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Xi Chen
Yale University and IZA

Xiaobo Zhang
Peking University and IFPRI

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Costly Posturing: Ceremonies and Early Child Development in China*

Participating in and presenting gifts at funerals, weddings, and other ceremonies held by friends and neighbors have been regarded as social norms in many parts of the world for thousands of years. However, due to the reciprocal nature of gift giving, 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 rural China, this paper provides empirical evidence on the squeeze effect of gift giving.

JEL Classification: D13, I14, I32, O15, Z13

Keywords: economic status, squeeze effects, food consumption, gift-giving, stunting, malnutrition

Corresponding author:
Xi Chen
Department of Health Policy and Management
and Department of Economics
Yale University
New Haven, CT 06520
USA
E-mail: xi.chen@yale.edu

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1. Introduction

In many developing countries where financial and insurance markets are lacking, the poor primarily rely on social networks to buffer shocks and risks. Over time, holding ceremonies and exchanging gifts have become a social norm to maintain social networks. The positive role of social networks and gift exchange as an informal insurance mechanism has been widely discussed in the literature (Townsend, 1994; Udry, 1994). By comparison, the downside of participating in social networks has been much less studied. In a close-knit community, avoiding networking with neighbors may result in social exclusion. Banerjee and Duflo (2011) 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 burden of hosting or taking part in these ceremonies is much higher for the poor than for the rich. In order to save money to host the events or prepare a gift, the poor may have to cut back basic necessities such as food. Such a reduction in food consumption may have a lasting impact on the nutritional and health status of the poor, defined as *squeeze effects*, especially for pregnant women and their children born to poor families (Aizer and Currie 2014; Aizer et al. 2016; Hoynes et al. 2016).

It is challenging to test the squeeze effects of "keeping up with the Joneses" using commonly available household surveys due to a lack of complete reference groups. In this study, we administered a census-type household survey in 26 villages in rural China over eight years to test the squeeze effects of social spending on child health. The dataset is unique in several ways. First, unlike typical surveys that sample a few households in each community, preventing researchers from observing the complete reference groups, all the households in our villages are interviewed. Since the villages are in mountainous areas, each forms a natural reference group, which enables us to measure everyone's socioeconomic status (hereafter SES) within the group. Second, we collected detailed household food consumption data and anthropometric information for all the children, which facilitate our test of squeeze effects. Third, we gathered information on all ceremonies held in the past 15 years.

We use the number of ceremonies held by fellow villagers, largely beyond the control of a family, to measure ceremony exposure. We focus on *in utero* exposures to ceremonies held in each village prior to birth on child health. It is challenging to evaluate the impact of exposures to ceremonies on children's health because of potential omitted factors, which may be correlated with health status. For example, the number of funerals may reflect a village's poor sanitation conditions, which may be associated with child stunting.

We employ two approaches to alleviate this concern. First, we classify ceremonies into negative and positive events, some of which are more predictable in nature, such as coming-of-age ceremonies, while some are less so, such as funerals. Even if some events are anticipated, they represent expenditure shocks to people in the community. Among all ceremonies, funerals are more likely to be associated with bad economic conditions, while non-funeral ceremonies (e.g. weddings, coming-of-age, and house building celebrations) tend to represent good economic times. Examining the impact of fetal exposures to negative and positive events on child health respectively may provide us the upper bound and the lower bound of the effects.

Although we control for rich family characteristics, there may still be some unobserved family-specific factors that explain the observed difference in child health outcome. To ameliorate this concern, we adopt a second approach by controlling for sibling fixed effects. Living in the same household, siblings share many common family-specific characteristics, which are often unobservable to outsiders. By including the sibling fixed effects in regressions, we can control for the unobserved family-specific factors and isolate the particular impact of fetal exposures to social events, which vary across siblings, on child health outcomes.

We show that *in utero* exposure to ceremonies generates unintended effects on height-for-age and stunting of children born to poorer households, but not the better-off families. This conclusion is robust to not only the upper and lower bound estimation strategy, but the approach of within biological sibling comparisons.

However, it is likely that the number of ceremonies held in a village actually embodies information of some unobservable factors that happen to be correlated with child health. One way to address this concern is to replace the *in utero* exposures variable with placebo exposures when a child has not yet been conceived. We find no impact at all in this falsification test. Therefore, the identified squeeze effects are likely driven by the *in utero* nutritional shock. When facing a greater number of ceremonies, poor families increase their gift expenditure at the expense of food consumption.

Besides providing one of the few evidence about the dark side of social networking on health, this paper contributes to at least two strands of the literature. First, our paper is tied to the large fetal origins literature that fetal nutrition has a lasting impact on later health outcomes. However, this literature has mainly relied on rare natural experiments, such as famine, to test this hypothesis. We show that prenatal exposures to more common and milder shocks in our daily lives, such as social events, can also exert a lasting health effect for children of the poor.

Our paper also contributes to better understanding the Deaton (2010) food puzzle. Despite rapid economic growth in India and China, calorie consumption has declined and the rate of improvement in nutritional status, in particular among the poor, 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). They are also more likely to spend their extra income on entertainment and social festivals than on food (Banerjee and Duflo 2007). A question arises: Why, amid income growth, do the poor prefer to consume less food at the high cost of nutrition and health?

Of course, there are many potential explanations to the puzzle, such as the reduction in physical activity associated with economic growth and therefore the calories needed to fuel that activity (Deaton 2010). However, this channel alone may not explain why the child malnutrition rate has barely improved in the past decades, considering that children's physical activities might not have declined as much as those of adults. In this paper, we offer an alternative explanation: the poor are under social pressure to cut necessities, including basic food, in order to afford gift and ceremonies in their communities. This is probably due to their binding budget constraint, little knowledge about grave health consequences of the exposures, different beliefs about human capital production of their children (Cutler and Lleras-Muney 2011), impatience to invest in children (Khalil et al. 2015), and social pressure, to the poor in particular, to participate in ceremonies and competitive social spending (Hopkins and Kornienko 2004).[1]

[1] In China, male-to-female sex ratio has been unbalanced and rising quickly. As a result, marriage market competition has intensified greatly over the past decades. Under such a marriage market squeeze, the poor with son have to signal their wealth through bigger houses, more generous bride price payments, lavish wedding banquets, and active participation in ceremonies in their community. In fact, the competition in gift and ceremony spending is more intense among the poorer segment of the population (Brown et al. 2011; Chen et al. 2011).

The rest of the paper is organized as follows: Section 2 documents social spending in literature and in China and presents evidence that social spending squeezes food consumption of the poor. Section 3 examines the impact of prenatal exposure to ceremonies on child health and projects its impact on human capital and long-term well-being. Section 4 concludes.

2. Social Spending and Food Consumption

Literature on Social Spending

It has been recognized that people care about relative standing, which shapes both consumption and savings behavior (Veblen 1989; Duesenberry 1949; Easterlin 1974; Sen 1983; Frank 1985 & 1997; Frank et al. 2010; Van de Stardt et al. 1985). While the literature largely focuses on rich contexts, an emerging body of literature documents that the phenomenon of "keeping up with the Joneses" applies to the poor as well. For example, the poor tend to spend much of their extra income on positional goods, such as buying designer-label goods in Bolivia (Kempen, 2003) and holding lavish weddings and funerals in India, Ghana and South Africa (Banerjee and Duflo 2007; The Economist 2007; Case et al. 2008).

Apart from status concerns, social norms may dictate the behavior of social spending. In developing countries, social networks, particularly within villages, 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. Presenting a gift at friends' and neighbors' weddings, funerals, and other social occasions is a social norm in many parts of the world.

Though gift giving is largely reciprocal, it is costly to build and maintain social networks. In China, a family is supposed to pay back previously received gifts according to the prevalent market price of a gift of similar size per occasion (Yan 1996), which becomes burdensome as gift price has been escalating in recent years.[2] Moreover, households receive gifts only when they hold ceremonies or suffer from major idiosyncratic shocks, none of which occur regularly.

[2] This is probably due to worsening inequality and rapid income growth. Specifically, some people get rich and spend heavily on ceremonies, so others have to follow suit (Chen et al. 2011). The unbalanced sex ratio under China's one child policy also strengthens the rapid increase in gift price because families with an unmarried son tend to throw more lavish wedding banquets and send larger gifts as a marriage market signal (Brown et al. 2011).

Further, the expenses associated with ceremonies are more than twice the income from gifts received, and are becoming even more costly (Chen et al. 2011). Therefore, reciprocal gift exchange may not be as effective in smoothing consumption in a rapidly changing environment as it was in a static and close-knit community.

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 behavior among the poor. Putting that aside, however, both mechanisms predict that the poor will tend to spend a larger share of their extra money on more socially visible goods and activities than do the rich.

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, from a unique dataset, that social spending poses a heavy burden on the poor. China is largely a *guanxi* (network) society. Participating in and presenting gifts at funerals, weddings, and other ceremonies held by neighbors have been regarded as social norms in China for thousands of years. Despite the ubiquity of gift giving 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, in large part due to lack of data.

The dataset for this study comes from a four-wave household survey conducted in Guizhou Province of China.[3] 26 villages were randomly selected that can represent the median level of economic development in Guizhou. Nearly all households from these villages were surveyed. The survey collected rich information at different levels (see Web Table A.1 for summary statistics of key variables used in this study). The four-wave survey included 801 households, 833 households, 872 households and 926 households, respectively. The increase in the number of households is largely due to the formation of new families.

This survey area offers an ideal setting to test the squeeze effects among the poor for several reasons. First, the poverty rate is quite high. As shown in Table 1, in 2004 more than 70 percent of households in the area lived below the international poverty line of 1.25 US dollar per day.

[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.

Second, despite the initial high incidence of poverty, real per capita income has grown rapidly at an annual rate of more than 10% since 2004. Even for the poor households below the poverty line, we still observe annualized income growth rate at 3.7%. However, despite rapid income growth, the absolute value of basic food consumption, even among the poor, has not increased during 2004-2011. This is exactly the feature of the Deaton food puzzle. Third, our surveyed villages are in a mountainous area in which villagers interact more frequently within the same village than with those residing outside their home village. As a result, each village naturally forms a good reference group. We are able to accurately measure economic status for each household via surveying all households in each village.

We asked all the households in the 26 villages to report all ceremonies hosted, including weddings, funerals, and coming-of-age ceremonies, since year 1996, as well as their related expenses and gifts received. As a tradition preserved in many countries, all households in this area spontaneously keep a gift book listing the size of each gift received and the names of gift presenters. We used digital cameras to record gift books from all the households in five randomly selected villages. This unique dataset enables us to examine the patterns of attendance and spending in different social occasions over time and across SES.

Table 2 presents the average gift size per occasion, number of major events, gift size per occasion by income group and by relationship, and participation rate in a village, based on the gift record data collected. Four salient features are apparent from the table. First, average gift size per occasion is increasing over time. Second, the difference in gift size between rich and poor is minimal, which is consistent with our field observation that there is an implicit “market price” per occasion that people follow when extending a gift. People at the bottom of income distribution on average even spend more on gifts per occasion than their rich counterparts in the same village across all the years. Third, there is no apparent difference in gift size between relatives and nonrelatives. Fourth, participation in ceremonies is almost universal within a village. As shown from the last two columns, more than 94 percent of households attend fellow villagers’ ceremonies. Participation rates among the rich and the poor are also very similar (Figure 1), suggesting that the decision to attend ceremonies is largely driven by social norms (Brown et al. 2011).

The rather standard gift size and nearly universal attendance rate in ceremonies indicate that the number of ceremonies, positively related to gift expenditure per capita, is a good proxy for overall social spending. This is apparently the case, as shown by the strong positive correlation between the two variables in Figure 2.

Measuring Reference Groups and Economic Status

We use two measures of SES to test the effect of social spending on food consumption and child health. The first measure, per capita income, represents money available for mother's nutrition and other prenatal inputs.[4] The second measure, the Deaton (2001) relative deprivation index (hereafter the Deaton index), gauges own income relative to richer counterparts in the reference group. Being relatively deprived is often a key motive behind spending more on social events but less on basic consumption (Brown et al. 2011; Chen et al. 2011; Chen 2014). Relative deprivation may affect child health (Reagan et al. 2007; Lhila and Simon 2010), such as through elevated maternal stress (Aizer et al. 2015).

Unlike absolute income, the Deaton index requires identifying reference groups, which often imposes a challenge for empirical research. People interact with different peers in their work and family life. The challenge may be smaller in rural areas in developing countries where people often live in a close community and use home village as their reference group (Knight et al. 2007; Mangyo and Park 2011). Moreover, our surveyed villages are located in mountainous region, presenting barriers for close interactions across villages. Therefore, we primarily use villages as reference groups but verify our results using alternative reference groups.

The Deaton index captures the idea that a person is deprived if others in the group possess something that one does not have (Yitzhaki 1979). Specifically, the level of deprivation experienced by an individual *i* with income *y* relative to another one with income *z* is

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

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

An individual would feel more deprived as the number of individuals in society with more income than themselves increases. The Deaton index computes relative deprivation for individual *i* based on the number of people in the reference group richer than this individual and their income gap. The Deaton index for an individual with income *x* takes into account

[4] We also use per capita consumption incurred in a household's daily life and production activities to proxy SES. The results are robust and will be available upon request.

differences in the scale of income distribution across groups and therefore is scale invariant. It can be written as

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

where μ 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 index ranges from 0 (the richest) to 1 (the poorest) in each reference group.

The Squeeze Effects of Social Spending on Food Consumption

While the region has experienced a double-digit growth rate, nearly half of the local households still lived under the international poverty line of $1.25 per day per person in 2011. Because the poor have limited financial resources, social spending poses a much heavier burden on the poor, akin to regressive taxation. Facing binding constraints, the poor may have to cut some basic consumption, such as clothing and food, to afford a gift.

As shown in Table 1, the absolute level of expenditure on food has only increased from RMB 671 to RMB 778.1 over 2004-2011 despite the more than 10% annual income growth during the period. Figure 3 plots the share of consumption on gift and food by income percentile. Households in the lowest 20 percent income group spend a smaller share of their budget on food than their richer counterpart, in contrast to the prediction of Engel's law. Coupled with the drop in the share of food consumption is an increase in the share of gift consumption among the poor. In principle, they could suffer less from malnutrition by simply spending more on food and less on gift. But apparently they did not make such a choice. By comparison, the share of food consumption for richer households parallels that of gift consumption without showing evident substitution. This figure provides suggestive evidence that the squeeze effect of gift giving on food consumption is more serious for the poor than for the rich.

To further test the *squeeze effects* of social spending on consumption and savings patterns, in Table 3 we run seemingly unrelated regressions (SURs) on the levels of consumption (Panels A&C) and shares of consumption (Panels B&D) on food, clothing, durable goods, gift, and household savings. We respectively use per capita income (Panels A&B) and the Deaton index

(Panels C&D) as a measure of SES. The key variable of interest is the interaction term between SES and the log number of events held by fellow villagers.[5] Apart from this variable, SES and a set of control variables at the household level are also included.

While the inclusion of village and year fixed effects largely controls for village and year specific factors, this specification can be inadequate if each village follows its own temporal patterns. Therefore, Panels A&B of Table 3 report the estimation results with village-year fixed effects. The highly significant estimates for the interaction term in regressions of gift and food consumption suggest that the poor spend a larger budget on gift at the expense of food, given the same number of ceremonies in a village. When using RD as a measure of SES in Panels C&D, per capita income and village-year fixed effects are removed to identify squeeze effects. Results are largely the same.

As an alternative strategy, we compare food and gift expenditure for a same household experiencing different number of ceremonies in different years. This standard household fixed effect model further removes household time-invariant unobserved factors that may drive our observed effects. The results, not reported in the paper, still suggest squeeze effects on food.

3. Quantifying the Effect of Social Spending on Child Health Outcomes

Fetal Origins Hypothesis

A large body of literature on the fetal origins hypothesis suggests that the time *in utero* is a critical period for human development. One of the most plausible channels through which prenatal exposure to shocks affects later outcomes is that mothers send biological signals to their fetuses, providing information about the outside world and thereby helping prioritize different aspects of fetal development. Regardless of whether catch-up growth is ultimately achieved, *in utero* exposures to malnutrition adversely affect health outcomes in later life (Barker and Osmond 1986; Barker et al. 1989; Victoria et al. 2008).

Since it is often 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

[5] The results are similar when using number of events.

health outcomes.[6] Yet, not all empirical studies based on natural shocks confirm the fetal origins hypothesis. One key reason is that the presence of mortality selection renders it less likely for researchers to observe the negative health impact on the survivors.[7] Exposure to milder shocks, however, might facilitate the testing of fetal origin hypothesis, since scarring effects for survivors are much less likely to be offset by selective mortality in extreme fetal exposures.

While studies based on extreme natural shocks provide tremendous insight on the fetal origins hypothesis, 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 Chinese Great famine are sufficient to imply that any reasonable measure to prevent such catastrophes is likely to pass a cost-benefit calculation. Therefore, showing that there was additional damage to fetuses from these disasters does not make much difference in decision-making. Meanwhile, most people, even the poor, do not suffer from natural shocks as severe as famine.

Recent studies evaluate more mild shocks *in utero*. For example, exposure to daytime fasting by pregnant women during Ramadan lowers male birth weight, increases the likelihood of adult disability (Almond and Mazumder 2011), and decreases children's test scores (Almond et al. 2011). Following this line of research, this paper investigates the consequences of exposures to frequent yet mild shocks — ceremonies, such as funerals and wedding that people around the world are often obligated to attend. To our knowledge, no study has examined unintended consequences of attending frequent ceremonies in early life.

The surveys in 2009 and 2011 collected anthropometric information for all the children in the villages. To control for sibling fixed effects, our main analysis focuses on more than 400 children with siblings also younger than age 6 at the time of survey. We adopt child height and

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[6] For example, studies reveal that the Dutch Famine (1944-1945) had negative impacts on various health outcomes, such as mental disorder in early adulthood, schizophrenia, and lower glucose tolerance in adults (Neugebauer et al. 1999; Brown et al. 2000; 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 in early life is associated with better health and education outcomes in later life for Indonesian women.

[7] For instance, studies on the survivors of the Leningrad Siege (1941-1944) in general conclude that those exposed to starvation in utero do not show much difference in health in later life from cohorts born outside Leningrad and in other years. Mu and Zhang (2011) show that prenatal exposures to the Chinese Great Famine (1959-1961) result in higher disability rates for female survivors but not for males, largely due to larger excess male mortality rates during the famine.

weight measures under both the World Health Organization (WHO) standard and the China Center for Disease Control and Prevention (CDC) standard. Height-for-age and stunting measure the cumulative long-term nutritional status an individual has obtained over the life course, while weight-for-height and wasting measure more acute changes.[8] We mainly report evidence on chronic nutritional restriction, while acute malnutrition is analyzed in a robust check.

As shown in Table 4, more than 40 percent of children were stunted in 2011. Despite annualized income growth above 10%, the stunting rate did not decline in the sampled villages. The problem is more acute among girls, whose stunting rate increased from 31% to 55%. The rate of underweight shows a similar pattern. Overall, the prevalent high stunting and underweight trend is consistent with Chen et al. (2012) that in impoverished counties in Guizhou and Guangxi the stunting and underweight rates were around 60% and 30%, respectively.

The observed Deaton food puzzle may have something to do with *in utero* exposures to ceremonies. Web Table A.2 reports the average height-for-age z-score and stunting rate for children by income group and frequency of ceremonies in the village. The last column presents difference-in-differences (DID) estimates. As shown in the table, children born to poor households exhibit significantly lower z-scores and higher stunting rate when exposed to more frequent ceremonies in utero. Web Figure A.1 depicts the height-for-age z-score against the number of ceremonies to which the child was exposed in utero for the high- and low-income groups. For the low-income group, the greater the number of ceremonies exposed, the lower the z-score. In contrast, the figure reveals a flat and insignificant pattern for the high-income group.

While the simple DID analysis and the bivariate plot based on discrete groups provide some suggestive evidence in support of the *squeeze effects* of fetal exposures to ceremonies, we will further control for covariates in quantitative analyses to more rigorously test the effects.

Quantifying the Effect of Ceremonies on Child Health Outcomes

The empirical model

Child health is a function of early life inputs (which can be positive, such as access to medical care, or negative, such as smoking) as well as parental health endowment (Grossman 1972;

[8] In the analysis of this paper, we restrict height-for-age z-score to be within the range [-6, 6]. The main results (not reported) are robust to, for example, removing lowest and highest 5 percentiles.

Behrman and Deolalikar 1988; Strauss and Thomas 1995, 2008). In this paper, we identify the impact of in utero exposure to frequent ceremonies on child health using the following basic specification

$$Outcome_{ijt} = \alpha SES_{j,t=1} * CAB_{j,t=1} + \beta SES_{j,t=0} * CBB_{j,t=0} + \gamma_0 SES_{j,t=1} + \gamma_1 SES_{j,t=0} + \gamma_2 CAB_{j,t=1} + \gamma_3 CBB_{j,t=0} + \alpha_c X_{ijt} + \upsilon_v + \delta_t + \varepsilon_{ijt} \quad (4)$$

where $Outcome_{ijt}$ denotes health status of child *i* in household *j* born in year *t*; $SES_{j,t=0}$ and $SES_{j,t=1}$ denote per capita income or the Deaton index for household *j* before (*t=0*) and after (*t=1*) birth; X_{ijt} contains child i 's characteristics in family *j* (i.e. sex, birth season and order), characteristics of caregivers (i.e. maternal education, age, ethnicity, height[9], presence of parents and grandparents in the village[10]), parental health behavior (i.e. smoking and problem alcohol drinking, during pregnancy and after child birth), other household characteristics (i.e., household head sex, household size, number of ceremonies hosted, major shocks like illnesses and natural disasters), and distance to the nearest clinic.

Two time periods are critical in identifying squeeze effects: the fetal period (t=0) and the period after birth (t=1). $CBB_{j,t=0}$ is the logarithmic number of ceremonies held by other families within the home village over a 9-month period prior to child *i*'s date of birth (hereafter DOB). Similarly, $CAB_{j,t=1}$ is the logarithmic number of ceremonies held by others over 9 months after child *i*'s DOB. Because of differences in DOB, the number of ceremonies exposed over the 9-month period prior to birth or after birth naturally differs across children, even among those born in the same village and same year.[11]

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[9] Fathers' health status is not included, since some of them were migrating out to work during our survey, so we were unable to collect their anthropometric information. In most cases, mothers and children were left behind in the villages. Our results are robust to the inclusion of mother's BMI.

[10] Support from grandparents may attenuate the squeeze effects, which could differ by whether grandparents live in the same village and therefore are subject to common shocks of ceremony spending.

[11] As shown in Web Figure A.2, most ceremonies (except funerals and childbirths) are held in January or February when most families return home to celebrate the Chinese Lunar New Year, which suggests large variation in the number of ceremonies exposed during the 9-month time window determined by DOB. The validity of using 9-month window hinges upon an assumption that the impact is short lived. However, the fact that food consumption in our survey is yearly average prevents us from directly examining if the impact of ceremonies on food intake is short lived or not through the timing of food intake relative to that of ceremonies. Given that we lack a solid test on if the shocks are instantaneous or persistent, we tried slightly longer time windows (i.e., 10-month and 11-month) in addition to 9-month. Luckily, regressions based on 9-month and these other time windows yield consistent results. To save space, we only present results based on 9-month window.

Since gift spending in ceremonies is rather standard for both rich and poor, and participation is nearly universal, the number of ceremonies, $CBB_{j,t=0}$ and $CAB_{j,t=1}$, is a good proxy for total gift expenditure in the exposed period. We collected information on all ceremonies held by each household, including year and month, which enables us to calculate $CBB_{j,t=0}$ and $CAB_{j,t=1}$. The main coefficients of interest are γ_2, γ_3, α and β. $\gamma_3 + \beta SES_{j,t=0}$ and $\gamma_2 + \alpha SES_{j,t=1}$ show to what extent exposures to ceremonies *in utero* or after birth matter to child health.

υ_v is a set of village fixed effects that account for time-invariant differences between villages that may also be correlated with ceremonies and child health. δ_t is a set of survey year fixed effects and age cohort fixed effects, which account for year-to-year changes in birth conditions that correlate with ceremonies, such as business cycles. Our identifications make use of within-sibling comparison in the sibling fixed effect specification and within-village-year comparison in the upper & lower bound specification. Since $CBB_{j,t=0}$ and $CAB_{j,t=1}$ vary within each village and year, we are able to control for unobserved (time-varying) confounders at the village level.[12] The estimations are clustered at the village level to account for correlated error terms ε_{ijt} within villages over time.[13]

The upper & lower bound approach

Although ceremonies held by other families within a village is largely beyond an individual household's control, the number of ceremonies may still reflect a village's underlying unobserved factors that may potentially influence food consumption and health conditions. For example, residents in a richer village may experience more wedding[14], house building, and

[12] One obvious factor is income/assets/wealth. In richer villages the number of important ceremonies that require expensive gifts might be higher. Another factor is inequality. Villages where the income gap between the well off and the poor is high and growing (Table 1) might be exactly the villages where such ceremonies are most frequent and costly and also where outcomes of poor children are relatively worse.
[13] In all the estimations a wild bootstrap procedure following Cameron, Gelbach and Miller (2008) is used to address the possibility that standard clustering methods may underestimate standard errors given the small number of clusters, i.e. 26 villages in the sample.
[14] One may argue that it is possible that more weddings mean that average age at marriage is lower, which is usually correlated with low investment in children. However, our data doesn't support this negative correlation between the number of weddings and marriage age.

coming-of-age[15] ceremonies (*positive* events[16]) than those in a poorer village, and they are also likely to consume more food. In contrast, people in villages with a greater number of funerals (*negative* events) may be generally poorer and suffer from food shortage. It is difficult to find good instruments to ameliorate the concerns about endogeneity of social events.

Our data indeed suggest that higher average income in a village is associated with fewer negative events and more positive events. Running separate regressions using positive and negative events may yield the lower bound and the upper bound estimates of squeeze effects if they bias the estimations in opposite directions.[17] Squeeze effects are more assuredly identified if both bounds are statistically significant and are of the same sign.

The sibling fixed effect approach

A more widely used and probably more reliable identification strategy would be to conduct an intra-household comparison between biological siblings, exploiting whether children born in years with more ceremonies are more disadvantaged than their biological siblings born in years with fewer ceremonies, in particular for poor households. Our pre-test suggests that villages with greater within-sibling variations in frequency of ceremonies over time do not exhibit systematic difference in child health between high- and low-SES households.

The biological sibling fixed effect approach not only removes all time-invariant unobserved factors at the household level that may bias the estimations but also gets rid of any time-invariant motives for selective timing of pregnancy at the mother level. However, it is still possible that mothers learn from previous negative experiences of fetal exposure to ceremonies and selectively time pregnancies for younger children. However, several pieces of evidence suggest that this is less plausible in our case. First, we do not find any systematic correlation between the observables used in regressions and the timing of births. Second, the number of ceremonies at

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[15] Coming-of-age ceremonies are held for boys aged 14 as a norm, which demonstrate to the local community that the boys are about to enter the marriage market. These events provide an important way to indicate wealth to the matchmakers and brides' families.

[16] Though birth more often occurs in a good year, the timing of delivery is not only affected by the timing of pregnancy but other seasonal, climate, and weather patterns. Therefore, in both Web Figure A.2 and all empirical estimations we exclude childbirth ceremonies from the positive event category. The results are not much affected when childbirth are included, probably because childbirth is much less costly than other events.

[17] Potential community unobserved factors that may bias both estimations in the same direction, and therefore threaten this identification strategy, should be absorbed by the inclusion of village fixed effects and village-by-age cohort fixed effects.

the village level is largely beyond the control of mothers even if they intend to time their pregnancies to avoid the ceremonies. In fact, our data show that younger children's *in utero* exposure to the number of ceremonies has nothing to do with their older siblings' exposure.

Main Empirical Results on Squeeze Effects

Before testing squeeze effects, we run regressions of the number of ceremonies on available household and child characteristics.[18] Assuredly, ceremonies held by fellow villagers are uncorrelated with these characteristics. The results are available upon request.

Building upon the findings in Web Figure A.1 and Web Table A.2, we run regressions on two child health outcome variables — height-for-age z-score and stunting — in low and high income groups. Table 5 reports the sibling fixed effects estimates based on equation (4) but with no interaction term. The SES measures are defined as per capita income in Panel A and the Deaton index in Panel B, respectively. Web Table A.3 reports the results based on the upper & lower bound approach. Children born to mothers in low-income groups, who are exposed to more ceremonies during their pregnancies, show lower height-for-age z-score and display higher rate of stunting. In contrast, the health outcomes of children born to richer families do not appear to be vulnerable to ceremonies experienced *in utero*. Unlike *in utero* exposures, ceremonies exposed in the postnatal period have no salient effect on child health.

One might question this arbitrary division of the sample into low-income and high-income groups. Panels A&B of Table 6 test the whole sample by interacting SES with the incidence of fellow villagers' ceremonies over 9-month period prior to and after a child's birth. All panels present results with rich covariates and the set of fixed effects in equation (4). Regardless of whether we use the absolute income or the Deaton index, the interaction terms between *in utero* ceremony exposure and SES are statistically significant. Considering that a larger value of the Deaton index (or a lower income) means lower SES, the significant interaction terms suggest that children from poor households prenatally exposed to more ceremonies are more likely to be shorter and develop higher stunting rates than those from rich households. As expected, results

[18] These variables include household characteristics (ceremony frequency before and after a child's birth, predicted per capita income, head sex, mother's education, parental health behavior at the time of the child's birth including smoking and problem drinking, household size, presence of grandparents and parents, ethnicity, mother's height, other major shocks, and so on), child characteristics (age cohort dummy, sex, birth season, birth order), year fixed effects, and village fixed effects.

using the upper & lower bound approach suggest that prenatal exposure to funerals has a more detrimental effect than exposure to non-funeral events (Web Table A.4).

Moreover, almost no significant effect is found for the interaction term between the Deaton index and ceremonies after birth, suggesting the impact is mainly channeled through fetal exposure. One plausible explanation is that infants are relatively more privileged in the intra-household allocation of consumption than women, even pregnant women, and thus squeeze effects attributable to ceremonies do not adversely affect infant health.

Interpretation of the Main Findings

Taking the first derivative of equation (4) with respect to the number of ceremonies and evaluating for an average household, we find similar results for the two approaches. Doubling the number of ceremonies exposed *in utero* in the sibling fixed effect model would decrease height-for-age z-score by .15 SDs and increase stunting rate by 13 percentage points (Table 6). Meanwhile, doubling the number of ceremonies in the upper & lower bound model reduces height-for-age z-score by .17-0.2 SDs and increases stunting rate by 1-14 percentage points, depending on the type of ceremonies (funerals or non-funerals) (Web Table A.4).

The negative impact of doubling ceremony exposure during pregnancy on an average child is equivalent to some 30 percent (or 32-38 percent using the upper & lower bound approach) of the impact of civil conflict and 37.5 percent (or 40-47 percent using the upper & lower bound approach) of the impact of crop failure on survived children in Rwanda (Akresh et al. 2011).[19]

The squeeze effects may have far-reaching implications. However, since the children under evaluation are still too young, for now it is hard to directly evaluate the long-term impact. Instead, we resort to multi-country evidence to project the potential long-term effects.

First, the squeeze effects to undernourished fetuses may threaten their physical health in adult and later life, especially height, body-mass index (BMI), body composition and obesity, type-2 diabetes, and hypertension (Li et al. 2003; Victora et al. 2008). Doubling the number of ceremonies for an average household is likely to be associated with a decline in adult height by .49cm, a drop in adult BMI by 0.08kg/m2 and adult fat-free mass by 0.07SD, an

[19] The presence of mortality selection, which is common in civil war and famine, makes it harder for researchers to observe the negative impact on survivors, who tend to be healthier. Therefore, our identified squeeze effects due to frequent ceremonies may account for a smaller part of the actual impact of civil war and famine.

0.0005log/mmol/L increase in blood glucose concentration, and an increase in the systolic blood pressure by 0.25mm Hg.

Second, the squeeze effects may generate intergenerational impact on birth length and birth weight (Kramer 1987; Ramakrishnan 1999; Victora et al. 2008). Exposure to doubled number of ceremonies among the impoverished mothers may lead to 11.73g lower birth weight of their grandchildren.

Third, the squeeze effects may undermine cognitive development, educational achievements as well as income and asset accumulation (Alderman et al. 2006; Daniels and Adair 2004; Grantham-McGregor et al. 2007; Engle et al. 2007; Victora et al. 2008; Autor et al. 2016). Exposure to doubled ceremonies among the poorest households may result in 0.08 fewer years of schooling, 1.2 percent lower income, and 0.05 lower number of household assets. Even if public health is not a priority for policymakers, the fact that the fetal environment affects economic outcomes makes a strong case for improving reproductive health on a purely economic basis.

Robustness Checks

Further to our evidence using two identification strategies, we perform a set of robustness tests. First, we run a falsification test by lagging the number of ceremonies nine months prior to birth by a year. If the channel of impact is mainly through exposures in utero, the number of ceremonies before a child is conceived ought not to matter to the child's health. However, we would expect the coefficient to remain significant if unobserved factors drive the result. As expected, in Table 7 none of the coefficients on the interaction term between SES and the placebo ceremonies is statistically significant.

Second, while exposure to social festivals reduces food intake among the pregnant, other things associated with social festivals may harm child health and confound the direct nutritional effect. For instance, exposure to more festivals might induce pregnant women to develop the habit of smoking and drinking, causing further damage to the fetus and child. However, smoking and alcohol use rates among Chinese women are respectively as low as 2 percent and 4 percent, and they are not culturally or socially accepted (Qian et al. 2010; Tang et al. 2013). Our multi-wave household survey shows that women of reproductive age rarely drink alcohol or smoke in their daily lives or are forced to do so during these social events, mitigating the concern over cultivating bad habits during ceremonies. Meanwhile, second-hand smoke is not an issue in our sample (and in large part of rural China) because ceremonies are mainly held outdoors, and as such the exposures are most likely to be minimal. Nonetheless, we control for parental smoking and alcohol drinking in all regressions.

Third, negative events, i.e., funerals, may also affect child health through maternal stress, especially for households with close ties. Table 8 presents the regression results that follow the same specifications as in Table 6 except that we remove funerals from the number of ceremonies exposed in utero and after birth. It is noted that none of the SES-ceremony interaction terms after birth are significant. Overall, regressions based on non-negative events yield consistent results — prenatal (but not postnatal) exposure to ceremonies has a lasting adverse impact on child health. This finding suggests that maternal stress due to the loss of close friends may not explain the observed relationship between social ceremonies and child health.

Fourth, the literature on the fetal origins hypothesis show that the presence of mortality selection associated with extreme shocks may mask the identification of long-term adverse 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. The population in the sampled villages was not subject to any major natural shocks in the last few years. The ceremonies, though 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 because the selection effect tends to trump the scarring effect (Pearson, 1912; Bozzoli et al., 2009).

Fifth, it is unlikely that migration may complicate our identifications. For example, it is concerned that some children may move out with migrant parents, leaving behind children not representative of the population. However, most migrants leave their children behind with mothers and grandparents in their home villages because of the high cost of urban living and the discrimination against migrants' children in urban schools. Our surveys were conducted right before the Chinese Lunar New Year when almost all migrants return to their villages. Comparing the respondents' roster from the 2006 survey with that from the 2009 and 2011 survey, we do not find any attrition. Further, we tracked residential locations of all respondents and confirmed that 98 percent of mothers with children age 0-6 stayed for more than 7 months in their villages during pregnancy, meaning that maternal exposure to ceremonies we measure has little error.

Sixth, to distinguish the squeeze effects of attending ceremonies from throwing ceremonies, throughout this paper we control for the number of self-held ceremonies in a year. Since only a small portion of households held ceremonies during pregnancy, and their behavior can be markedly different from others, we exclude them in a robust check. The results, presented in Web Table A.5, are largely the same.

Seventh, the height-for-age z-score and stunting are computed based on the WHO standard. The Chinese population is on average shorter and lighter in weight than the world average, thereby likely approaching the cutoff value. The China CDC publishes its own cutoff values for the Chinese population. In Web Table A.6, we report main results with the same specifications as those in Table 6, replacing the WHO standard with the China CDC standard. Both the sign and the magnitude of squeeze effects are quite similar to those based on the WHO standard.

Eighth, due to the marked seasonal profile of most festivals celebrated in December and the following January (Web Figure A.2), better off families might be more likely to avoid pregnancies that fall in (most of) these months. However, Web Table A.7 suggests no systematic evidence of selection bias in avoiding pregnancy in December and the following January according to a wide range of socioeconomic characteristics, such as per capita income, parental education, parental height, assets, cadre status, ethnicity, presence of grandparents and parents to take care of the child, and parental smoking and problem drinking.

Ninth, if the main driving force of long-term adverse health outcomes is *in utero* exposure to malnutrition, we should expect the prenatal squeeze effects to impose more chronic restriction on potential growth, such as low height-for-age z-score or stunting that indicates chronic malnutrition, than acute malnutrition, such as low weight-for-height z-score or wasting that indicates acute weight loss (Black et al. 2008). The results, available upon request, confirm this hypothesis that the chronic restriction is statistically much stronger than acute malnutrition.

Finally, since height-for-age z-scores can be both positive and negative, we cannot directly take a logarithm on them. To explore whether our linear-log and linear-linear specifications are drastically sensitive to different specifications, following Hoddinott and Kinsey (2001) we transform the z-scores into percentiles according to international standards and then take the logarithm of the percentile. The results on the squeeze effects of *in utero* exposure to ceremonies remain largely the same as those based on z-scores. The results under this specification are available upon request.

4. Conclusion and Discussion

In developing countries, gift exchange with reciprocity is almost a universal phenomenon. It is a social norm to attend neighbors' weddings, funerals, and other major ceremonies. People normally think that ceremonies tend to be redistributive, i.e. that wealthier villagers pay for ceremonies disproportionately. Such ceremonies serve to redistribute wealth in society according to a vision of what promotes cosmic justice in these circumstances.

However, because of the reciprocal nature of gift exchange and "mandatory" participation, frequent social ceremonies place a much heavier burden on the poor than on the rich. Participation in social events is more like a regressive taxation for the poor. In order to afford a gift, the poor often have to forgo consumption of basic food items for weeks around a social event. Such a squeeze on food intake can extract an unintended long-term toll on the children of women pregnant at the time. In contrast, because they have financial slack and because food consumption accounts for a small share of their budget, the rich do not need to worry about food consumption when engaged in positional spending.

Using a unique household survey collected in Chinese villages, we find that gift spending during ceremonies squeezes out food consumption and compromises nutritional status in poor households, and their children tend to develop shorter and lighter physical statures if their home villages held a greater number of ceremonies in the year prior to their births. Our findings may contribute to explaining the widely noted fact that improvement in nutritional status among the poor in developing countries lags far behind income growth.

We would like to draw a few cautious notes for future research. First, our surveyed villages may not represent rural China, let alone the developing world. Nonetheless, the setting in our sample villages resembles many parts of the developing world where the poor live in a similar close community and know each other well. The phenomena of *Keeping up with the Joneses* and of gift giving have been widely documented. More research is needed to check the external validity of our findings drawn from rural China in other developing countries. Second, more detailed data are required to improve our understanding of the potential mechanisms. For example, with richer data on food consumption (e.g. individual-specific and contemporaneous measures of nutrients intake) and psychological burden in attending ceremonies (e.g. stress measured in saliva or blood sample) among expectant mothers, we will be able to more clearly distinguish the mechanisms.

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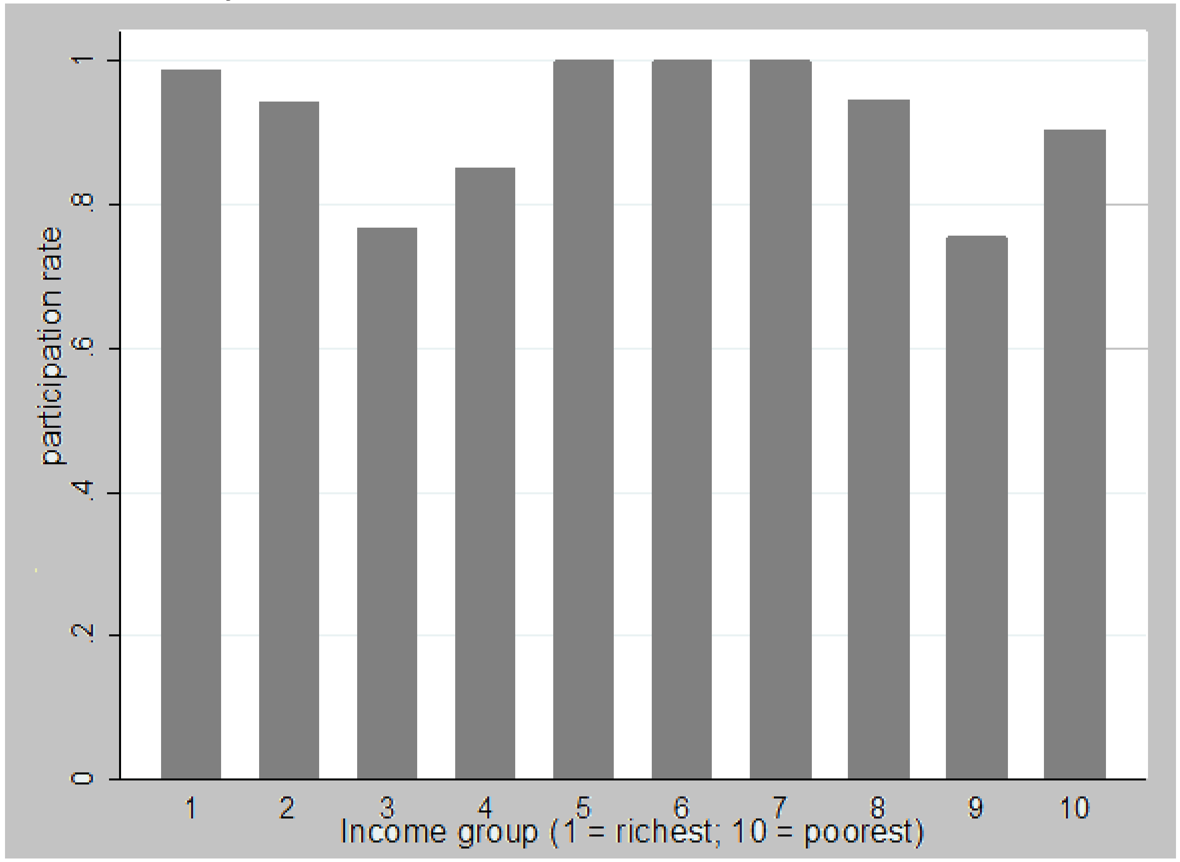
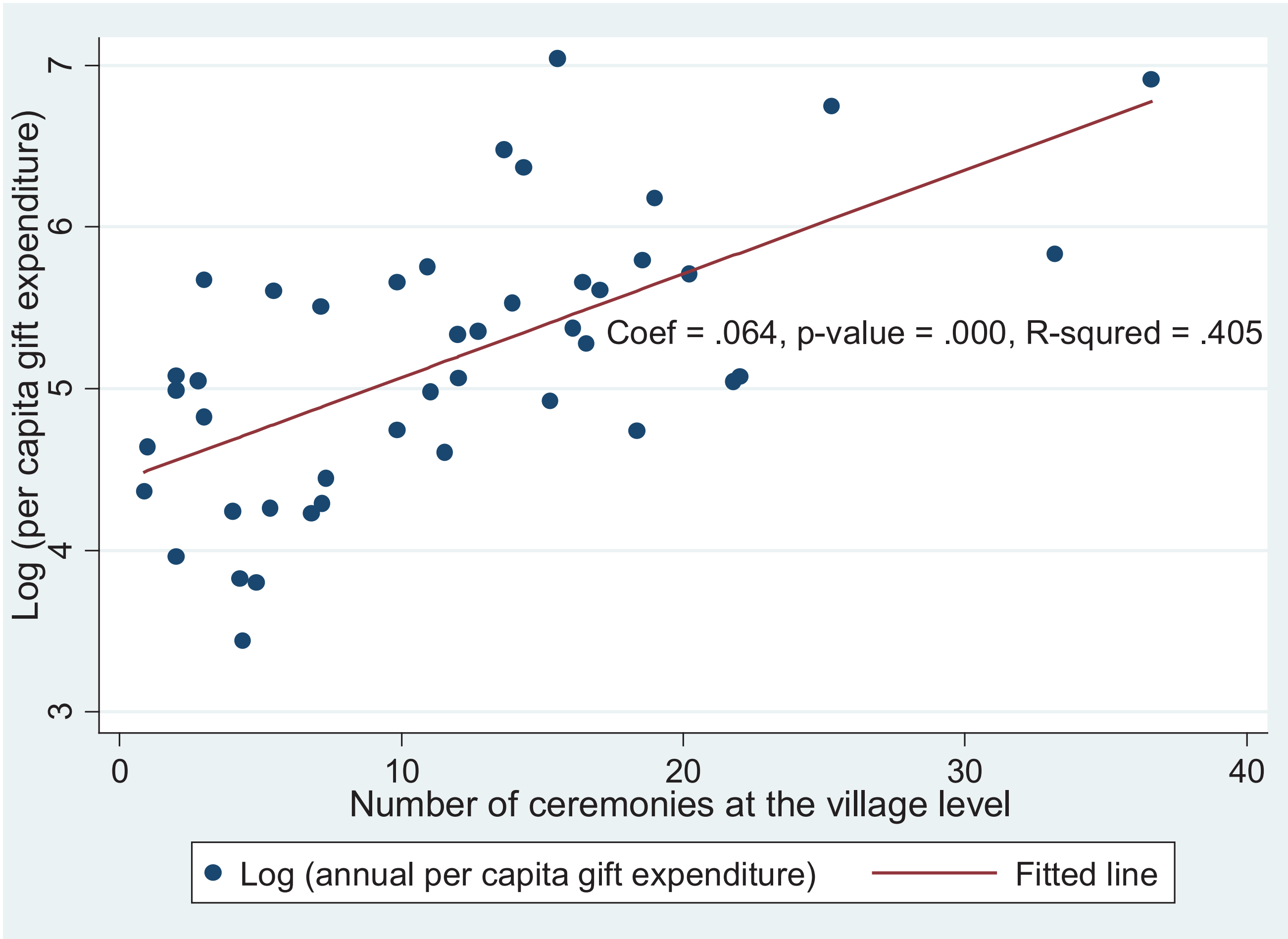
Figure 1—Income levels and ceremony attendance rates



Sources: Authors' gift record data

Notes: By each year and each village, all the households are divided into 10 groups by per capita income. The vertical axis represents ceremony participation rates by income group.

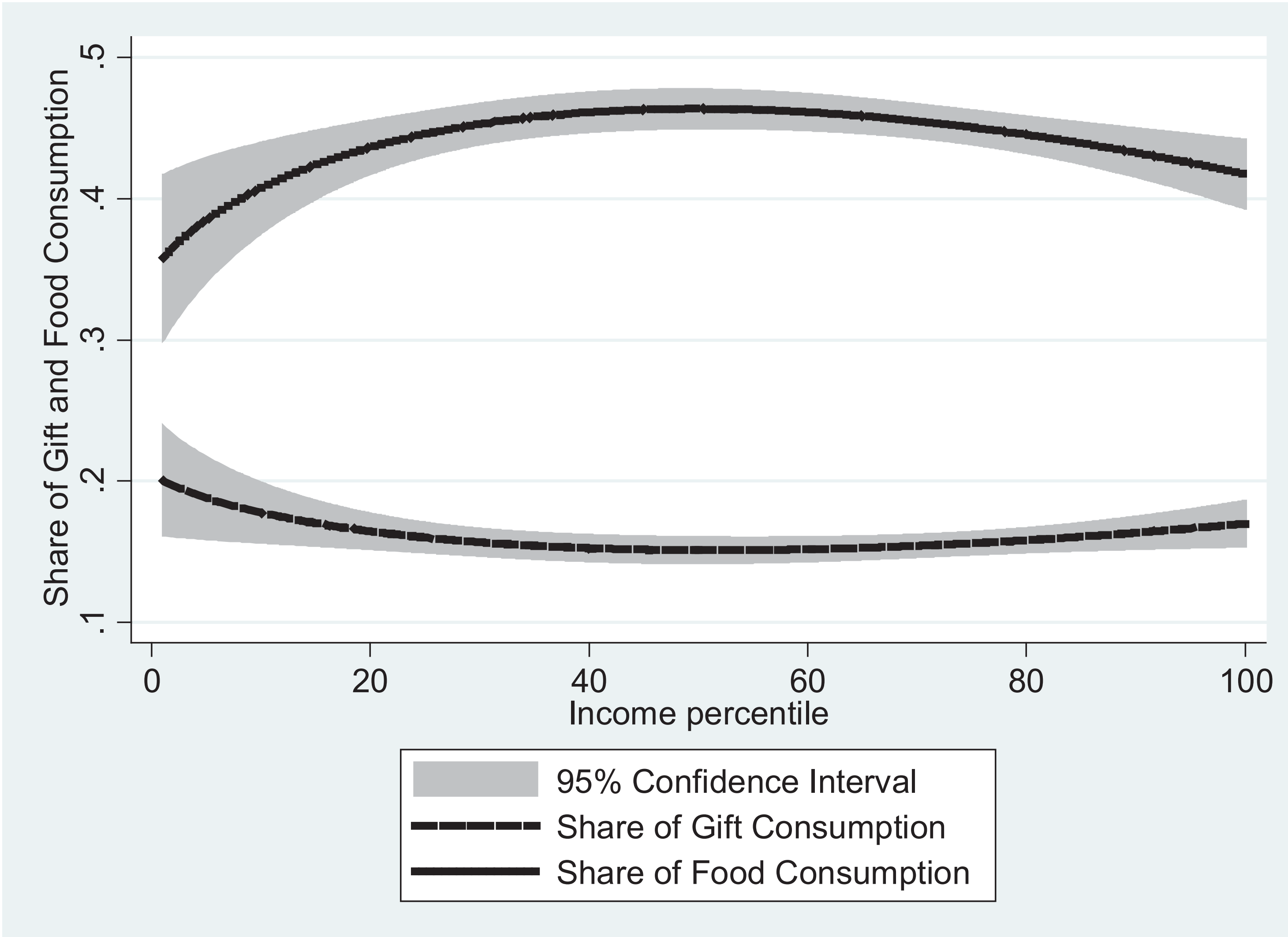
Figure 2—Average per capita gift expenditure and number of ceremonies at the village level



Sources: Authors' survey data

Notes: This figure is computed based on our four-wave household survey data during 2004-2011 in Guizhou province. The horizontal axis stands for the number of ceremonies at the village level, while the vertical axis represents the corresponding average per capita gift expenditure (log) at the village level.

Figure 3—Share of gift and food consumption



Sources: Authors' survey data
Notes: All households surveyed in 2004-2011 are included to generate this figure.

Table 1 Summary statistics on major economic indicators of Guizhou household survey in 2004, 2006, 2009 and 2011

	2004	2006	2009	2011
Per capita real annual income (in RMB)	1404	1817	2855	3127
Income below poverty line of US $1.25 per day using 2005 PPP (%)	71.3	64.1	52.7	49.1
Income inequality (Gini)	43.1	48.2	55.2	58.1
(Mean) Deaton index	0.423	0.432	0.495	0.523
Share of consumption (%)				
Food	47.8	42.2	35.5	34.4
Gift and festival spending	7.9	13.9	15.2	15.6
Food consumption (in RMB)				
Grain	312.9	300.9	273.7	275.1
Condiment (salt, vegetable oil and animal oil)	134.9	138.8	115.8	124.6
Vegetable, fruit, tea, drink, cigarette and tobacco	134.1	236.1	229.0	299.9
Vegetable and fruit	-	126.9	170.8	187.6
Tea, drink, cigarette and tobacco	-	109.2	58.2	112.3
Meat, egg and dairy product	76.3	94.9	60.0	78.5

Source: Authors' survey data

Notes:

[1] RMB = yuan renminbi. PPP = purchasing power parity.

[2] The 2005 PPP exchange rate is at the "China-rural" level. See http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp. The Poverty lines for 2004-2011 are adjusted according to the published annual inflation rate in various issues of *China Statistic Year Book,* published by China's National Bureau of Statistics.

[3] The Deaton index measures household-specific SES in a village. It is valued between 0 and 1. The larger the number, the lower the relative SES.

[4] All items of food consumption adjusted for inflation based on *China Statistical Year Book*. All values are in RMB.

[5] "-" denotes that no information was collected in the category. Compared with the 2004 survey, in the 2006-2011 household survey more detailed information was collected on subcategories of food consumption.

Table 2 Summary statistics on major ceremonies

Year	Female wedding		Male wedding		Funeral		Gift giving per occasion by relatives status (in RMB)		Gift giving per occasion by income group (in RMB)			funeral attendance rate	non-funeral ceremony attendance rate
	Gift size (RMB)	# of ceremonies	Gift size (RMB)	# of ceremonies	Gift size (RMB)	# of ceremonies	relatives (RMB)	non-relatives (RMB)	bottom 25%	middle 50%	top 25%	% of villagers	% of villagers
2004	31.6	0.91	38.9	0.95	31.5	3.19	36.2	35.8	39.8	34.1	35.5	99.1	98.1
2005	59.9	1.77	45.9	2.47	28.7	3.03	50.6	50.0	47.9	53.1	47.1	98.3	97.4
2006	71.8	0.97	55.4	1.94	21.8	3.13	43.6	43.8	53.4	38.7	43.2	95.1	94.3
2007	59.9	0.94	60.5	2.06	54.7	4.30	58.1	57.6	63.0	50.2	62.6	97.3	98.7
2008	60.5	1.13	73.6	2.75	85.4	3.32	70.3	72.1	67.3	75.4	66.1	97.6	97.5
2009	68.4	1.31	90.6	2.65	87.9	3.19	75.7	75.5	70.6	79.1	69.3	97.8	95.3
2010	72.3	1.57	85.7	1.98	86.5	5.07	78.6	79.4	75.2	84.2	73.8	95.6	94.2
2011	78.1	1.80	91.4	2.75	91.2	4.34	85.7	85.1	80.1	89.8	78.7	96.9	94.6

Source: Authors' gift record data

Notes:

RMB = yuan renminbi.

[1] The gift spending data were based on gift records kept by all the households in five randomly selected villages. 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.

[2] The gift sizes have been adjusted to constant 2004 price (RMB) using the rural consumer price index published in *China Statistic Yearbook* (China National Bureau of Statistics, various issues). A household's income status is based on its income standing in a village in a given year. Because the income data are available only for four years when surveys were conducted, we use household income surveyed in 2006 to proxy income status in 2005, income data in 2009 to proxy income status in 2007 and 2008, and income data in 2011 to proxy income status in 2010.

Table 3 Squeeze effects of ceremonies on food consumption

	Panel A *Level of consumption* *SES = Per capita income*		*Panel B* *Share of consumption* *SES = Per capita income*		*Panel C* *Level of consumption* *SES = Deaton index*		*Panel D* *Share of consumption* *SES = Deaton index*	
	Ln(food exp)	Ln(gift exp)	s(food)	s(gift)	Ln(food exp)	Ln(gift exp)	s(food)	s(gift)
SES * # events	0.020**	-0.015**	0.019***	-0.013***	-0.225**	0.399**	-0.072***	0.079***
	(0.009)	(0.008)	(0.006)	(0.005)	(0.105)	(0.197)	(0.025)	(0.020)
SES	0.012	0.008	-0.052***	-0.045***	-0.032	-0.183	0.188***	0.168***
	(0.014)	(0.026)	(0.014)	(0.011)	(0.451)	(0.380)	(0.055)	(0.045)
# events	-0.041	0.276***	-0.053***	0.044***	-0.106	0.253**	-0.045***	0.040***
	(0.048)	(0.091)	(0.016)	(0.013)	(0.074)	(0.121)	(0.015)	(0.014)
Year FEs, Village FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village*year FEs	Yes	Yes	Yes	Yes	No	No	No	No
Adjusted R2	0.275	0.312	0.271	0.221	0.248	0.279	0.242	0.194
N	2827	2827	2827	2827	2827	2827	2827	2827

Source: Authors' survey data

Notes: SUR = seemingly unrelated regression. "# of events" means all ceremonies held by other villagers in a village.

The SUR estimation represents five simultaneous regressions of consumption on gift, food, clothing, durable goods and savings. Both cash and in-kind consumption are included in the food consumption measure throughout this paper. We only present food and gift equations for each set of SUR estimation to save space. Panels A&C test logarithmic food and gift expenditures as outcomes, and Panels B&D test share of food and gift expenditures in total consumption as outcomes. To test the role played by relative deprivation, in Panels C&D we do not control for per capita income and village-year fixed effects. Standard errors are in parentheses. The estimations are clustered at the village level. The symbols *, **, and *** indicate confidence levels at 90%, 95%, and 99%, respectively.

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	-1.41	30.88	16.18	-1.50	30.77	15.39	-1.38	31.04	17.24
2005	-1.59	36.54	13.46	-1.54	30.00	13.33	-2.10	45.46	13.64
2006	-2.23	51.06	17.02	-2.34	56.00	12.00	-1.65	45.36	22.73
2007	-1.69	35.85	16.98	-1.85	41.38	17.24	-1.52	29.17	16.67
2008	-2.29	58.33	16.67	-2.21	59.52	14.29	-2.51	55.56	22.22
2009	-2.03	43.19	17.02	-2.17	41.18	11.77	-1.71	45.46	18.18
2010	-1.40	36.32	13.16	-1.31	28.57	9.52	-1.54	43.53	17.65
2011	-2.52	45.71	14.29	-1.95	41.67	16.67	-3.04	54.55	9.09
	China CDC standard								
2004	-1.93	42.65	23.53	-1.99	43.59	28.21	-1.91	41.38	17.10
2005	-2.01	46.15	13.46	-1.96	46.67	13.33	-2.49	45.46	13.64
2006	-2.50	55.32	19.15	-2.62	60.00	16.00	-1.97	50.00	22.32
2007	-2.07	49.06	16.98	-2.11	55.17	17.24	-2.03	41.67	16.19
2008	-2.44	56.67	13.33	-2.19	57.14	9.52	-2.76	55.56	22.22
2009	-2.33	59.57	18.05	-2.46	64.71	17.65	-1.99	45.46	18.18
2010	-1.78	36.84	13.15	-1.67	33.33	9.53	-1.95	41.18	17.20
2011	-2.40	48.57	11.43	-2.02	45.83	12.50	-3.24	54.55	9.09

Source: Authors' survey data

Notes:

WHO = World Health Organization. CDC = Center for Disease Control.

Children's anthropometric indicators were taken from the 2009 and 2011 survey. Stunting is defined as height-for-age z-score less than two standard deviations (SD) of the WHO standard or the China CDC standard. Underweight is defined as weight-for-age z-score less than two SD of the WHO standard or the China CDC standard.

Table 5 Exposures to ceremonies and child health outcomes by income group

	R1-high	R2-low	R3-high	R4-low	R5-high	R6-low	R7-high	R8-low
	Height-for-age z-score (*OLS*)		Stunting (*Linear probability)*		Height-for-age z-score (*OLS*)		Stunting (*Linear probability)*	
	Panel A: SES = Per capita income				*Panel B: SES = Deaton index*			
# of events *before* birth	-0.006	-0.101**	0.123	0.199**	-0.046	-0.103*	0.117	0.190*
	(0.373)	(0.050)	(0.096)	(0.101)	(0.336)	(0.054)	(0.103)	(0.107)
# of events *after* birth	0.067	-0.018	-0.026	0.115	0.157	-0.087	-0.026	-0.116
	(0.061)	(0.035)	(0.024)	(0.094)	(0.160)	(0.079)	(0.021)	(0.095)
SES *before* birth	1.094***	0.224	-0.014	-0.243***	-1.998	-0.207	0.022	0.473
	(0.340)	(0.492)	(0.115)	(0.081)	(2.070)	(0.982)	(0.710)	(0.669)
SES *after* birth	-0.504	0.061	0.016	0.111	-1.355	-1.202	-0.049	-0.482
	(0.375)	(0.431)	(0.092)	(0.096)	(2.627)	(1.114)	(0.591)	(0.510)
Individual & household covariates	Y	Y	Y	Y	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
(Adjusted) R-square	0.473	0.431	0.404	0.378	0.343	0.375	0.358	0.391
N	221	214	221	214	221	214	221	214

Source: Authors' survey data

Notes: OLS = ordinary least squares. "# of events" refer to the total number of ceremonies held by other villagers in a village.

All the regression analyses are conducted at the child level. All regressions restrict the sample to households with at least two children before age 6 at the time of survey. Due to the small sample size, we only divide the sample into high-income group (R1, R3, R5, R7) and low-income group (R2, R4, R6, R8) by per capita income. The health outcome measures are based on the World Health Organization standard. Household level characteristics include ceremony frequency before and after a child's birth, per capita income, head sex, mother's education, mother's age, parental smoking and problem drinking at the time of the child's birth, household size, presence of grandparents and parents, ethnicity, mother's height, and other major shocks. Child characteristics involve age dummy, sex, birth season, and birth order. To test the role played by relative deprivation, in Panel B we do not control for per capita income. The estimations are clustered at the village level. Robust standard errors with the wild bootstrap procedure used in Cameron, Gelbach and Miller (2008) are reported. The symbols *, **, and *** indicate confidence levels at 90%, 95%, and 99%, respectively.

Table 6 ***Main results:*** **Exposures to ceremonies and child health**

	R1: Height-for-age z-score (*ols*)	R2: Stunting (*linear probability)*	R3: Height-for-age z-score (*ols*)	R4: Stunting (*linear probability)*
	Panel A: SES = Per capita income		*Panel B: SES = Deaton index*	
SES * # of events *before* birth	0.231**	-0.055*	-1.530**	0.364*
	(0.085)	(0.031)	(0.561)	(0.205)
SES * # of events *after* birth	0.091	0.016	-1.094	-0.101
	(0.074)	(0.023)	(0.826)	(0.141)
# of events *before* birth	-0.878***	0.314**	0.632	-0.050
	(0.286)	(0.125)	(0.378)	(0.131)
# of events *after* birth	0.332	-0.017	-0.605	-0.006
	(0.198)	(0.045)	(0.357)	(0.110)
SES *before* birth	0.140	0.069	-0.925	0.259
	(0.452)	(0.148)	(2.995)	(0.978)
SES *after* birth	0.278	0.007	-0.729	-0.045
	(0.555)	(0.106)	(2.457)	(0.659)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.431	0.415	0.298	0.215
AIC	633	-517	628	-519
N	435	435	435	435

Source: Authors' survey data

Notes: AIC = Akaike information criterion. Other notes follow Table 5.

Table 7 Falsification test on squeeze effects: non-exposed ceremonies and child health outcomes

	R1	R2	R3	R4
	Height-for-age z-score *(ols)*	Stunting (*linear probability)*	Height-for-age z-score *(ols)*	Stunting (*linear probability)*
	Panel A: SES = Per capita income		*Panel B: SES = Deaton index*	
SES * # of events *before* birth	-0.026	-0.007	-0.022	-0.011
	(0.150)	(0.014)	(0.866)	(0.097)
SES * # of events *after* birth	-0.058	-0.016	0.029	0.085
	(0.077)	(0.016)	(0.863)	(0.203)
# of events *before* birth	0.083	0.038	-0.014	0.012
	(0.486)	(0.056)	(0.470)	(0.038)
# of events *after* birth	0.118	0.035	-0.064	-0.104
	(0.196)	(0.044)	(0.625)	(0.155)
SES *before* birth	0.277	0.018	-0.553	0.173
	(0.734)	(0.164)	(3.292)	(0.776)
SES *after* birth	-0.138	0.027	-0.835	0.216
	(0.460)	(0.137)	(3.698)	(0.558)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.286	0.229	0.192	0.174
N	435	435	435	435

Source: Authors' survey data

Notes: The specification is the same as that of Table 6 except that "# of events before birth" lags the number of ceremonies nine months prior to birth by a year. Other notes follow Table 5.

Table 8 Robust check: Exposures to ceremonies and child health excluding funerals exposed

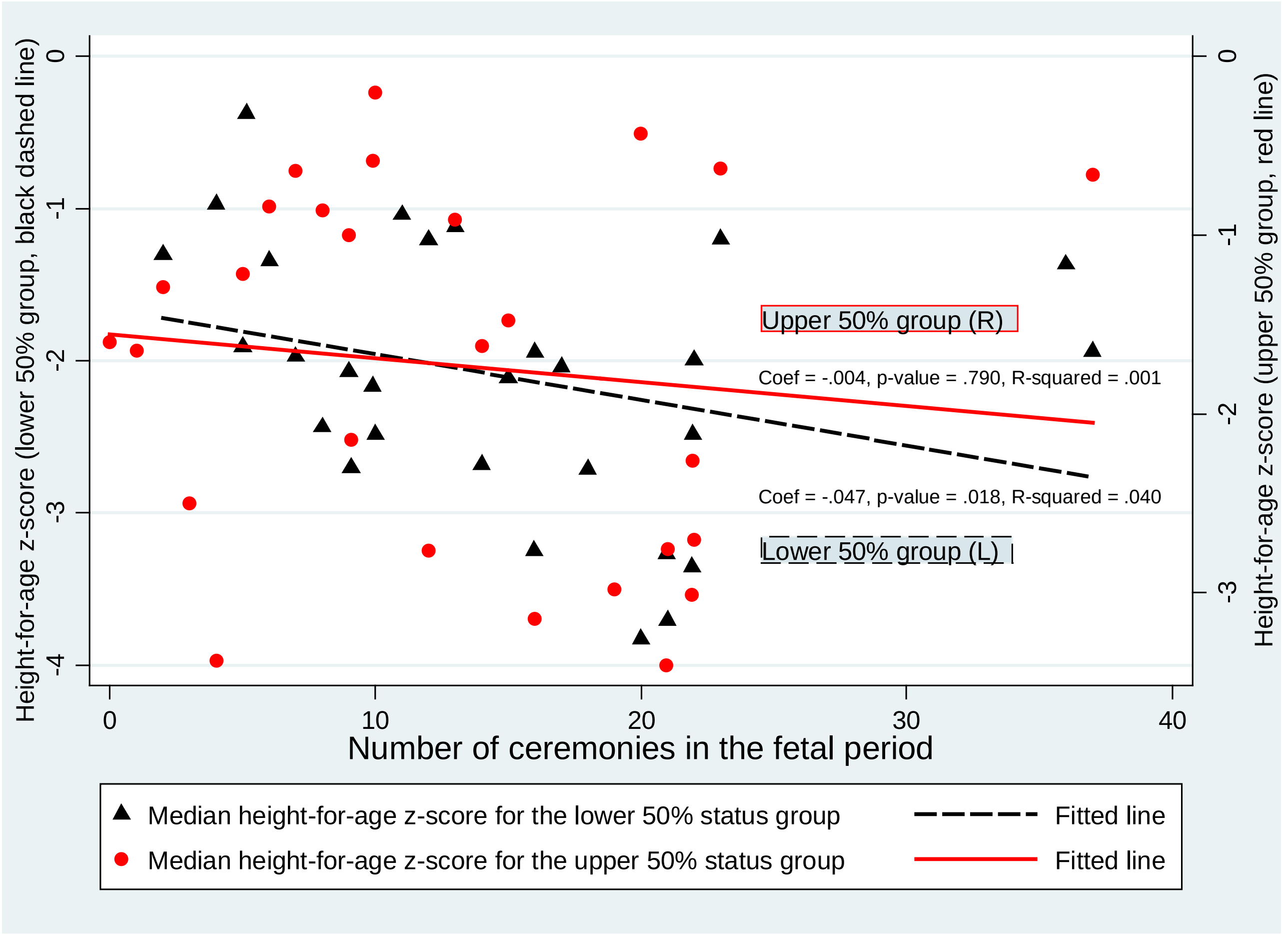
	R1	R2	R3	R4
	Height-for-age z score (ols)	Stunting (linear probability)	Height-for-age z score (ols)	Stunting (linear probability)
	Panel A: SES = Per capita income		Panel B: SES = Deaton index	
SES * # of events before birth	0.213**	-0.068**	-1.414**	0.448*
	(0.101)	(0.033)	(0.613)	(0.250)
SES * # of events after birth	-0.102	0.016	0.259	-0.105
	(0.082)	(0.025)	(0.510)	(0.156)
# of events before birth	-0.784**	0.268*	0.630	-0.079
	(0.354)	(0.147)	(0.523)	(0.162)
# of events after birth	-0.524	0.017	-0.736*	-0.013
	(0.427)	(0.049)	(0.391)	(0.123)
SES before birth	0.154	-0.105	-1.023	-0.201
	(0.609)	(0.172)	(4.038)	(1.141)
SES after birth	0.380	-0.001	-1.369	0.002
	(0.543)	(0.106)	(3.381)	(0.659)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.368	0.313	0.396	0.416
N	433	433	433	433

Source: Authors' survey data

Notes: The specification is the same as that of Table 6 except that we remove the number of funerals exposed during pregnancy and after birth. Other notes follow Table 5.

Web Appendix: Supplementary Figures & Tables

Web Figure A.1—Number of ceremonies and height-for-age z-score by income status

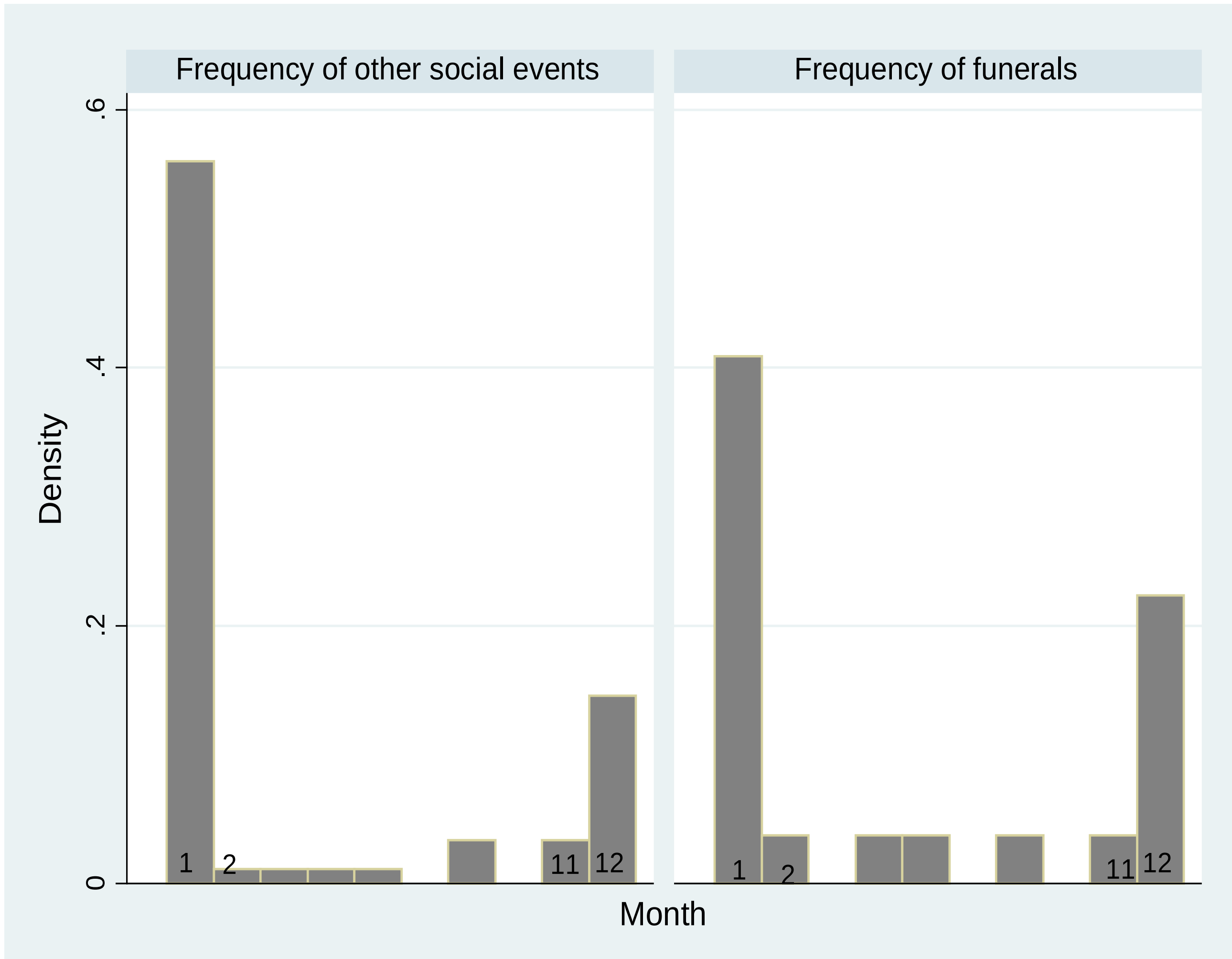


Source: Authors' survey data

Notes: L = left; R = right

The high and low-income groups are divided based on the difference between household average income status and village average income status over the four wave survey (2004 – 2011). The anthropometric information for children born in the period 2004 - 2011 is taken from the most recent 2009 and 2011 survey. The vertical axis represents the average height-for-age z-score corresponding to each number of ceremonies in the fetal period.

Web Figure A.2—Distribution of ceremonies by month



Sources: Authors' gift record data

Notes: The year and month information on all ceremonies between 2004 and 2011 was collected from all surveyed households. Childbirths and funerals are excluded from the left figure.

Web Table A.1—Summary statistics of key variables

	Mean	Median	SD
Height-for-age z-score	-1.841	-1.847	1.527
Stunting status	0.421	0	0.495
Underweight status	0.161	0	0.368
Deaton index (during fetal period)	0.521	0.521	0.260
Deaton index (during birth year)	0.505	0.494	0.260
Number of funerals (during 9-month prenatal period)	3.025	3	2.045
Number of funerals (during 9-month postnatal period)	2.621	2	2.112
Number of non-funeral events (during 9-month prenatal period)	11.794	11	6.359
Number of non-funeral events (during 9-month postnatal period)	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

Source: Authors' survey data

Notes: Sample includes all children younger than age 6. Income includes all earned and non-earned items, such as remittances from migrant household members. Height and weight were objectively measured by interviewers during the survey.

Web Table A.2 Height-for-age z-score and stunting status by ceremony frequency and income group (simple Difference-in-Difference)

Ceremony frequency Income status	Frequent (1)	Less frequent (2)	(1)-(2)		Difference-in-Difference
Birth cohort: 0-5 years old (height-for-age z-score)					
Lower 50%	-2.72	-1.90	-0.82	(3)	
Upper 50%	-1.63	-1.52	-0.11	(4)	(3)-(4) = ***-0.71* (0.390)***
Birth cohort: 0-5 years old (stunting)					
Lower 50%	0.607	0.443	0.164	(3)	
Upper 50%	0.318	0.266	0.052	(4)	(3)-(4) = ***0.112** (0.052)***

Source: Authors' survey data

Notes:

The groups of "frequent" and "less frequent" are defined based on whether the number of ceremonies in a village is below or above the average 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 income status compared with the village average income status over the four wave survey between 2004 and 2011. The standard errors are presented in parentheses. The symbols * and ** indicate confidence levels at 90% and 95%, respectively.

Web Table A.3 - Exposures to ceremonies and child health outcomes by income group (upper & lower bound strategy)

	R1-high	R2-low	R3-high	R4-low	R5-high	R6-low	R7-high	R8-low
	Height-for-age z-score (*OLS)*		Stunting (*Linear probability)*		Height-for-age z-score (*OLS)*		Stunting (*Linear probability)*	
	Panel A: funerals				*Panel B: non-funeral ceremonies*			
# of events *before* birth	-0.016	-1.134**	0.020	0.414**	-0.518	-1.432	0.114	0.329***
	(0.937)	(0.040)	(0.880)	(0.027)	(0.510)	(0.280)	(0.213)	(0.000)
# of events *after* birth	-0.008	-0.072	0.016	0.205	-0.107	-0.242	0.083	0.148
	(0.130)	(0.973)	(0.200)	(0.333)	(0.810)	(0.747)	(0.653)	(0.200)
Individual and household covariates	Y	Y	Y	Y	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Village x cohort fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
(Adjusted) R-square	0.630	0.313	0.504	0.387	0.643	0.345	0.492	0.410
N	221	214	221	214	221	214	221	214

Source: Authors' survey data

Notes: OLS = ordinary least squares. "# of events" means funerals for Panel A, non-funeral ceremonies for Panel B. Other notes follow Table 5.

Web Table A.4 *Main results:* Exposures to ceremonies and child health (upper & lower bound strategy)

	R1: Height-for-age z-score (*ols*)	R2: Stunting (*linear probability)*	R3: Height-for-age z-score (*ols)*	R4: Stunting (*linear probability)*
	Panel A: funerals		*Panel B: non-funeral ceremonies*	
	SES = Per capita income			
SES * # of events *before* birth	0.276***	-0.078**	0.205*	-0.061*
	(0.096)	(0.035)	(0.099)	(0.035)
SES * # of events *after* birth	0.144**	0.017	0.155*	-0.035
	(0.069)	(0.023)	(0.088)	(0.042)
# of events *before* birth	-1.044**	0.239*	-1.036	0.225
	(0.521)	(0.134)	(0.648)	(0.235)
# of events *after* birth	0.167	0.053	0.848	-0.155
	(0.410)	(0.098)	(0.513)	(0.198)
SES *before* birth	0.251*	-0.081	0.421	-0.144
	(0.138)	(0.068)	(0.285)	(0.115)
SES *after* birth	0.349***	-0.067*	0.556**	-0.126
	(0.099)	(0.037)	(0.238)	(0.108)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Village x cohort fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.451	0.438	0.443	0.321
AIC	1538	493	1543	505
N	435	435	435	435

Source: Authors' survey data

Notes: OLS = ordinary least squares. AIC = Akaike information criterion. "# of events" means funerals for Panel A, and non-funeral ceremonies for Panel B. Other notes follow Table 5.

Web Table A.5 Exposures to ceremonies and child health (Excluding those held ceremonies during pregnancy)

	R1: Height-for-age z-score (*ols*)	R2: Stunting (*linear probability)*	R3: Height-for-age z-score (*ols*)	R4: Stunting (*linear probability)*
	Panel A: SES = Per capita income		*Panel B: SES = Deaton index*	
SES * # of events *before* birth	0.228**	-0.081**	-1.446**	0.394*
	(0.102)	(0.040)	(0.723)	(0.217)
SES * # of events *after* birth	0.106*	0.005	-1.158*	0.193
	(0.057)	(0.034)	(0.675)	(0.331)
# of events *before* birth	-0.943**	0.345**	0.480	-0.137
	(0.381)	(0.147)	(0.567)	(0.205)
# of events *after* birth	0.349	-0.025	-0.664	0.031
	(0.254)	(0.085)	(0.525)	(0.242)
SES *before* birth	0.197**	-0.106	-1.246	0.152
	(0.096)	(0.100)	(2.532)	(0.626)
SES *after* birth	0.128	-0.031	-0.874	0.092
	(0.070)	(0.054)	(2.502)	(0.735)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.261	0.234	0.463	0.398
N	357	357	357	357

Source: Authors' survey data

Notes: AIC = Akaike information criterion. Other notes follow Table 5.

Web Table A.6—Exposures to ceremonies and child health outcomes using the China CDC standard

	R1	R2	R3	R4
	Height-for-age z-score (*ols*)	Stunting (*linear probability)*	Height-for-age z-score (*ols)*	Stunting (*linear probability)*
	Panel A: SES = Per capita income		*Panel B: SES = Deaton index*	
SES * # of events *before* birth	0.199**	-0.064*	-1.349***	0.294
	(0.084)	(0.036)	(0.479)	(0.220)
SES * # of events *after* birth	-0.081	0.038	-0.690*	0.094
	(0.079)	(0.111)	(0.394)	(0.087)
# of events *before* birth	-0.915***	0.194	0.502	-0.091
	(0.231)	(0.164)	(0.338)	(0.127)
# of events *after* birth	0.105	0.057	-0.527*	0.125**
	(0.081)	(0.040)	(0.302)	(0.059)
SES *before* birth	0.599	-0.019	0.745	-0.146
	(0.430)	(0.106)	(2.722)	(0.699)
SES *after* birth	-0.375	-0.013	-0.644	0.168
	(0.424)	(0.071)	(2.929)	(0.456)
Individual and household covariates	Y	Y	Y	Y
Birth seasonality	Y	Y	Y	Y
Village fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Cohort fixed effects	Y	Y	Y	Y
Sibling fixed effects	Y	Y	Y	Y
(Adjusted) R-square	0.354	0.300	0.359	0.307
N	435	435	435	435

Source: Authors' survey data

Notes: "# of events" means all ceremonies.

The specification is the same as that of Table 6 except that height-for-age z-score and stunting status are measured based on the China CDC standard. Other notes follow Table 5.

Web Table A.7—Prenatal social events exposure on socioeconomic characteristics

Coefficients on social festival exposure

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
Month Events Began	Ln (per capita income)	Year of edu	Maternal height	Paternal height	# cows	Cadre status	Minority status	Grandparent present	Father present	Mother present	Parents smoke & problem drinking
0	-0.137	1.822	-9.564	0.353	0.358	-0.185*	-0.033	0.139	0.109	0.017	0.363*
(*conceived*)	(0.527)	(1.151)	(13.562)	(7.021)	(0.331)	(0.096)	(0.196)	(0.186)	(0.171)	(0.152)	(0.201)
1	0.58	0.258	-7.036	-3.532	-0.407	0.004	-0.06	-0.256	-0.173	-0.044	-0.23
	(0.494)	(1.080)	(12.704)	(6.637)	(0.310)	(0.090)	(0.184)	(0.175)	(0.160)	(0.143)	(0.188)
2	0.042	-0.812	9.415	4.125	-0.096	0.052	-0.249	0.071	0.062	-0.014	0.095
	(0.265)	(0.570)	(6.822)	(3.368)	(0.166)	(0.047)	(0.197)	(0.094)	(0.086)	(0.077)	(0.101)
3	0.238	0.911	1.966	1.498	0.271	-0.155	0.055	-0.056	0.188	0.242*	0.266
	(0.456)	(1.002)	(11.738)	(6.213)	(0.286)	(0.183)	(0.171)	(0.161)	(0.148)	(0.132)	(0.174)
4	0.371	-0.86	-10.725	-1.24	-0.336	0.138*	-0.062	-0.032	-0.224*	-0.192	-0.126
	(0.413)	(0.907)	(10.618)	(5.706)	(0.259)	(0.075)	(0.155)	(0.146)	(0.134)	(0.119)	(0.157)
5	-0.114	-0.23	6.854	6.516*	0.039	-0.086	-0.16	0.133	-0.006	0.07	-0.059
	(0.308)	(0.666)	(7.919)	(3.888)	(0.193)	(0.055)	(0.113)	(0.109)	(0.100)	(0.089)	(0.117)
6	0.008	0.445	-14.424	1.953	0.079	-0.191	0.107	-0.112	0.172	0.126	0.142
	(0.389)	(0.861)	(10.006)	(5.276)	(0.244)	(0.171)	(0.146)	(0.137)	(0.126)	(0.112)	(0.148)
7	0.313	1.805**	-0.516	-1.28	-0.076	0.206	-0.061	0.054	-0.114	0.207	-0.158
	(0.329)	(0.731)	(8.455)	(4.629)	(0.206)	(0.161)	(0.125)	(0.116)	(0.107)	(0.195)	(0.125)
8	-0.408	0.629	-9.851	3.402	-0.084	-0.017	-0.167*	-0.028	-0.095	-0.065	-0.083
	(0.276)	(0.597)	(7.101)	(3.482)	(0.173)	(0.049)	(0.101)	(0.098)	(0.090)	(0.080)	(0.105)
9	0.008	0.721	8.534	4.438	-0.017	-0.082*	-0.09	-0.156*	0.106	0.170**	0.188*
(born)	(0.261)	(0.570)	(6.729)	(3.199)	(0.164)	(0.047)	(0.096)	(0.092)	(0.085)	(0.076)	(0.100)
Adj R-square	0.060	0.072	0.080	0.045	0.012	0.087	0.047	0.047	0.020	0.052	0.037
N	435	435	435	435	435	435	435	435	435	435	435

Source: Authors' survey data

Notes: Each column is a separate regression that checks whether households with any of these characteristics are more / less able to select the timing of pregnancies. "Month Events Began" indicates the gestational months that overlaps with the intense social events (during December and the following January), which ranges from 0 (conceived) to 9 (born). The default category corresponds to no exposure to intense ceremonies.

Other notes follow Table 5.