world spend large amounts on weddings, dowries, and christenings. Part of the reason is probably that they don't want to lose face, when the social custom is to spend a lot on those occasions. In South Africa, poor families often spend so lavishly on funerals that they skimp on food for months afterward.

Because the poor have limited resources, the fiscal burden of hosting or taking part in these social events is much higher for the poor than the rich. In order to save money for hosting the events or preparing a gift, the poor have to cut back on basic necessities such as food. Such a reduction in food intake may have a lasting detrimental impact on the nutritional and health status of the poor. In other words, the reductions in food intake and stagnant improvement in nutritional status are likely caused by increased social spending.

It is challenging to test the 'squeeze effects' of keeping up with the Joneses using commonly available household surveys, since they normally sample only a few households in a community, making it impossible to measure relative concerns. In this paper, we use a unique primarily collected census-type panel household survey in 18 villages in rural China to test the squeeze effects of social spending on children's health outcomes. The dataset is unique in several ways. First, all of the households in the villages are measured in three waves. Since the villages are in

remote and poor mountainous areas, the villages form a good reference group. Therefore, we are able to measure the relative deprivation status for each household over years. Second, all of the children's anthropometric information was collected in the third wave survey in 2009. Third, we collected detailed information on funerals, weddings, and all other ceremonies in the past ten years.

Because the number of social events held by other households in a village is largely beyond the control of a family, we use it as an identification strategy to examine the impact of fetal exposures to costly social events on children's health outcomes. However, if the health outcome and number of social events are both influenced by some unobserved factors, the above identification strategy will be biased. For example, a village with a higher mortality rate may be inherently less healthy, therefore displaying higher rate of underweight and stunting among children. To alleviate this concern, we classify social events into negative and positive shocks. Among all social events, funerals are more likely to be associated with bad economic conditions, while other ceremonies (e.g. weddings, coming-of-age, house-building) tend to represent good economic status. We separately examine the impact of fetal exposures to negative and positive shocks[1] on child health outcomes and find the results are robust no matter whether the positive or negative shock variable is used.

We focus on the impact of frequent social events that occur at the very beginning of life—the fetal period. Our results show that it is the children of the poor who are more vulnerable to the shocks of social events. Those born to mothers who were exposed to frequent social events during their pregnancies are more likely to display higher rates of stunting and being underweight for their age. For the poor, attending social events may yield an unintended negative consequence on their children's health outcomes. However, avoiding social networking with neighbours may result in social exclusion.

The rest of the paper is organized as follows: Section 2 provides evidence that social spending imposes squeeze effects on the poor's food consumption; Section 3 examines the impact of prenatal exposures to social shocks on child health outcomes; and Section 4 concludes.

## 2 Social spending and food consumption

### 2.1 Literature on social spending

It has been increasingly recognized in the economics literature that people care about their relative standing in a society and that the concern for status shapes both consumption and savings behaviour (Veblen 1899; Duesenberry 1949; Easterlin 1974; Sen 1983; Frank 1985; Van de Stadt et al. 1985). The literature on relative concern and status consumption is largely focused

[1] Though child birth generally occurs in a good year, the planned pregnancy also determines the timing of delivery and may demonstrate other seasonal/climate/weather patterns. Therefore, we excluded the number of births from the good year shock category. However, the estimation result will not be much affected, since child birth is much less costly than other events. During a birth ceremony, only closest relatives come to celebrate and most gifts are in-kind (mostly in the form of 'red eggs'), which are cheap in monetary terms. Moreover, many local residents preserve the tradition of organizing weddings and birth ceremonies into a single event due to the high organizing cost.

on rich people and high-income countries. It is widely documented that the rich care about status and tend to indulge conspicuous consumptions. Recently, there is an emerging body of literature showing that the poor are also subject to relative concerns—the phenomenon of keeping up with the Joneses applies to the poor as well. For example, the poor prefer to consume designer-label goods in Bolivia (Kempen 2003); lavish weddings are ubiquitous in India (Banerjee and Duflo 2007); funerals in Ghana (*The Economist* 2007) and South Africa (Case et al. 2008) cost more than one year's household income; and in Nepal, rural residents' expected adequate level of consumption is largely influenced by the average consumption of the other people living in the same village (Fafchamps and Shilpi 2008). Powered by relative concerns in a manner similar to the rich, the poor also tend to spend more of their extra income on status goods and in visible social occasions.

Apart from relative concerns, social norms may also dictate the behaviour of social spending. In developing countries, social networks, particularly within villages, can provide informal insurance (Udry 1994). Gift exchanges play an important role in lubricating social networks. For instance, in the event of a family member's death, the pooled gifts from social networks can help the survivors to defray part of what are quite often costly funeral expenses. Attending and presenting a gift at friends' and neighbours' weddings, funerals, and other social occasions is a social norm in many parts of the world.

Though gift-giving is largely reciprocal, it takes time and effort to build and maintain social networks. In China, a family is supposed to pay back previously received gifts later on, according to the prevalent market price of gift size per occasion (Yan 1996). Unfortunately, gift prices have been escalating in recent years due to worsening inequality and particular demographic patterns (Chen et al. 2011). Specifically, some people get really rich and spend heavily on social events, while other people have to follow. Unbalanced sex ratios under the one child policy strengthen the fast increasing gift trends so that families with unmarried sons send more gifts as a marriage market 'signal' (Brown et al. 2011). However, households get gifts back only when they have major ceremonies to hold or suffer from major idiosyncratic shocks, none of which occur regularly. Given absent financial instituteions, the consumption smoothing mechanism because of reciprocal gift exchanges is not valid. Even if in cases gifts are returned at a critical time point, that does not work to improve child nutrition, since gifts received may not be in the form of food or fungible.

It is an open question as to which of the above two channels, i.e., concern for relative standing or social norms, better explains the observed social spending behaviour among the poor. Putting that aside, however, both mechanisms predict that the poor tend to spend more of their extra money on more socially visible goods and activities.

### 2.2 Patterns of social spending in rural China

The objective of this paper is not to test the mechanisms behind social spending, but rather to present empirical evidence that social spending poses a heavy burden on the poor using a unique

dataset from China.[2] China is largely a *guanxi* (network) society. Participating in and presenting gifts at funerals, weddings, and other ceremonies held by fellow villagers have been regarded as social norms in Chinese villages for thousands of years. Despite its ubiquitousness in daily life, there is surprisingly little empirical evidence in the economics literature on the patterns of social spending across income groups and over time in Chinese societies.

The dataset for this study comes from three waves of census-type household survey conducted in 18 villages in Puding County, a nationally designated poor county in Guizhou Province in China (Appendix Figure 1).[3] The survey collected detailed information on household demographics, income, consumption and transfers (see Appendix Table 1 for summary statistics of key variables used in this study). The first wave of the survey included 801 households at the beginning of 2005. The second wave of the survey was administered in early 2007 and 833 households were interviewed. In January 2010, the third wave follow-up survey was conducted and 872 households were interviewed.

The survey area offers an ideal setting to study the relationship between social spending and food intake among the poor for several reasons. First, the poverty rate is quite high in the county. As shown in Table 1, in 2004, more than one-third of people lived below the national poverty line. Using the higher international poverty line of one dollar per day, the poverty incidence is higher. Second, despite the initial high incidence of poverty, the real per capita income has grown rapidly at an annual rate of more than 10 per cent from 2004 to 2009. However, we do not observe any improvement in most categories of basic food intake. This provides us with a good opportunity to study Deaton's food puzzle as to why the improvement in nutritional status has been stagnant among the poor amid rapid income growth. Third, our survey villages are in rather isolated and mountainous areas. In such an isolated environment, villagers naturally interact much more frequently with each other within the same village than with those residing outside their home village. As a result, the villages form a clearly defined reference group.[4] By surveying all the households in the villages, we are able to accurately measure relative income status for each household within a village.

In the second and third waves of the survey, we asked the households to report major events, including weddings, funerals, coming-of-age ceremonies, during the past ten years, as well as the related expenses and gifts received. In this area, all the households keep a gift book, which lists the amount of all gifts received and the names of gift givers in major ceremonies held by them. In the third wave of the survey, we used digital cameras to record gift books from all the households in three out of eighteen villages. The data enable us to examine the patterns of social spending in different social occasions over time and across income groups.

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[2] In another paper, Chen et al. (2011) look at the relative importance of peer effects, status concern, and risk pooling on the escalation of social spending in rural China and conclude that peer effects and status concern well explain the observed gift-spending pattern in rural China. Meanwhile, risk-sharing is not the underlying determinant.

[3] This survey was jointly conducted by the International Food Policy Research Institute (IFPRI), the International Center for Agricultural and Rural Development (ICARD) at the Chinese Academy of Agricultural Sciences (CAAS), and Guizhou University.

[4] Because of the high degree of isolation from the outside, people within a village know each other well. Three small neighbouring villages of ethnic Miao group form a strong bond among themselves. Therefore, we combine them when defining a reference group.

Table 2 presents the average gift size per occasion, number of weddings and funerals, and participation rate of funerals within a village during 2004-08, based on the gift record data collected in three villages. Four salient features are apparent from the table. First, average gift size per occasion has increased from 2004 to 2008. Second, the difference in gift size between rich and poor is minimal. The poor at the bottom 25 per cent of the income distribution on average spend even more on a gift per occasion than their top 25 per cent counterparts in the same village across all the years. The finding is consistent with our field observation that in the survey areas, there is an implicit 'market price' for gift size per occasion that people follow when extending a gift. Third, participation at funerals is almost universal within a village. As shown clearly from the last column, more than 95 per cent of households attend fellow villagers' funerals. Fourth, participation rates between the rich and the poor in social events are very similar, especially for funerals. Figure 1 shows that households in the poorest income group participate more widely in funerals than the third and fourth highest income groups.This is consistent with the findings by Brown et al. (2011) that participating in funerals is largely driven by social norms. The rather standard gift size and nearly universal participation rate of major ceremonies indicate that the average gift expenditure per capita in a village should be positively related to the number of ceremonies held in a year. This is apparently the case, as shown by the strong positive correlation between the two variables in Figure 2.

### 2.3 The squeeze effects of social spending on food consumption

Because the poor have limited financial resources, social spending poses a much heavier fiscal burden on the poor than the rich. In order to afford a gift to attend a social festival, they have to make a sacrifice elsewhere. Living on the margin, they have little to cut back on. Tightening their financial belt and skimping on purchases of meat, sugar and other food items for a few weeks after the ceremony is often the default option for the poor. Figure 3 plots the share of cash expenditure spent on gifts and food by relative status, measured by Deaton relative deprivation index (2001, shortened as RD index hereafter).[5] For those with lower relative status (larger value along the horizontal axis), we can clearly see that the drop in the share of food expenditure is accompanied by the increase in the share of gift expenditure. In principle, they could eat more food and suffer less from malnutrition by simply spending less on gifts. But apparently they did not make such a choice. By comparison, for those households with higher status (smaller values along the horizontal axis), both lines barely move.

To further test the squeeze effects of social spending on the food consumption of people with low status, in Table 3 we run a seemingly unrelated regressions (SUR) on the share of food and gift cash expenditure. In the first regression (R1), we include the number of ceremonies other than funerals held by fellow villagers,[6] Deaton RD index, the interaction term between the above two variables, as well as a set of control variables at the household level, and year and village fixed effects. Ceremonies held by other families within the same village are largely exogenous shocks to a family. Since the 18 villages are in the same township, they are likely to be subject to the same covariate natural shocks, if any, mitigating some concerns about unobserved

[5] We will discuss the measure in detail in the next section.

[6] Throughout the estimations in this paper, we take the log form for the number of funerals and other ceremonies.

idiosyncratic natural shocks. The coefficient for the interaction term in the food share equation is statistically significant and negative. This suggests that those with lower status spend less on food consumption than their richer counterparts, provided that they attend the same number of ceremonies in a given year.

However, one may still argue that the number of ceremonies might capture some unobserved factors which also determine consumption patterns. For example, it is possible that residents in a richer village can afford more wedding, house building and coming-of-age ceremonies (positive shocks) than those in a poorer village and they are likely to consume more food. In contrast, the population in villages with greater number of funerals (negative shocks) may be generally poorer. Consequently, they may have less money to buy food. Therefore, the positive and negative shocks may bias the estimation of food consumption in different directions. Although it is difficult to find good instruments to ameliorate the concern on the potential endogneity problem of the ceremony variable, we run separate regressions by using positive and negative shocks to see if the estimates fall in a narrow band. If both positive and negative shocks yield similar results, we can confidently rule out the potential bias as a result of endogneity. The coefficient for the interaction term in the second regression (R2) remains negative and significant, suggesting squeeze effects of social spending on food consumption among those in the lower social spectrum.

## 3 Quantifying the effect of social spending on child health outcomes

### 3.1 Fetal origins hypothesis

To resolve Deaton's food puzzle, next we need to test if a cut in food intake as a result of social spending comprises nutritional status, in particular that of children. A burgeoning body of literature on fetal origins hypothesis suggests that *in utero* is a critical period for human development. In utero exposures to malnutrition are likely to adversely affect health outcomes in later life (Barker and Osmond 1986; Barker et al. 1989).

However, it is impossible to directly test this hypothesis using human subjects in a controlled experiment. The empirical literature largely relies on natural shocks, such as famine and drought, to identify the casual effect of prenatal exposures to malnutrition on long-term health outcomes. For example, studies based on the Dutch Famine (1944-45) reveal that the famine had negative impacts on various health related outcomes, such as mental disorder in early adulthood, schizophrenia, and lower glucose tolerance in adults (Neugebauer et al. 1999; Brown et al. 2011; Hulshoff Pol et al. 2000; Ravelli et al. 1998). Similar fetal origins effects are found in studies on the 1918 flu (Almond 2006) and the Chernobyl radioactive fallout (Almond et al. 2009). Children born during a drought in rural Zimbabwe show a higher rate of stunting in the subsequent two years (Hoddinott and Kinsey 2001). Maccini and Yang (2009) show that high rainfall at the very beginning of life is associated with better health and education outcomes in later life for Indonesian women.

Yet, not all empirical studies based on natural shocks confirm the fetal origins hypothesis. For instance, studies on the survivors of the Leningrad Siege (1941-44) in general conclude that

those exposed to starvation in the fetal stage do not show much difference in health outcomes from cohorts born outside Leningrad and in other years in the later stages of life. One key reason is that in the event of severe shocks like the Leningrad Siege, only the healthier survive and can be observed in later life. Therefore, the presence of mortality selection renders it less likelyfor researchers to observe the negative health impact on the survivors later on. Mu and Zhang (2011) show that prenatal exposures to the Chinese Great Famine (1959-61) result in higher disability rates for female survivors but not for males, largely because of much larger excess male mortality rates during the famine.

The studies based on natural shocks have provided tremendous insight into the fetal origins hypothesis in extreme events. However, estimates of the effects of mild exposures may be more relevant to policy than estimates of the effects of disasters. Almond and Currie (2011) argue that the immediate mortality and economic disruption from the 1918 flu or the China famine are sufficient to imply that any reasonable measure to prevent such catastrophes is likely to pass a cost-benefit calculation, thereby showing that there was additional damage to fetal health from these disasters merely 'makes the rubble bounce'.

Moreover, most people, even the poor, do not suffer from natural shocks as severe as famine. Instead, they face more frequent, yet minor, social shocks–funerals and wedding that they are obligated to attend. Do children born to mothers exposed to more frequent social shocks have worse health outcomes as predicted by the fetal origins hypothesis? To our knowledge, no studies have examined the impact of prenatal exposures to social shocks on child health outcomes.

In the third wave of our survey, we collected anthropometric information for all the children in our sample. The data enables us to address the above question. We use three variables—height-for-age, stunting, and underweight–as major child health outcome measures. Stunting and underweight are defined based on two standards: the WHO standard and the standard of China Center for Disease Control and Prevention (CDC).

Height-for-age measures the cumulative long-term nutritional status an individual has obtained over the life course, while weight-for-height or BMI-for-age measures more acute changes. Weight-for-age and underweight may confound the height-for-age measure. A stunted child would have a low weight-for-age z-score due to his low height even if his weight-for-height z-score is normal. If squeeze effects due to prenatal exposure to social shocks are found, it should be mainly related to height-for-age and stunting status but to a much lesser extent related to weight-for-age[7] or underweight and not related to weight-for-height. A comparison of the most important anthropometric indicator in this paper—height-for-age z-score—between our IFPRI-

[7] Weight-for-age is not adopted in this paper due to the concern for measurement errors. The third wave survey took place in January, the coldest time of the year when people often wear heavy winter clothes. However, it is difficult to weigh children's clothes, in particular those of newborns. Therefore, the measurement for the weight of young babies is likely less accurate. In the wake of potential large measurement errors on anthropometric information among newborns, we exclude those born in 2009 (i.e., 1-12 months after birth) from our empirical analysis. The doted vertical reference line in the Appendix Figure 2 shows this cut-off point. More importantly, we have to exclude those samples because our 2009 survey was conducted in January 2010 during which social events were frequently held. Without the complete number of events including January, the definition for number of social events in lunar year 2009 is inaccurate.

CAAS Guizhou sample and the matched CHNS 2004 & 2006 Guizhou sample is drawn in the Appendix Figure 2 and help confirm the data representativeness.

As shown in Table 4, nearly half of children born in 2008 are stunted. Despite impressive annual rates of income growth of more than 10 per cent during 2004-08, the stunting rate had not declined, but rather rose slightly in the sample villages. The problem is more acute among girls, whose stunting rate increased from 41.4 per cent in 2004 to 55.6 per cent in 2008. The rate of underweight shows a similar pattern. Overall, the prevalent high stunting and underweight trend is consistent with He and Chen (2004) that in impoverished counties in Guizhou and Guangxi the most recent stunting and underweight rates are around 60 per cent and 30 per cent, respectively. As illustrated, the Deaton food puzzle can be observed in rural China as well.

The observed Deaton puzzle may have something to do with in utero exposures to social shocks. Table 5 reports the average height-for-age z-score for children born between 2004 and 2008 according to low and high income groups in villages with more frequent and less frequent social shocks (number of all ceremonies). The last column measures the difference-in-differences (DID) of the z-score. Almost all the values are negative, suggesting that it is children of the poor income groups who exhibit lower z-scores when exposed to more frequent social shocks at the fetal stage. Because of the small sample size for each cohort, we cannot compute the *t*-value of the DIDs. In the last row, we pool together all the children born between 2004 and 2008. The DID value is significant and negative. While this simple analysis based on two-by-two discrete groups shows some suggestive evidence on the squeeze effects of social spending on child health outcomes, it is interesting to further investigate if there is a linear negative relationship between the continuous variables of z-scores and number of ceremonies.

Figure 4 depicts the height-for-age z-score against the number of ceremonies exposed in the fetal period for the high and low income status groups. For the low-income status group, the greater number of exposures to ceremonies, the lower value of z-score. In contrast, the figure does not reveal an obvious pattern between z-scores and social shocks for the high-income group.

The simple DID analysis and bivariate plot provide tentative evidence in support of the squeeze effects of fetal exposures to social events. In order to more rigorously verify the squeeze effects, we need to control for more variables in more quantitative analyses.

### 3.2 Measuring reference groups and relative status

Before going to the quantitative analyses, we need to first define reference groups and measure relative status. The theoretical models on relative concerns often take reference groups as given. However, in empirical analyses, defining reference groups is more of an art than science. People interact with others in different cycles in their work and family life. Identifying and measuring reference groups are always a great challenge for empirical research on social interactions.

The challenge may be greater in cities than in rural areas. In rural areas in developing countries, people often live in a rather close community. Two recent studies on China show that people in rural China often use their home village as a reference group (Knight et al. 2007; Mangyo and Park 2011). In our survey area, the villages are located in an area renowned for its *Karst*

landform, which presents a barrier for frequent interactions across villages. Therefore, in this paper, we primarily use the village as a reference group in our empirical analyses.[8]

Having defined reference groups, next we need to measure relative concerns, as they are often mentioned as a key motive behind social spending in the literature (e.g. Brown et al. 2011; Chen et al. 2011). In this paper, we adopt the widely used Deaton RD index (2001). The index captures the idea that a person is deprived if others in the group possess something that one does not have. It closely follows the spirit of Frank et al. (2010) and Hopkins and Kornienko (2004).[9]

The Deaton RD index originated from Yitzhaki (1979) and Wildman (2003). The level of deprivation experienced by an individual *i* with income *y*[10] relative to another individual with income *z*is formulated as,

$$D(i;y) = z - y \text{ if } y < z \quad \text{or} \tag{1}$$

$$D(i;y) = 0 \text{ if } y \geq z \tag{2}$$

Based on this formula, an individual would feel more deprived as the number of individuals in society with more income than this individual increases. Thus, an overall measure of deprivation for the individual *i* is computed by summing the differences in income and weighting it with the proportion of people with higher income than the individual *i*. The above measures tend to overstate relative deprivation of individuals in high-income reference groups. This could be a very important issue when incomes differ substantially across groups. To make scale invariant, Deaton (2001) proposes a measure of relative deprivation for an individual *i* with income *x*:

$$(1/\mu)\int_{x}^{x^T}(y-x)dF(y) \text{ or } (1/\mu)[1-F(x)][\mu^{+}(x)-x] \tag{3}$$

where $\mu$ denotes mean income for those in the reference group, $x^T$ is the highest income in the group. *F(y)* is the cumulative distribution of incomes among individuals in the group, and $\mu^{+}(x)$ is the average income of those with income higher than the individual with income *x*. The Deaton RD indexnormalizes difference between average income of those with higher income and income *x* weighted by the proportion of those with income higher than the individual *i*.The Deaton RD index takes into account differences in the scale of income distribution across groups. Unlike other deprivation measures, such as deprivation of absolute income (Li and Zhu 2006), the Deaton RD indexis scale invariant. In others words, it will not automatically doubleas everyone's income doubles.

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8 We also check the robustness of our results using alternative reference groups—surname networks within a village.

9 Frank et al. (2010) define 'expenditure cascade' in an economy where every agent judges own behaviour based on others closest above them. Hopkins and Kornienko (2004) develop a rank-based theoretical model that captures the status concern motive for lower ranked agents. In the model, rising average income of their fellow residents triggers a competition for status that extends all the way down to the bottom of the distribution. Moreover, Hopkins and Kornienko (2004) relate positional spending to a measure of income inequality, which pave the way for us to empirically identify status seeking and social influences.

10 *Y* can be defined in the dimension of income, consumption, assets and so on. Here income is utilized, which includes both in-kind and cash income.

### 3.3 Quantifying the effect of social shocks on child health outcomes

The standard child nutritional and health demand function, derived from a welfare maximization framework, often includes income, food prices, access to healthcare, genetic make-up, and other individual characteristics (Behrman and Deolalikar 1988; Strauss and Thomas 1995, 2008). In this paper, we include the Deaton relative deprivation measure as well as its interactions with variables of interest as additional variables. The specification can be written as:

$$Outcome_{ijt} = \alpha RD_{j,t=1} * CAB_{j,t=1} + \beta RD_{j,t=0} * CBB_{j,t=0} + \gamma_0 RD_{j,t=1} + \gamma_1 RD_{j,t=0} + \gamma_2 CAB_{j,t=1}$$
$$+\gamma_3 CBB_{j,t=0} + \alpha_c \cdot C_{ijt} + \alpha_p \cdot PCG_{jt} + \alpha_p \cdot PB_{jt} + \alpha_h \cdot H_{jt} + \alpha_s \cdot S_{jt} + \upsilon_v + \delta_t + \varphi_{vt} + \varepsilon_{ijt} \quad (4)$$

where $Outcome_{ijt}$ denotes child *i*'s nutrients intake and health status in household *j* at time *t*; $RD_{jt}$ denotes relative status for household *j*; $C_{ijt}$ is a vector of child *i*'s characteristics, including age, sex and birth order; $PCG_{jt}$ is a vector of characteristics of the principal care giver, including household head sex, mother's education, ethnicity, mothers' height[11], presence of grandparents, and presence of mother and father in a household; $PB_{jt}$ denotes parental health behavior, including whether parents smoke or drink alcohol; and $H_{jt}$ is a vector of local health facility characteristics, such as distance to the closest clinic center. Other household characteristics, including household size, major shocks (illnesses and natural disasters), and per capita income are controlled for.[12]

$\upsilon$ is a set of village fixed effects that account for any time-invariant differences between villages (such as geography) that may also be correlated with social events and child health outcomes. $\delta$ is a set of year of birth fixed effects, which account for any year-to-year changes in birth conditions that occur for the surveyed region that potentially correlate with social events (such as business cycles). The baseline model in Panel A of Table 3.4 includes both year and administrative village fixed effects. In Panel B of Table 3.4, we further include a set of administrative village-specific linear time trends that address the concern that the trend in social events within some villages is spuriously correlated with the trend in child health outcomes across villages over time. In Panel C of Table 3.4 and all the other regression tables, we further control for administrative village x year fixed effects $\varphi_{vt}$. To account for the possibility that the stochastic error terms ($\varepsilon_{ijt}$) are correlated within villages over time, the estimations are clustered at the year x administrative village level. The results are robust when the estimations are clustered at the village level.

11 Fathers' health status is not included, since some of them were migrating out to work during our survey. In most cases, mothers and children were left behind in the villages. Throughout this paper, our results controlling mother's height are robust to the use of mother's BMI.

12 Here we use income as a proxy for wealth and to measure relative deprivation status in our paper. We also compute asset index based on livestock and family assets and used it as a proxy and the main results remain largely the same.

Two time periods are critical in the identification of squeeze effects: the fetal period (t=0) and the period after birth (t=1). $CBB_{j,t=0}$ is the number of ceremonies held by other families within the same home village in the year prior to child i's birth. Similarly, $CAB_{j,t=1}$ is the number of ceremonies held by others during child i's birth year. The main coefficients of interest are $\gamma_2, \gamma_3$, $\alpha$ and $\beta$. The magnitude and significance level of these coefficients as well as $\gamma_2 + \alpha RD_{jt}$ and $\gamma_3 + \beta RD_{jt}$, shows us degrees of exposures to social events shocks in the fetal period or after birth matter to child health outcomes.

As discussed earlier, although the number of all ceremonies held by other families within a village is largely beyond an individual household's control, the number of ceremonies may reflect a village's wealth level as well as other underlying unobserved factors, which may potentially influence child health outcomes. To address this concern, we distinguish negative shocks (number of funerals) from positive shocks (e.g. weddings, coming-of-age and other ceremonies). If positive and negative shocks also represent the underlying unobserved health conditions in a village which are correlated with child health outcomes, then the estimations based on positive and negative shocks will yield biases in opposite directions. Therefore, separate regressions using positive and negative shocks provide us with a lower and upper bound of the effect. If both sets of regressions produce significant results with similar magnitude and the same sign, it suggests that there are indeed squeeze effects.

The simultaneous identification of prenatal social events shocks $CBB_{j,t=0}$ and social events shocks after birth in our study does not confound each other. In our survey, dates of birth were recorded based on household registration book, which follows the western calendar. However, dates of social events were recorded according to respondents' recall, and local rural residents generally adopt lunar calendar in their everyday life, which spans from February to January. As shown in Figure 5, most ceremonies (except funerals) are planned and held at the end of the lunar year, i.e., January, when nearly all families come back to celebrate the Chinese lunar new year.[13] The timing of major social events in the lunar calendar combined with dates of birth in the western calendar makes sure that children in the prenatal period are exposed to most social events in the year prior to birth (t=0), while most social events in the birth year (t=1) occur after child birth.

Even if funerals are most often unplanned and held throughout a year, they demonstrate a seasonal pattern—a disproportionate share of them are between November and the following January (Figure 5)—due to typical demographic characteristics that more people die in winter than in any other seasons. This fact ensures a clean identification using the number of funerals.

Considering that the normal gestation period is 38-42 weeks, the clustered number of social events towards the end of the lunar year guarantees children born before the end of the following September had prenatal exposure to most of these social events. The earlier the birth date, the

[13] Though we do not have information about the exact timing of all social events for 18 villages, nearly all gift record books we collected from 3 out of 18 villages provide us with rich information about the timing. Since the three villages are very similar in terms of socioeconomic conditions to the other 15 villages, we can infer that the pattern of timing generally applies to all these villages.

later a child is exposed to clustered social events during the fetal period. However, for children born between October and December, none of them directly experienced social events shocks in the prior year. In the robustness checks, we restrict our sample to children born between February and September.

Building upon the findings from Figure 4 and Table 5, we run separate regressions on three child health outcome variables,—height-for-age z-score, stunting, and underweight,—in low and high income groups. The specification is the same as in equation (4) except that it excludes the interaction terms of RD. Table 6 reports the regression results for the key variable of interest, the number of funerals (or other ceremonies) exposed in prenatal period and after birth, respectively. Children born to mothers in low income groups, who are exposed to more funerals or other ceremonies during their pregnancies, show lower height-for-age z-scores and display higher rates of stunting and underweight. Doubling the exposure to funerals or other ceremonies in the network on average corresponds to 0.37-0.57 standard deviation lower height-for-age z-score and 0.33-0.56 standard deviation higher stunting rate. In contrast, the health outcomes of children born to richer families do not appear to be vulnerable to social event shocks experienced in the year prior to their birth. More social events experienced by children in rich families are even associated with insignificantly better height-for-age z-score. For them, more social events in the neighbourhood mean more social capital than social burden and mobilize resources towards children. Unlike in utero exposures, the number of social events exposed after birth have little to do with child health outcomes. The findings in this table indicate that the health outcomes of children born to poor families are associated with the number of social events held in their village in the year before their birth.

One may question the arbitrary way of dividing the sample into low and high-income groups. In Table 7a, we regress the three health outcome variables on the whole sample by interacting the Deaton RD measure with the incidence of funerals or other ceremonies at the village level in the year prior to or in the year after child birth. Regardless of whether we use the number of funerals or other ceremonies, the interaction term of in utero exposures to the number of social shocks incurred prior to birth with the Deaton RD measure is always statistically significant, negative in the regression on height-for-age z-scores, and positive in regressions on stunting and underweight rates. In comparison, the squeeze effects identified by number of funerals show larger marginal effects than identified by number of other events. This is consistent with our earlier expectation that in utero exposures to bad year social events are more detrimental to early child development than good year social events. Moreover, none of the coefficients for the interaction term between the Deaton RD measure and the number of funerals or other ceremonies after birth is significant.

Considering that a larger value of the RD measure means a lower status, the significant interaction terms mean that children from households with lower economic status and who are prenatally exposed to social event shocks are more likely to be shorter and develop higher rates of stunting and underweight than those from higher status households. In Panel A of Table 7a, the baseline estimations with year fixed effects and administrative village fixed effects are presented.squeeze effectssqueeze effects

In Panel B of Table 7a, administrative village-specific year trends are further controlled for. Both Panel A and B find significant squeeze effects on health outcomes towards the poorer segment. While the mean and distribution of RD index over the three-wave survey are known, the first derivative of equation (4) with respect to the number of social events tells us the proportion of households suffering from net squeeze effects.squeeze effectssqueeze effects Panel C in Table 7a, our preferred specification, adopts village X year fixed effects, which captures more general village-specific unobservable factors over time. The squeeze effects are significant and marginal effects are similar to Panel A and B. Specifically, when all ceremonies other than funerals are included, all households suffer from net squeeze effects. Even when only funerals are included, at least households with Deaton RD values above or equal 1/3 suffers significantly from squeeze effects. In other words, the cutoff point for net squeeze effects applies to a majority of local households.

One common finding worth noting in Table 7a and other Tables follow by is that squeeze effects are almost always much more significantly demonstrated in the longer term nutritional status measures, i.e., height-for-age and stunting, than in the shorter term measure, i.e., underweight status, suggesting the long-term negative impact of prenatal exposure to costly social events. However, underweight may not be a good measure for comparison, since a child suffering from stunting is very likely to also suffer from being underweight only because of their small stature. Therefore, it is worthwhile to further get rid of the potential confounded longer and shorter term effects. If the main driving force of stunting is in utero exposure to malnutrition, we should expect that the effects are not captured by more acute health measures. Table 7b finds that the squeeze effects are not embodied in the contemporaneous nutritional status, i.e., weight-for-height z-score, which strengthens our argument that fetal origins effects are the main driving force behind bad child health outcomes.

In the two tables just mentioned, we do not distinguish the different impacts on boys and girls. In the human biology literature, it has been widely documented that boys are more susceptible to adverse nutritional environment than girls in the early stages of life. To examine the potential gender difference, in Table 8, we run separate regressions on the health outcomes of boys and girls. The upper panel reports the results using the number of funerals as proxy for social spending, while the lower panel uses other ceremonies to represent social events.We find that boys from lower status households who are prenatally exposed to the same number of funerals display worse health outcomes than those from higher status families. However, prenatal exposures to social events do not seem to affect girls' health outcomes. The findings are largely consistent with the literature that girls are more robust than boys in early life.

In addition to running separate regressions using positive and negative shocks to check the potential bias of unobserved factors, we also run a falsification test on the squeeze effects by lagging the variable on the number of funerals and other ceremonies by one year. In other words, in this test the variable labelled '# of social events before birth' actually corresponds to the number of social events held in a village two years ahead of child birth, which is supposed to have nothing to do with the prenatal health status, rather than in the year prior to birth. If some unobserved factors instead of the squeeze effect drive the result, we would expect that the coefficient remains significant in the falsification test. Fortunately, all the coefficients for the

interaction terms in Table 9 are statistically insignificant. Thus, the number of funerals in years other than the year prior to child birth does not seem to affect child health outcomes.

### 3.4 **Robustness checks on the** squeeze effects

Because we do not know the exact dates of all ceremonies, we cannot match them with the months of mothers' pregnancies. Instead, we simply count the number of all ceremonies held by other families in the home village in the year prior to a child's birth and use it as a measure of fetal exposures to social shocks. This simple procedure may result in measurement errors. For example, if a child is born between October and December of this year, then ceremonies held in the last year won't directly affect the child's in utero development. As a robustness check, we restrict our sample to those children born between February and September. Children in this sample are definitely conceived in the year prior to their birth, and the feature of social events' clustering towards the end of the lunar year further ensures direct exposures. Table 10 repeats the main regressions in Table 7 on the restricted sample. The coefficients for the interaction terms between the Deaton RD measure and the number of funerals or other ceremonies prior to birth are statistically significant and in expected sign. The findings are consistent with those reported in Table 7.

Although people are familiar with each other within villages, villagers from the same family clan are still likely to interact more frequently among themselves than with other clans. If it is true, then using the village as a reference group would likely result in measurement errors on relative status and consequently estimations bias on the regression results. We classify households whose heads share the same surnames as the same network. Households belonging to a larger surname network tend to participate in more social events.

Table 11 presents the regression results. The regressions follow the same specifications as in Table 7 except that we replace villages with surname networks as a reference group. Specifications R1-R3 in the upper panel use the number of funerals within villages. The coefficients for the first interaction term in R1-R3 are statistically significant, showing that funerals held in surname networks tend to lower the height-for-age z-score and increase the probability of underweight for those children from lower-status households. As shown by the significant coefficients in the height-for-age z-score regression in the lower panel, when using the number of other ceremonies as an indicator of social spending, the squeeze effects still show up. It is noted that none of the interaction terms between RD measures and the number of funerals or other ceremonies after birth is significant. Overall, regressions based on two different reference groups yield largely consistent results—prenatal exposures to social event shocks have an unintended negative consequence on the health outcomes of children born to lower-status families.

The literature on fetal origins hypothesis has shown that mortality selection associated with extreme natural shocks may mask the identification of long-term negative impact on health (Mu and Zhang 2011). In the event of severe shocks, the most fragile fraction of the population is more likely to die first. As a result, the survivor population tends to be healthier than the general population in the absence of shocks. In other words, the presence of mortality selection will

make it harder to discern the adverse effect of fetal origins. The population in the 18 villages in our sample was not subject to any major natural shocks. The social events, albeit a heavy fiscal burden for the poor, are unlikely to lead to excess mortality. The presence of excess mortality, if any, will only strengthen our results as the selection effect tends to trump the scarring effect (Pearson 1912; Bozzoli et al. 2010).

Another potential selection problem is that children may have moved to cities with their migrant parents, thereby leaving behind an unhealthy group of children in the villages. Our surveys were conducted right before the Chinese New Year when almost all migrants return home and children are at home for their winter break. Comparing the list of respondents' names from the 2006 survey with that of the 2009 survey, we do not find any attrition. Although many young people have taken migratory jobs throughout most time of the year, they generally leave their children behind with grandparents in their home villages because of the high cost of living and discrimination against migrants' children in urban schools.

The stunting and underweight cutoff values are based on the WHO standard. The Chinese population is on average shorter and lighter in weight than the world average, thereby likely implying a cutoff value. The China Center for Disease Control (CDC) publishes its own cutoff values for the Chinese population. In Table 12, we report the main results with the same specifications to Table 7 by replacing the WHO standard with the CDC standard. Both the sign and magnitude of prenatal squeeze effects are quite similar to those based on the WHO standard. Once again, we do not find a noticeable effect on exposures to social shocks after birth.

Finally, since height-for-age z-scores can be both positive and negative, we cannot directly take a logarithm on them. Instead, in our main regression, we simply use the original z-scores as a dependent variable, although most of the right-hand variables are in logarithmic form. To explore whether this linear-log specification yields drastically different results, following Hoddinott and Kinsey (2001) we transform the z-scores into percentiles according to international standards and then take the logarithm of the percentile. In general, the results on the squeeze effects of in utero exposures to social shocks remain largely the same as using z-scores. To save space, the results under this specification are not reported but available upon request.

## 4. Conclusions

It has been widely noted that the improvement in nutritional status among the poor in developing countries lag far behind income growth. Deaton (2010) and Banerjee and Duflo (2007) have asked: why do the poor not eat more with their extra income?

In this paper, we argue that social spending can squeeze out food consumption, which in turn compromises nutritional status. In developing countries, most of the poor live in a close community where they know each other well. Their consumption decisions are shaped not only by their own preferences and budget constraints, but also by peers in their communities. When peer pressure and relative status are of importance, people tend to spend more on visible goods and activities (like social festivals) at the expense of less visible goods, including food.

Gift exchange is almost a universal phenomenon in developing countries. One important feature of gift exchange is reciprocity. In many rural areas, it is a social norm to attend neighbours' weddings, funerals, and other major ceremonies. Because of the reciprocal nature of gift exchange and 'mandatory' participation, gift-giving places a much heavier burden on the poor than on the rich. In order to afford a gift, the poor often have to forgo the consumption of meat, eggs, and other food items for weeks after attending a social event. Such a squeeze on food intake can extract an unintended long-term toll on unborn children. In contrast, because they have financial slack and food consumption accounts for a small share of their budget, the rich do not need to worry about food consumption when engaged inconspicuous behaviour.

Using a unique census-type household survey collected in remote mountainous villages in China, we are able to clearly define reference groups and empirically examine the impact of social spending on food consumption and nutritional status. We find that children born to households with lower income status develop shorter and lighter physical stature if their home villages held a greater number of social events in the year prior to their birth.

A question thus arises: given the negative impact of social spending on child health outcomes, why do the pregnant women not avoid attending fellow villagers' social festivals in the first place? There are several possible explanations. First, people may not be aware of the negative health consequence of prenatal exposures to social events. To our knowledge, this paper is one of the first papers to provide empirical evidence showing the existence of such an effect. It is likely that a more informed mother will be more careful in making a choice between eating adequate and healthy foods and attending a neighbour's social event.

Second, when rewards for higher status are high and punishment for lower status is grave, people, in particular the poor, will intensify their competition in status goods consumption (Hopkins and Kornienko 2004). In China, sex ratios have become increasingly unbalanced (Bulte et al. 2011). As a result, the marriage market competition has intensified greatly over the past several decades. Under such a marriage market squeeze, the poor have to vigorously signal their wealth through bigger houses, more generous bride price payments, lavish wedding banquets, and active participation in social events within their village. In fact, the competition in social spending is more intensive among the poor segment of the population in rural China (Brown et al. 2011; Chen et al. 2011).

In this paper, we have focused mainly on child health outcomes. In utero exposures to adverse events may also affect education achievement and earning potentials in later life (Almond and Currie 2011). As predicted by the fetal origins hypothesis, people who are exposed to a malnourished environment before birth are likely to develop a series of chronic diseases in adult life. As a future research project, it is interesting to continue to follow the population in the villages over a longer period of time and quantify the impact of in utero exposures to social events on education achievement, earnings, and health outcomes in later stages of life.

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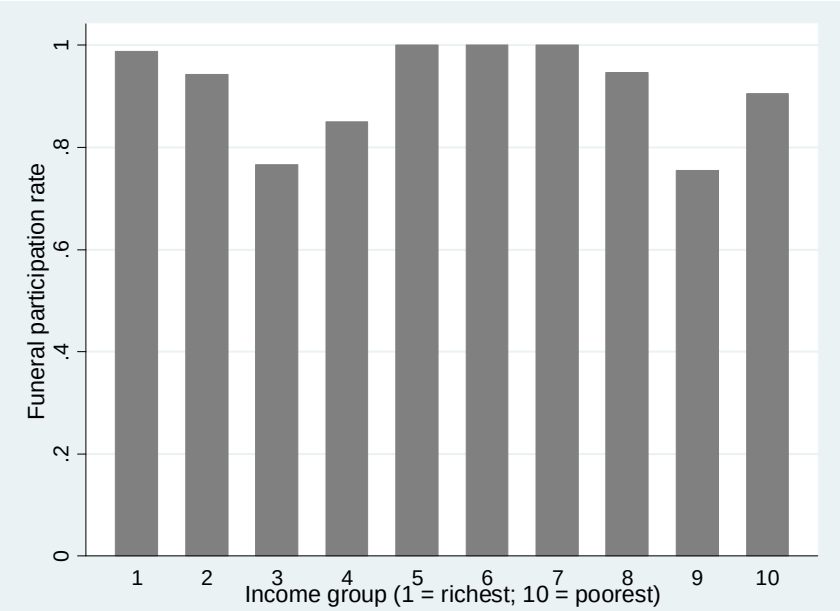
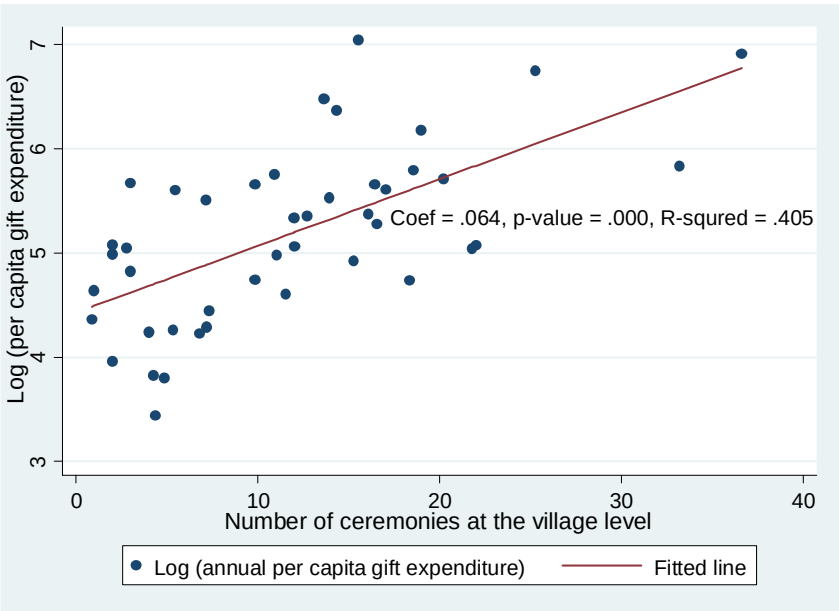
Figure 1: Income level and funeral attendance rate in local villages




Notes: The population is divided into 10 groups by per capita income. The vertical axis represents the participation rate of funerals by income groups.

Sources: Authors' gift record data.

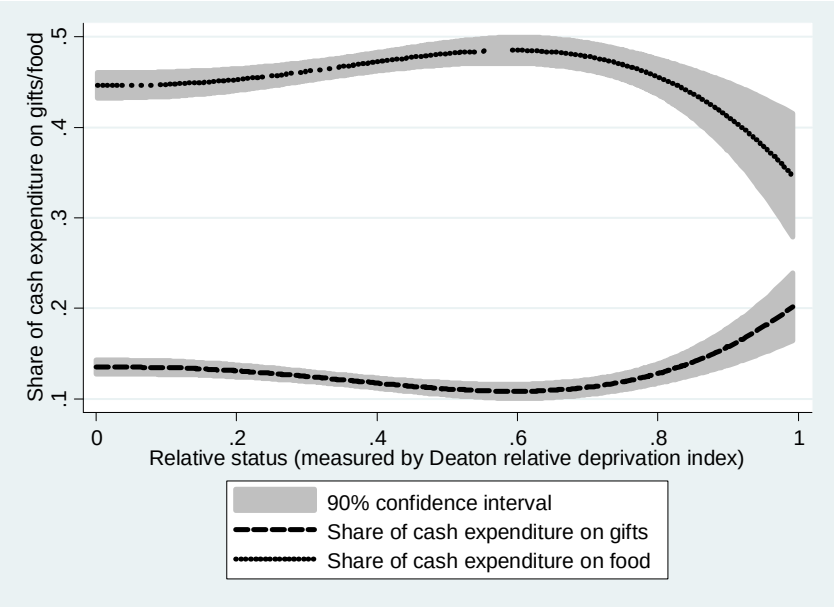
Figure 2: Average per capita gift expenditure and number of ceremonies at the village level




Notes: The figure is computed based on our three-wave household survey data in 2004, 2006 and 2009 in Guizhou Province. The horizontal axis stands for the number of ceremonies at the village level in the three years, while the vertical axis represent the average per capita gift expenditure (log) at the village level in the corresponding year.

Sources: Authors' survey data.

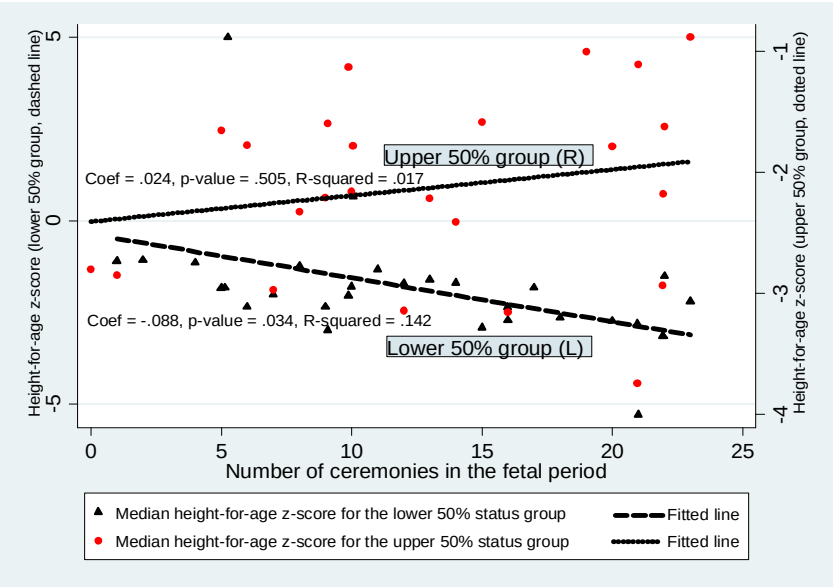
Figure 3: Share of cash expenditure spent on gifts and food




Notes: Deaton index ranges from 0 to 1 with 1 corresponding to the lowest status and 0 standing for the highest status. All households surveyed in 2004, 2006 and 2009 are used to generate this figure.

Sources: Authors' survey data.

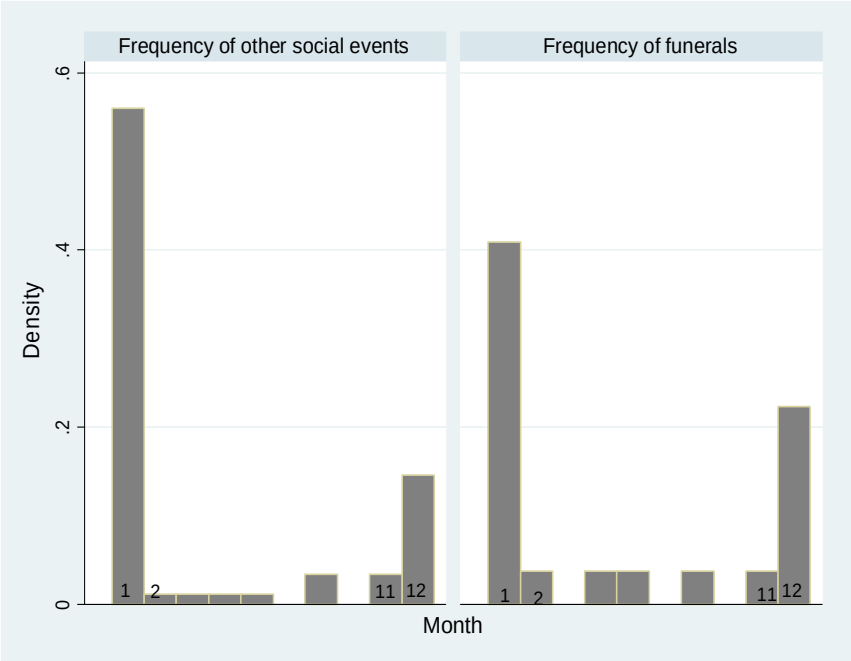
Figure 4: Number of ceremonies and height-for-age Z-score by income status group




*Notes:* The high- and low-income groups are divided based on the difference between household average income status and village average income status over the three wave survey between 2004 and 2009. The anthropometric information for children born in the period 2004-08 is taken from the 2009 survey. The vertical axis represents the average height-for-age z-score corresponding to the number of ceremonies at the village level between 2003 and 2007.

Source: Authors' survey data.

Figure 5: Distribution of social events by month




Notes: Information on all ceremonies during 2005-09 was collected from all households in three out of eighteen villages in rural Guizhou. Childbirths and funerals are excluded from the left figure.

Sources: Authors' gift record data.

Table 1: Summary statistics on major economic indicators of Guizhou household surveys in 2004, 2006, and 2009

| | Three Wave | | |
|---|---|---|---|
| | 2004 | 2006 | 2009 |
| Per capita annual income (RMB) | 1404 | 1817 | 2855 |
| Income below poverty line $1.25 per day using 2005 PPP (%) (P0) | 71.3 | 64.1 | 52.7 |
| come below official national poverty line 892 RMB per year (%) (P0) | 37.3 | 36.3 | 22.4 |
| Poverty-gap below poverty line of 892 RMB (P1) | 14.5 | 15.0 | 10.1 |
| Squared poverty-gap below poverty line of 892 RMB (P2) | 7.5 | 8.3 | 6.4 |
| Income inequality (Gini) | 43.1 | 48.2 | 55.2 |
| (Mean) Deaton relative deprivation index | 0.423 | 0.432 | 0.495 |
| Share of consumption (%) | | | |
| Food | 47.8 | 42.2 | 35.5 |
| Gift and festival spending | 7.9 | 13.9 | 15.2 |
| Cash and in-kind food consumption (RMB) | | | |
| grain | 312.9 | 300.9 | 273.7 |
| condiment (salt, vegetable oil and animal oil) | 134.9 | 138.8 | 115.8 |
| vegetable, fruit, tea, drink, cigarette and tobacco | 134.1 | 236.1 | 229.0 |
| vegetable and fruit | - | 126.9 | 170.8 |
| tea, drink, cigarette and tobacco | - | 109.2 | 58.2 |
| meat, egg and dairy product | 76.3 | 94.9 | 60.0 |

Notes:

[1] The 2005 purchasing power parity (PPP) exchange rate is atthe 'China-rural' level http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp. The poverty lines for 2004-09 are adjusted according to published annual inflation rate in various issues of the *China Statistic Year Book*.

[2] The poverty line 892 RMB per year in terms of PPP equals US$0.61 per day.

[3] Deaton Relative Deprivation Index (Deaton 2001) measures household-specific relative status in a village. It is valued between 0 and 1. The larger the number, the lower the relative status, and the more relatively deprived a household is.

[4] All items of food consumption have been adjusted for inflation based on China Statistic Year Book published by NBS. All values are in RMB.

[5] Compared to the 2004 survey, in the 2006 and 2009 household surveys more detailed information on subcategories of cash food expenditure was collected.

Source: Authors' survey data.

Table 2: Summary statistics on major ceremonies in three villages

| | Female Wedding | | Male Wedding | | Funerals | | All ceremonies | | Gift giving per occasion by income group (CNY) | | | % of villagers attending funerals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Gift size (CNY) | No. of ceremonies | Gift size (CNY) | No. of ceremonies | Gift size (CNY) | No. of ceremonies | Gift size (CNY) | No. of ceremonies | Bottom 25% | Middle 50% | Top 75% | |
| 2004 | 41.6 | 0.77 | 54.1 | 1.65 | 41.5 | 3.19 | 45.8 | 9.29 | 49.8 | 44.1 | 45.5 | 100% |
| 2005 | 59.9 | 0.77 | 47.8 | 1.47 | 40.4 | 2.03 | 50.2 | 9.82 | 47.9 | 53.1 | 47.1 | 100% |
| 2006 | 71.8 | 0.94 | 55.7 | 0.94 | 30.7 | 2.13 | 43.7 | 12.18 | 53.4 | 38.7 | 43.2 | 95.1% |
| 2007 | 59.9 | 1.13 | 41.2 | 2.06 | 54.7 | 4.30 | 57.9 | 9.00 | 63.0 | 50.2 | 62.6 | 99.1% |
| 2008 | 60.5 | 1.31 | 63.5 | 1.75 | 92.5 | 3.32 | 71.9 | 9.38 | 67.3 | 75.4 | 66.1 | 98.6% |

Notes:

[1] The gift spending data were based on gift records kept in all the households in three villages collected in the 2009 survey. They have been adjusted into constant 2004 price (yuan) using rural consumer price index published in *China Statistic Yearbook* (China National Statistical Bureau, various issues). A household's income status is based on its income standing in a village at a given year. Because the income data are available only for three years when surveys were conducted, we use household income surveyed in 2006 to define income status in 2005, and income data in 2009 to compute income status in 2007 and 2008.

[2] The gift books record all the gifts received and the corresponding names of gift givers in different occasions. Based on these names, we can compute the participation rate for major events, such as funerals, within each village.

Source: Authors' gift record data.

Table 3: The effect of funerals and other ceremonies on the share of food and gift cash expenditure

| | R1-Food Share | R1-Gift Share | R2-Food Share | R2-Gift Share |
|---|---|---|---|---|
| | *SUR estimation* | | *SUR estimation* | |
| Rd * # of *ceremonies* | -0.068*** | -0.010 | | |
| | (0.022) | (0.014) | | |
| # of *ceremonies* | 0.031** | 0.009 | | |
| | (0.013) | (0.008) | | |
| Rd * # of*funerals* | | | -0.041* | 0.027* |
| | | | (0.025) | (0.016) |
| # of *funerals* | | | 0.022 | -0.001 |
| | | | (0.015) | (0.010) |
| Deaton RD | 0.187*** | 0.002 | 0.115*** | -0.044 |
| | (0.048) | (0.032) | (0.044) | (0.029) |
| Year fixed effect | Yes | Yes | Yes | Yes |
| Village fixed effect | Yes | Yes | Yes | Yes |
| (Pseudo) R2 | 0.242 | 0.277 | 0.230 | 0.269 |
| N | 1834 | 1834 | 2048 | 2048 |

Notes:

[1] The SUR estimation represents simultaneous regressions on the shares of cash expenditure spent on food and gift.

[2] The number of ceremonies refers to all major ceremonies excluding funerals held by others villagers in a village in the year prior to a child's birth. The number of funerals refers to funerals held by others villagers in a village in the year prior to a child's birth.

[3] Robust standard errorsare in parentheses. The estimations are clustered at the year X village level.The symbols *, **, and *** indicate confidence levels at 90%, 95%, and 99%, respectively.

Source: Authors' survey data.

Table 4: Height-for-age Z-scores, stunting rate (%) and underweight rate (%)

| Birth year | Total | | | Boys | | | Girls | | |
|---|---|---|---|---|---|---|---|---|---|
| | Z-score | Stunting (%) | Underweight (%) | Z-score | Stunting (%) | Underweight (%) | Z-score | Stunting (%) | Underweight (%) |
| | | | | | *WHO Standard* | | | | |
| 2004 | -1.93 | 45.59 | 16.18 | -2.01 | 48.72 | 15.39 | -1.82 | 41.38 | 17.24 |
| 2005 | -2.10 | 40.39 | 13.46 | -2.16 | 40.00 | 13.33 | -2.01 | 40.91 | 13.64 |
| 2006 | -2.23 | 53.19 | 17.02 | -2.48 | 56.00 | 12.00 | -1.99 | 50.00 | 22.73 |
| 2007 | -1.88 | 33.96 | 16.98 | -2.09 | 41.38 | 17.24 | -1.58 | 25.00 | 16.67 |
| 2008 | -2.55 | 45.00 | 16.67 | -2.38 | 40.48 | 14.29 | -2.91 | 55.56 | 22.22 |
| | | | | | *China CDC Standard* | | | | |
| 2004 | -2.48 | 55.88 | 23.53 | -2.55 | 53.85 | 28.21 | -2.39 | 58.62 | 17.10 |
| 2005 | -2.53 | 50.00 | 13.46 | -2.60 | 53.33 | 13.33 | -2.40 | 45.46 | 13.64 |
| 2006 | -2.53 | 59.57 | 19.15 | -2.77 | 64.00 | 16.00 | -2.29 | 54.55 | 22.32 |
| 2007 | -2.22 | 47.17 | 16.98 | -2.37 | 51.72 | 17.24 | -2.00 | 41.67 | 16.19 |
| 2008 | -2.61 | 46.67 | 13.33 | -2.37 | 42.86 | 9.52 | -2.94 | 55.56 | 22.22 |

Notes: Children's anthropometric indicators were taken from the 2009 survey. Stunting is defined as height-for-age z-score less than two standard deviations (SD) of the WHO standard and the China CDC standard. Underweight is defined as weight-for-age z-score less than two standard deviations (SD) of the WHO standard or the China CDC standard.

Source: Authors' survey data.

Table 5 Ceremony frequency and height-for-Age Z-scores by income group

| Ceremony / Income Status | Frequent (1) | Less frequent (2) | (1)-(2) Difference-in-Difference | |
|---|---|---|---|---|
| | | ***Birth year: 2004*** | | |
| Lower 50% | -2.89 | -1.66 | -1.23 (3) | |
| Upper 50% | -1.04 | -1.25 | 0.21(4) | (3)-(4)=-1.44 |
| | | ***Birth year: 2005*** | | |
| Lower 50% | -2.41 | -1.98 | -0.43(3) | |
| Upper 50% | -2.01 | -1.64 | -0.37(4) | (3)-(4)=-0.06 |
| | | ***Birth year: 2006*** | | |
| Lower 50% | -3.06 | -2.71 | -0.35(3) | |
| Upper 50% | -1.44 | -1.41 | -0.03(4) | (3)-(4)=-0.32 |
| | | ***Birth year: 2007*** | | |
| Lower 50% | -2.92 | -0.42 | -2.50(3) | |
| Upper 50% | -2.12 | -1.57 | -0.55(4) | (3)-(4)= -1.95 |
| | | ***Birth year: 2008*** | | |
| Lower 50% | -3.27 | -2.86 | -0.41(3) | |
| Upper 50% | -2.66 | -2.18 | -0.48(4) | (3)-(4)= 0.07 |
| | | ***Birth year: 2004-2008*** | | |
| Lower 50% | -2.87 | -1.87 | -1.00(3) | |
| Upper 50% | -1.84 | -1.70 | -0.14(4) | (3)-(4)=***-0.86* (0.48)*** |

Note: The groups of 'frequent' and 'less frequent' are defined based on whether the number of ceremonies in a village is below or above the median number of ceremonies in our sample for a given year. The 'lower 50%' and 'upper 50%' income groups are defined according to a household's average income status compared with the village average income status over the three wave survey between 2004 and 2009. In the last row, all the cohorts born between 2004 and 2008 are combined. The standard errors are presented in parentheses. The symbols * indicates confidence interval at the 90% level.

Source: Authors' survey data.

Table 6: Exposures to funerals and other ceremonies on child health outcomes by income group

| | R1-high | R2-low | R3-high | R4-low | R5-high | R6-low |
|---|---|---|---|---|---|---|
| | Height for Age | | Stunting | | Underweight | |
| | (*OLS*) | | (*Linear Probability*) | | (*Linear Probability*) | |
| | Panel A: Funerals | | | | | |
| # of funerals *before* birth | 0.331 | -1.119 | -0.203** | 0.239** | -0.071 | 0.130* |
| | (0.302) | (0.732) | (0.091) | (0.100) | (0.091) | (0.076) |
| # of funerals *after* birth | 0.195 | -0.166 | -0.06 | 0.022 | -0.085 | 0.044 |
| | (0.385) | (0.450) | (0.082) | (0.126) | (0.062) | (0.071) |
| (Pseudo) R2 | 0.417 | 0.219 | 0.388 | 0.245 | 0.204 | 0.354 |
| N | 117 | 117 | 117 | 117 | 117 | 117 |
| | Panel B: Other Major Ceremonies | | | | | |
| # of ceremonies *before* birth | -0.006 | -1.716*** | -0.084 | 0.413*** | -0.053 | 0.197* |
| | (0.411) | (0.416) | (0.125) | (0.129) | (0.072) | (0.109) |
| # of ceremonies *after* birth | -0.278 | 0.565 | 0.108 | -0.141 | -0.040 | 0.057 |
| | (0.409) | (0.365) | (0.134) | (0.128) | (0.080) | (0.108) |
| (Pseudo) R2 | 0.414 | 0.257 | 0.358 | 0.286 | 0.192 | 0.382 |
| N | 117 | 117 | 117 | 117 | 117 | 117 |

Notes: [1] Due to the small sample size, we divide the sample into high income group (R1, R3 and R5) and low income group (R2, R4 and R6) according to the difference between a household's income status during prenatal period and the average village income status.

[2] The number of ceremonies and funerals refer to the total number of ceremonies (excluding funerals) and funerals held by other villagers in a village in the year prior to a child's birth.The health outcome measures are based on the WHO standard.

[3] Household level characteristics (ceremony frequency before and after child birth, predicted per capita income, head sex, mother's education, parental health behavior including smoking and drinking, household size, presence of grandparents, presence of parents, ethnicity, mother's height, other major shocks and so on), child characteristics (age dummy, sex, birth season, birth order), year fixed effect, village fixed effects, and year X village fixed effects are also included but not reported here. The estimations are clustered at the year X village level, and the results are robust when clustered at the village level.

[4] Robust standard errors are in parentheses. The symbols *, **, and *** indicate confidence levels at 90%, 95%, and 99%, respectively. OLS = ordinary least squares. RD = relative deprivation index.

Source: Authors' survey data.

Table 7a: Main results: exposures to funerals and other ceremonies, relative status, and child health outcomes

| | R1-ceremony | R2-funeral | R3-ceremony | R4-funeral | R5-ceremony | R6-funeral |
|---|---|---|---|---|---|---|
| | Height for Age | | Stunting | | Underweight | |
| | (*OLS*) | | (*Linear Probability*) | | (*Linear Probability*) | |
| | Panel A: without village-specific linear time trends | | | | | |
| Deaton Rd * # of events *before* birth | -1.913*** | -2.078*** | 0.509** | 0.508** | 0.065 | 0.445* |
| | (0.693) | (0.711) | (0.205) | (0.231) | (0.219) | (0.230) |
| Deaton Rd * # of events *after* birth | 0.886 | 0.349 | -0.34 | -0.131 | 0.050 | -0.117 |
| | (0.711) | (0.629) | (0.276) | (0.212) | (0.144) | (0.137) |
| (Pseudo) R2 | 0.253 | 0.228 | 0.219 | 0.208 | 0.200 | 0.219 |
| N | 234 | 234 | 234 | 234 | 234 | 234 |
| AIC | 592 | 576 | 188 | 239 | 224 | 211 |
| | Panel B: with village-specific linear time trends | | | | | |
| Deaton Rd * # of events *before* birth | -1.992*** | -2.015*** | 0.491** | 0.481** | 0.040 | 0.348* |
| | (0.700) | (0.713) | (0.234) | (0.231) | (0.189) | (0.204) |
| Deaton Rd * # of events *after* birth | 0.739 | 0.391 | -0.296 | -0.131 | 0.093 | -0.055 |
| | (0.749) | (0.675) | (0.293) | (0.214) | (0.121) | (0.130) |
| (Pseudo) R2 | 0.276 | 0.244 | 0.231 | 0.218 | 0.112 | 0.135 |
| N | 234 | 234 | 234 | 234 | 234 | 234 |

| | | | | | | |
|---|---|---|---|---|---|---|
| AIC | 976 | 986 | 332 | 338 | 221 | 217 |
| | | | Panel C: with village x year fixed effects | | | |
| Deaton Rd * # ofevents *before* birth | -1.886*** | -2.079** | 0.423* | 0.430* | 0.033 | 0.418* |
| | (0.640) | (0.803) | (0.229) | (0.254) | (0.156) | (0.210) |
| Deaton Rd * # ofevents *after* birth | 0.803 | 0.441 | -0.314 | -0.132 | 0.027 | -0.042 |
| | (0.726) | (0.765) | (0.287) | (0.219) | (0.138) | (0.170) |
| # ofevents *before* birth | -0.026 | 0.71 | -0.017 | -0.138 | 0.096 | -0.193* |
| | (0.411) | (0.465) | (0.151) | (0.140) | (0.114) | (0.106) |
| # ofevents *after* birth | -0.429 | -0.167 | 0.142 | 0.056 | -0.035 | -0.07 |
| | (0.400) | (0.478) | (0.147) | (0.134) | (0.088) | (0.098) |
| (Pseudo) R2 | 0.286 | 0.252 | 0.257 | 0.237 | 0.15 | 0.168 |
| N | 234 | 234 | 234 | 234 | 234 | 234 |
| AIC | 986 | 996 | 338 | 345 | 232 | 221 |

Notes: see notes [2]-[4] for Table 6. Our preferred specification is in Panel C. To save space, Panel A and B do not show estimation results for # of events before and after birth.
AIC = Akaike information criterion.
Source: Authors' survey data.

Table 7b Main results using contemporaneous health measure: weight-for-height Z-score

| | R5-ceremony | R6-funeral |
|---|---|---|
| | Weight-for-Height Z-Score (*OLS*) | |
| Deaton Rd * # of events *before* birth | 0.285 | 0.255 |
| | (1.193) | (1.167) |
| Deaton Rd * # of events *after* birth | 0.131 | -0.390 |
| | (0.927) | (1.270) |
| # of events *before* birth | 0.292 | 0.994 |
| | (0.716) | (0.594) |
| # of events *after* birth | 0.113 | 0.064 |
| | (0.537) | (0.579) |
| (Pseudo) R2 | 0.217 | 0.234 |
| N | 231 | 231 |
| AIC | 1163 | 1162 |

Notes: see notes [2]-[4] for Table 6.

Wasting is defined as weight-for-height z-score less than two standard deviations (SD) of the referred standard. Underweight may indicate stunting and/or wasting. However, In Utero exposure to costly social events is expected to affect chronic health outcomes, such as stunting status, rather than acute undernutrition status, such as weight-for-height z-score or wasting status. Estimation results in this table confirm the presence of squeeze effects on chronic restriction of child growth (stunting).

Source: Authors' survey data.

Table 8: Exposures to funerals and other ceremonies and child health outcomes by gender

| | R1-Boy | R2-Girl | R3-Boy | R4-Girl | R5-Boy | R6-Girl |
|---|---|---|---|---|---|---|
| | Height-for-Age z score | | Stunting | | Underweight | |
| | *OLS* | | (*Linear Probability)* | | (*Linear Probability)* | |
| | | | Panel A: Funerals | | | |
| Rd * # of *funerals* before birth | -3.283** | -0.477 | 0.17 | 0.59 | 0.691** | 0.140 |
| | (1.585) | (0.902) | (0.356) | (0.445) | (0.330) | (0.420) |
| Rd * # of *funerals* after birth | 1.626 | -0.816 | -0.172 | 0.219 | -0.200 | 0.150 |
| | (1.369) | (1.102) | (0.236) | (0.472) | (0.180) | (0.290) |
| # of *funerals* before birth | 1.350* | -0.405 | -0.18 | -0.273 | -0.361* | -0.080 |
| | (0.781) | (0.549) | (0.181) | (0.227) | (0.190) | (0.230) |
| # of *funerals* after birth | -1.333* | 0.976 | 0.256 | -0.187 | 0.140 | -0.050 |
| | (0.718) | (0.709) | (0.153) | (0.253) | (0.120) | (0.180) |
| (Pseudo) R2 | 0.35 | 0.447 | 0.37 | 0.417 | 0.323 | 0.471 |
| N | 139 | 95 | 139 | 95 | 139 | 95 |
| | | | Panel B: Other Major Ceremonies | | | |
| Rd * # of *ceremonies* before birth | -1.856* | -0.167 | 0.222 | -0.106 | 0.306 | -0.011 |
| | (1.064) | (2.078) | (0.321) | (0.751) | (0.369) | (0.422) |
| Rd * # of *ceremonies* after birth | 0.448 | 0.454 | -0.158 | 0.576 | -0.062 | 0.410 |
| | (1.328) | (2.267) | (0.356) | (0.719) | (0.202) | (0.387) |
| # of *ceremonies* before birth | 0.104 | -1.141 | 0.024 | 0.21 | -0.317** | 0.122 |
| | (0.634) | (1.077) | (0.185) | (0.430) | (0.152) | (0.273) |
| # of *ceremonies* after birth | -0.449 | 0.013 | 0.186 | -0.295 | 0.074 | -0.182 |
| | (0.706) | (1.202) | (0.152) | (0.365) | (0.133) | (0.223) |
| (Pseudo) R2 | 0.352 | 0.468 | 0.384 | 0.413 | 0.299 | 0.479 |
| N | 139 | 95 | 139 | 95 | 139 | 95 |

Notes: see notes [2]-[4] for Table 6.
Source: Authors' Survey Data.

Table 9: Falsification test: non-exposed social events on early child health outcomes

| | R1 | R2 | R3 |
|---|---|---|---|
| | Height-for-Age Z Score | Stunting | Underweight |
| | | Panel A: Funerals | |
| Rd * # of funerals *before* birth | -0.653 | 0.158 | 0.059 |
| | (0.765) | (0.263) | (0.051) |
| Rd * # of funerals *after* birth | 0.236 | -0.081 | -0.015 |
| | (0.806) | (0.218) | (0.035) |
| # of funerals *before* birth | 0.13 | -0.119 | -0.029 |
| | (0.422) | (0.133) | (0.032) |
| # of funerals *after* birth | -0.025 | 0.03 | 0.024 |
| | (0.543) | (0.139) | (0.026) |
| (Pseudo) R2 | 0.239 | 0.228 | 0.160 |
| N | 234 | 234 | 234 |
| | | Panel B: Other Major Ceremonies | |
| Rd * # of ceremonies *before* birth | -0.962 | 0.225 | -0.021 |
| | (1.026) | (0.319) | (0.135) |
| Rd * # of ceremonies *after* birth | -0.418 | -0.086 | 0.017 |
| | (0.987) | (0.280) | (0.107) |
| # of ceremonies *before* birth | 0.178 | -0.106 | -0.027 |
| | (0.485) | (0.144) | (0.088) |
| # of ceremonies *after* birth | -0.157 | 0.121 | 0.028 |
| | (0.467) | (0.135) | (0.067) |
| (Pseudo) R2 | 0.261 | 0.239 | 0.167 |
| N | 234 | 234 | 234 |

Notes: see notes [2]-[4] for Table 6. The specification is similar to Table 7 except that we lag the number of funerals / other major ceremonies for each age cohort by one year.
Source: Authors' survey data.

Table 10: Robust check: impact of exposures to social events on the health outcomes of children born between February and September

| | R1 | R2 | R3 |
|---|---|---|---|
| | Height-for-Age | Stunting | Underweight |
| | | Panel A: Funerals | |
| Rd * # of funerals *before* birth | -3.196*** | 0.889*** | 0.693** |
| | (0.954) | (0.309) | (0.330) |
| Rd * # of funerals *after* birth | -0.021 | -0.057 | -0.048 |
| | (0.782) | (0.307) | (0.240) |
| # of funerals *before* birth | 0.786 | -0.388** | -0.428** |
| | (0.615) | (0.150) | (0.194) |
| # of funerals *after* birth | 0.239 | 0.026 | -0.002 |
| | (0.488) | (0.181) | (0.152) |
| (Pseudo) R2 | 0.265 | 0.333 | 0.446 |
| N | 146 | 146 | 146 |
| | | Panel B: Other Major Ceremonies | |
| Rd * # of ceremonies *before* birth | -2.393* | 0.574* | 0.661** |
| | (1.211) | (0.328) | (0.292) |
| Rd * # of ceremonies *after* birth | -0.043 | -0.171 | -0.375 |
| | (0.923) | (0.301) | (0.298) |
| # of ceremonies *before* birth | 0.574 | -0.157 | -0.166 |
| | (0.710) | (0.170) | (0.159) |
| # of ceremonies *after* birth | -0.408 | 0.11 | 0.177 |
| | (0.542) | (0.127) | (0.201) |
| (Pseudo) R2 | 0.276 | 0.317 | 0.408 |
| N | 146 | 146 | 146 |

Notes: The specification is the same as Table 7 except that we restrict our sample to children who were born between February and September.
Source: Authors' survey data.

Table 11: Robust check: the squeeze effects of exposure to social events on child health outcomes using alternative reference groups

| | R1 | R2 | R3 |
|---|---|---|---|
| | *Surname Networks* | | |
| | Height-for-Age Z-Score | Stunting | Underweight |
| | Panel A: Funerals | | |
| Rd * # of *funerals* before birth | -2.124** | 0.322 | 0.426* |
| | (0.955) | (0.295) | (0.242) |
| Rd * # of *funerals* after birth | 0.798 | -0.15 | -0.153 |
| | (0.870) | (0.242) | (0.156) |
| # of *funerals* before birth | 0.618 | -0.184 | -0.246** |
| | (0.492) | (0.151) | (0.121) |
| # of *funerals* after birth | -0.307 | 0.081 | 0.036 |
| | (0.495) | (0.141) | (0.093) |
| (Pseudo) R2 | 0.253 | 0.231 | 0.216 |
| N | 234 | 234 | 234 |
| | Panel B: Other Major Ceremonies | | |
| Rd * # of *ceremonies* before birth | -1.767*** | 0.408* | 0.023 |
| | (0.658) | (0.236) | (0.212) |
| Rd * # of *ceremonies* after birth | 0.94 | -0.331 | 0.117 |
| | (0.727) | (0.282) | (0.157) |
| # of *ceremonies* before birth | 0.056 | -0.047 | -0.078 |
| | (0.385) | (0.147) | (0.105) |
| # of *ceremonies* after birth | -0.272 | 0.111 | -0.107 |
| | (0.362) | (0.139) | (0.098) |
| (Pseudo) R2 | 0.274 | 0.248 | 0.205 |
| N | 234 | 234 | 234 |

Notes: The specification is the same as Table 7 except that we use replace villages with surname networks as reference groups. Surname networks are confined to the boundaries of a village.

Source: Authors' survey data..

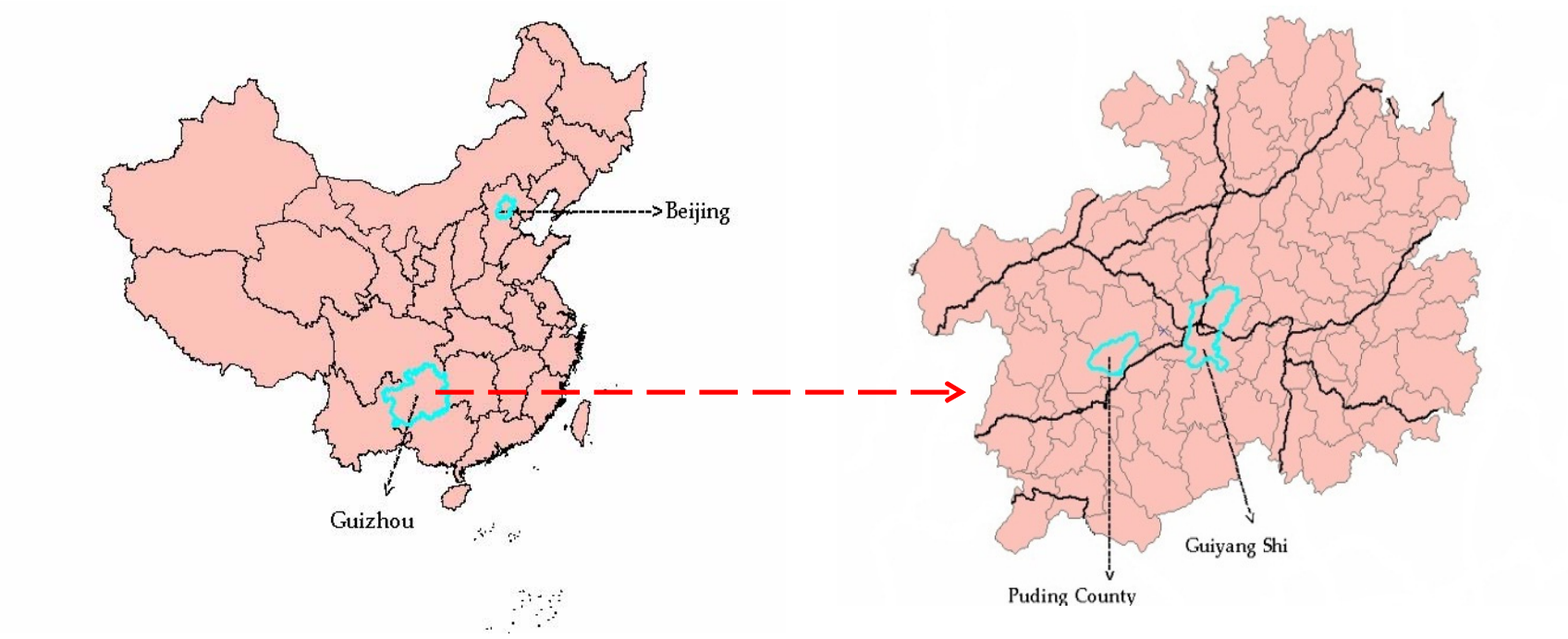
Table 12: The impact of fetal exposures to social events on early child health outcomes (the China CDC Standard)

| | R1-Ceremony | R2-Funeral | R1-Ceremony | R2-Funeral | R3-Ceremony | R4-Funeral |
|---|---|---|---|---|---|---|
| | Height-for-Age Z-Score | | Stunting | | Underweight | |
| Deaton Rd * # of events before birth | -1.885*** | -1.950** | 0.951*** | 0.539** | -0.074 | 0.254 |
| | (0.596) | (0.733) | (0.274) | (0.234) | (0.156) | (0.181) |
| Deaton Rd * # of events after birth | 0.857 | 0.479 | -0.386 | 0.159 | -0.105 | -0.178 |
| | (0.701) | (0.709) | (0.290) | (0.185) | (0.123) | (0.135) |
| # of events before birth | -0.033 | 0.62 | -0.320* | -0.301** | 0.098 | -0.093 |
| | (0.381) | (0.402) | (0.177) | (0.120) | (0.092) | (0.115) |
| # of events after birth | -0.441 | -0.123 | 0.107 | -0.129 | -0.032 | 0.038 |
| | (0.380) | (0.450) | (0.155) | (0.127) | (0.083) | (0.085) |
| (Pseudo) R2 | 0.292 | 0.253 | 0.277 | 0.24 | 0.176 | 0.181 |
| N | 233 | 233 | 233 | 233 | 233 | 233 |
| AIC | 954 | 951 | 326 | 327 | 251 | 250 |

Notes: see Table 7.

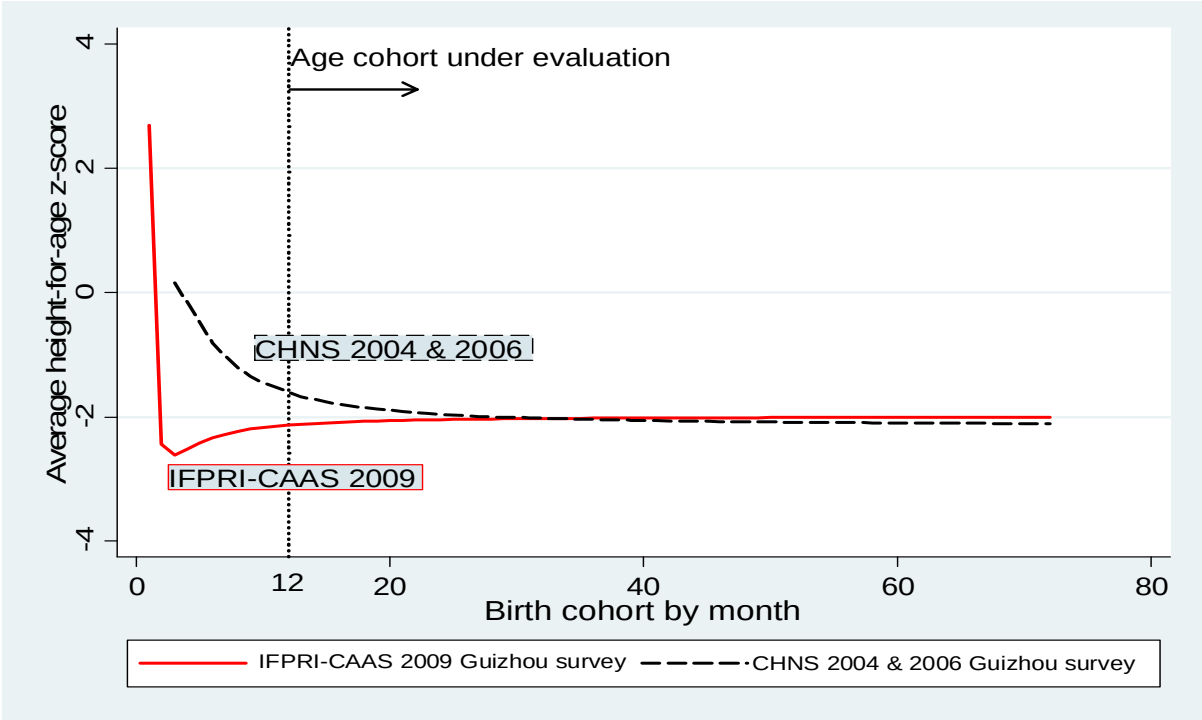
Source: Authors' survey data.

Appendix Figure 1: A map of the location of surveyed region




Source: Michigan China Data Center.

Appendix Figure 2: Height-for-age Z-score for CHNS Guizhou data and our IFPRI-CAAS sample




Notes: This paper evaluates the impact of prenatal exposure to social events for children between 12-72 months. The patterns of z-score between the two datasets after the 12th month are very similar. However, our IFPRI-CAAS survey is of census type, which better represents the demographic pattern in China—unbalanced sex ratio. The *China 1% Population Survey 2005* indicates that sex ratio at birth in Guizhou province is 128:100 (Zhu et al., 2009), inrural Guizhou this number should be even higher. Sex ratio between 1-72 months in the IFPRI-CAAS sample is around 139:100, while the ratio is 70:100 in CHNS 2004 & 2006 Guizhou sample.

Sources: Our IFPRI-CAAS 2009 wave Guizhou survey has a sample size of N=276 in the age range of 1-72 months. To closely match our sample, CHNS 2004 & 2006 subsample from Guizhou province is the best option available. The CHNS data comes from an ongoing international collaborative project between the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Center for Disease Control and Prevention, available via http://www.cpc.unc.edu/projects/china. Both waves of survey were conducted in nine provinces. In total, there are 137children in the age range of 1-72 months in rural Guizhou.

Appendix Table 1: Summary statistics of key variables

| Key Variables | Mean | Median | SD |
|---|---|---|---|
| Height-for-age z-score | -2.160 | -1.967 | 2.089 |
| Stunting status | 0.436 | 0 | 0.497 |
| Underweight status | 0.161 | 0 | 0.368 |
| Deaton relative income status (during fetal period) | 0.521 | 0.521 | 0.260 |
| Deaton relative income status (during birth year) | 0.505 | 0.494 | 0.260 |
| Number of funerals (during fetal period) | 3.025 | 3 | 2.045 |
| Number of funerals (during birth year) | 2.621 | 2 | 2.112 |
| Number of other events (during fetal period) | 10.794 | 10 | 5.359 |
| Number of other events (during birth year) | 10.423 | 10.5 | 5.908 |
| Per capita income (log) | 7.397 | 7.492 | 1.314 |
| Household head gender | 0.960 | 1 | 0.196 |
| Household head education | 5.215 | 5 | 2.863 |
| Birth order | 1.421 | 1 | 0.629 |
| Household size | 4.579 | 4 | 1.625 |
| Minority status | 0.350 | 0 | 0.478 |
| Child gender | 0.589 | 1 | 0.493 |
| Presence of mother in a family | 0.782 | 1 | 0.414 |
| Presence of father in a family | 0.746 | 1 | 0.436 |
| Presence of grandparents in a family | 0.318 | 0 | 0.467 |
| Whether parents smoke | 0.579 | 1 | 0.495 |
| Mother's height | 149.603 | 151 | 15.980 |
| Mother's bmi | 22.714 | 21.929 | 4.143 |
| Birth season | 2.602 | 3 | 1.129 |

Notes: Sample includes children who were aged 1-5 years in 2009.

Source: Authors' survey data.