Health Care Consumerization: The Case of Private Segment Health Care Provision in Poland

Waldemar Karpa, Kozminski University[1]
Mateusz Zabolski, Kozminski University[2]

Extended Abstract

Since few years now, there has been a growing interest in consumerism in health care sector. Both medical practitioners, as well as policy makers, focus on the role of consumers and competition in achieving a more efficient provision of health care services that concentrates on patients' needs. Moreover, there is evidence that patients – who are also consumers – are more and more interested in getting convenient and tailored-made health care services. At the same time, we can observe how new technology (mainly telemedicine and digital health) is changing the way health care is administrated, creating room for improvement in health outcomes and allocation of resources.

Therefore, investigating the feasibility of systemic change in health care provision seems to be a priority for scholars, service providers, payers and all involved in designing health care policy.

The aim of the study

Referred to the above, this paper aims at providing a systematic review of challenges and opportunities associated with adoption of the consumer-centered design of health care provision in Poland. We focus on the private sector services since it has consequently been implementing and leading the consumerization change. There is a double rationale for it: first, there is a dearth of empirical evidence on the topic and most literature investigating the health care-related consumerism phenomena focuses on the U.S. Second, it is interesting to check whether consumerization might be a solution in reforming Polish public health care system, facing recurrent supply shortages and missing resources.

Methodology

After describing and analyzing the forms of consumerization in primary care (such as: telemedicine, retail clinics, medication management, etc.) we discuss the issue by interviewing the medical and strategy directors of two major private health care service providers in Poland. We aim to verify whether these companies consider, or are willing to introduce solutions that have been successfully introduced elsewhere and display the following series of benefits, such as:

- Reduction in utilization of health care services
- Decrease in overall cost of diseases, and
- Better long-term health outcomes.

Findings: According to the experts

- There is a clear and pronounced strategy orientation towards the consumer-patient-centered system of health care provision. It is based on two pillars: on the one hand, there is a technological dimension that offers tools to improve and raise the efficiency of care; on the other hand, it is clear that the sole technology (in the form of smart apps, chat-bots, etc.) cannot completely substitute the real contact with the medical profession. Therefore, these pillars seem to be complementary and the health care providers opt for the omnichannel system of care. Both providers are systematically implementing the business management process (BMP) solutions to match the demand and increase the availability and accessibility of care.
- The implementation of flexible, on-demand care, involves the adequate adaptation strategy for both patients and medical professions. While the younger group of patients and medical practitioners is already embracing the opportunities of technological change, it is important to

[1] Assistant Professor, Economics Department, Kozminski University, 59, Jagiellonska St., 00-301 Warsaw, Poland. Email: wkarpa@kozminski.edu.pl
[2] PhD Candidate, Kozminski University, 59, Jagiellonska St., 00-301 Warsaw, Poland. Email: mzabolski@gmail.com

inform older group of patients about the possibilities of omnichannel care. Furthermore, the older group of practitioners requires an incentive-based training schemes, aiming at valuating benefits of flexibility associated with telemedicine.

- The idea of time-saving multivisits is already implemented by both providers, however, its scope remains limited to a tiny series of medical specialties, such as occupational medicine.
- The health providers do as much as they can in terms of technology in-house, however, as far as they can obtain the complex solutions elsewhere, they do not hesitate to acquire it on the market.
- The proactive approach to health is implemented mainly through a series of coordinated check-ups and healthy life-style counseling, responding to the growing wellness-oriented needs of patients.

Keywords: Healthcare, Consumer economics

JEL codes: I11; D6; D12

Analysis of The Impact of The New Medical System Reform on The New Rural Cooperative Medical System -- An Actuarial Perspective

Yuantao Xie[1], Juan Yang[2]*
1. School of Insurance and Economics, University of International Business and Economics, Beijing, China; email: xieyuantao@uibe.edu.cn
2. Institute of Comprehensive Development, Chinese Academy of Science and Technology for Development, Beijing 100038, China; email:yangj@casted.org.cn)
***Corresponding author：Yuantao Xie**
Email: xieyuantao@uibe.edu.cn

Abstract

This paper aims at providing actuarial formula for cooperative medical insurance funds' revenue and outlay under risk and welfare type cooperative medical insurance system, that is advocated by present policy, moreover, this paper presents calculating methods for indicators such as per capita premium, loss ratio, funds carry-over rate, financial burden rate, etc. This paper calculates basic medicine policy implementation, impacts of financial expenditure increase on new rural and local finance based on an actuarial formula. On the basis of Hubei province's Sui County's real data, uses empirical analysis and stochastic simulations to analyze different policy's impact.

Key word: Medical system reform; NCMS; turnover rate; financial burden rate

Introduction

Background

Four basic medical insurance system forms the main part of China's established medical insurance system, supplemented with rural and urban residents serious illness insurance. The General Office of the State Council released *Opinions on Consolidating and Improving the Basic Drug System and the New Mechanism for the Operation of the Basic Level* in February 2013. Indicating medical and health system reform is advancing in depth. Nevertheless, to what degree could this influence NCMS, experts just give theoretical analysis and few detailed calculation.[1]

Literature review

Gu (2005) stated the trend of global medical system reform; Xu and Leng (2007) further summarized Chinese medical system's problems; Li et al. studied marketization of Chinese medical system reform; Gu and Fang Liming discussed sustainable development and implementation of NCMS.

On the system design of the new rural cooperative medical system, Guo (2013) conceived a three levels model with medical separation, insurance payments, and government subsidies，to both ensure that the majority of Chinese residents can bear the cost of medical expenses and minimize government's burden, make a good balance between fairness and efficiency.

Wang (2013) analyzed on the satisfaction degree of the new rural cooperative medical reform from the perspective of farmers based on the results of a questionnaire of 16 villages of Lin You County; Zhu (2013) analyzed present problems like unreasonable allocation of medical resources, management system is not perfect, promotion system is not perfect exist in rural medical and health services.

From the government functions' perspective, Xie and Li (2013) analyzed American medical insurance reform, discussed basic political context, the behavior of interest groups and budget subjects during reform, and reckon that only a perfect system could guarantee the reasonable budget politics process. Zhao and Jiang (2002) discussed policy choice of medical system reform，Peng (2013) discussed paths government relies on during medical reform; Zhang (2013) discussed the factors

restricted by government toward medical system reform. Zuo(2017) thinks that the new rural cooperative medical system can alleviate the economic risk of disease, and it is a link of chain health insurance system to cut off the vicious circle of "poverty and disease" in rural areas. Zhou C et al. (2016) analyzed the incidence and intensity of catastrophic health service fee (CHE) in 347 cases of tuberculosis in three provinces and cities in China and evaluated the compensation effect of NCMS. The study found that NCMS can reduce CHE and the problem of poverty caused by illness in a certain extent, but even in the new agriculture subsidy is still facing 46.7% families and 35.4% CHE families below the poverty line. This article analyzed the impact of the new medical system reform on the new rural cooperative medical system from an actuarial Perspective, which is totally different from other research.

Contribution of this paper

The contribution of this paper lies in calculating basic medicine system and the effect of fiscal expenditure on the new rural cooperative medical system and local finance through the actuarial perspective.

Cooperative medical insurance fund's actuarial estimation

NCMS makes overall plans with county（city）as a unit, covering whole country's farmers, township enterprises' employees (not including peasant family as a unit to participate in NCMS) are also included.

Rural cooperative medical system's principle is: voluntary participation, multi financing; the amount of expenses is decided by income, guarantee moderation; trial in advance and promote gradually. NCMS management system's principle is simplicity and efficacy.

Expenditure

China 's rural cooperative medical insurance mainly use risk-welfare type cooperative medical insurance, which combines risk type cooperative medical insurance with welfare type cooperative medical insurance, taking serious illness and ailments into consideration. And making compensation fees based on each proportion of outpatient and hospitality expenses. Due to the different proportions of outpatient and hospitality costs, we need to calculate two parts which often based on empirical data from sample population to estimate the amount of premium for the insurers.

According to China's relevant regulations, the cooperative medical insurance fund expenditure mainly cover three parts,

TE=BE+RR+AE

TE: total expense

BE: benefit expense, referring to the direct costs of medical services occur within the scope of insurance compensation, which is the most basic and important part of medical insurance.(net premium)

RR: risk reserve, additional risks that use to pay the extraordinary outbreak of epidemics and make up the deficit of the medical benefit fund. The impacts of risk reserve contain the size of reserve a degree of risk. It takes as a percentage of total health care expenditure cooperation，such as $r_1 \cdot TE$

AE: The administration expense, containing initial establishment fees, marketing fees and overheads. Management fees are often divided into fixed costs and variable costs, cited as $AE = r_2 \cdot TE$, expressed as a percentage of total health care expenditures cooperation

The expenditure of medical compensation amounts= (outpatient fees*ratio of outpatient's compensation +hospital fees *ratio of hospital's compensation)* accelerated factors

1. The calculation based on counties

The new rural cooperative medical system often implements based on counties or cities.

Assume that each county has n towns, the outpatient compensation ratio of the ith town is o_i , the total outpatient fee of towns is, the compensation ratio of hospitality is i_i , the total hospitality expenditure is ISE_i so the total medical compensation expenditure is

$$BE = \sum_{i=1}^{n} \left(OSE_i \times o_i + ISE_i \times i_i \right) \times k$$

Then,

$$TE = \frac{BE}{1-(r_1+r_2)} = \frac{\sum_{i=1}^{n}(OSE_i \times o_i + ISE_i \times i_i)\times k}{1-(r_1+r_2)}$$

The total expenditures of the cooperative medical system are total insurance fees.

2. Summarize the each insured fee for insurer

$$BE = \sum_{i=1}^{N}(X_i - d)_+ R$$

Where R=reimbursement rate, then

$$(X_i - d)_+ = \begin{cases} 0, & X_i < d \\ X_i - d, X_i \geq d \end{cases}$$

The above is left censored and shifted variable. D is the determined threshold level, only if the part of hospitality costs exceed d can be compensated, then,

$$TE = \frac{BE}{1-(r_1+r_2)} = \frac{\sum_{i=1}^{N}(X_i - d)_+ R}{1-(r_1+r_2)}$$

Actual calculation can be simplified, first the use of empirical data to estimate

Health care costs that over d which is the actual medical costs, second, the estimation of probability of medical expenses exceed d, so cooperative medical insurance fees(ie, the total premium)

$$TE = \frac{BE}{1-(r_1+r_2)} = \frac{N \cdot p \cdot X_0 \cdot R}{1-(r_1+r_2)}$$

Income

New rural cooperative medical care system implements the combined funding regime from individual contributions, collective support, and financing mechanisms. Therefore, rural health insurance fund level

The cooperative insurance fund level= average insured fee * total insurers+ funding from the rural economy organizations+ funding from domestic fiscal aid+ funding amount at the beginning of the year.

The formula is $TR = AC \times N + CA + FA + TR_0$

Average cost is based on the domestic regulation. The funding amounts at the beginning time contain compensating balances and risk reserve.

Measurable indicators

This article is derived the following actuarial indicators as a basis for policy evaluation.

1. Premium for each insurer

If you do calculations based on each county. Then average insured cost is

$$AP = \frac{P}{N} = \frac{\sum_{i=1}^{n}(OSE_i \times o_i + ISE_i \times i_i)\times k}{N\left[1-(r_1+r_2)\right]}$$

If we make the summary of the cost for each insurer, then average insured cost is

$$AP = \frac{P}{N} = \frac{p \cdot X_0 \cdot R}{1-(r_1+r_2)}$$

2.Compensation rate

$$CR = \frac{\sum_{i=1}^{n}(OSE_i \times o_i + ISE_i \times i_i)\times k}{(AC \times N + CA + FA)\cdot\left[1-(r_1+r_2)\right]}$$

If we make the summary of costs for all insurers, then

$$CR = \frac{N \cdot p \cdot X_0 \cdot R}{(AC \times N + CA + FA) \cdot [1 - (r_1 + r_2)]}$$

3.Turnover rate of funds

$$TTR = \frac{\sum_{i=1}^{n} (OSE_i \times o_i + ISE_i \times i_i) \times k - (AC \times N + CA + FA) \cdot [1 - (r_1 + r_2)]}{[1 - (r_1 + r_2)] \cdot TR}$$

If we make the summary of costs for all insurers, then

$$TTR = \frac{\sum_{i=1}^{N} (X_i - d)_+ R - (AC \times N + CA + FA) \cdot [1 - (r_1 + r_2)]}{TR \cdot [1 - (r_1 + r_2)]}$$

4.Financial burden ratio

$$FBR = \frac{\sum_{i=1}^{n} (OSE_i \times o_i + ISE_i \times i_i) \times k - (AC \times N + CA + FA) \cdot [1 - (r_1 + r_2)]}{[1 - (r_1 + r_2)] \cdot FE}$$

Wherein, FE is the expenditure budget, if we make a summary of costs for all insurers. Then

$$FBR = \frac{\sum_{i=1}^{N} (X_i - d)_+ R - (AC \times N + CA + FA) \cdot [1 - (r_1 + r_2)]}{FE \cdot [1 - (r_1 + r_2)]}$$

Empirical Analysis

This part takes Hubei Province's Sui county as the research object.

Brief introduction of the situation

Located in the northeast of Hubei, Sui county covers an area of 5673 square kilometers, has a population of 0.9768 million, of which 0.6118 million are rural people, 199 thousand people work in the first industry, GDP reached 13.61billion yuan, first industry created 5.322 billion yuan, local fiscal revenue reached 230 million yuan, tax income is 162 million yuan, local fiscal expenditure budget is 2.399 billion yuan, rural per capita disposable income is 8672 yuan, of which the consumption expenditure is 6326 yuan, has 36 rural hospitals, 2609 hospital beds, more than 1423 docotrs, 2.67 hospital beds per thousand people, 1.46(assistant) medical practitioner. Annual individual payment standard is 70 yuan per person in 2013(60 yuan for fund fee, 10 yuan for networking costs; in contrast, it was 50 yuan in 2012); local finance and central finance offer 240 yuan's subsidies through special transfer every year.

Extracting hospital medical fund's 70%, outpatient medical fund's 20%, venture fund's 10% in 2013. In accordance with Opinions on the Comprehensive reform of public hospitals at the county level (the State Council), 15% of drug addiction is canceled in June 2012. Increasing financial input; adjusting the cost of treatment, limiting the drug price's increase within 90% of the differentiation in drug price; reducing hospital self-digestion 10% of income, the government bear the fallback responsibility, compensating for hospitals' reduced revenue.

Continuously improve the compensation mechanism of medical insurance and finance, rural area medical institutions' 20 commonly used drugs were significantly lower than local retail pharmacies; get rid of the situation of using medicine to supplement treatment and maintaining public hospital 's public consciousness; township hospitals and village health room hardware facilities improved significantly and personnel also get strengthened.

Calculation result

According to current basic data and with the County Health Bureau of Statistics' data, Sui County's per capita premium (pure premium) is 276.91 yuan, loss ratio is 89.33%, fund transfer rate is

9.07%, at all levels of government financial subsidies is about 0.146832 billion yuan, local financial burden ratio is 3.06%. Comprehensive reimbursement rate (comprehensive consideration of outpatient and inpatient) is 38.14%

Stochastic Simulation

Government subsidies for the new rural cooperative medical system and urban residents have exceeded 360 yuan per person per year since 2015. This paper separately discusses the influence of the change of central financial subsidy standard from 120-180.

If medical expenses (including the cost of medicine and treatment) grow by 10%, the fiscal expenditure also grows by 10%, local fiscal expenditure subsidizes medical insurance fund if fallback.

On the other hand, the proportion of drug price adjustment (considering the combined ratio of basic drugs and drugs at their own expense) was reduced from 15% to 5%. Procedures for the general cost of the disease: Registration - diagnosis - injection/medication, procedures for major disease expenditures: Registration - diagnosis - medical equipment - the conclusion of surgery - surgery - hospital" Taking insulin as an example, each 65 yuan, the actual reimbursement is 18 yuan. If people catch a cold: it will cost him 20 yuan to buy medicine, if he resorts to hospital, it will cost him 100 yuan (registration + injection + medicine); take normal fracture for example, the total cost of treatment will be 1000-2000 yuan, of which surgery fee accounts for 40%. For major diseases, with leukemia, treatment cost is between 10-30 million yuan, HLA preliminary examination fee is 500 yuan, CT300 yuan/times, chemotherapy drugs costs 3000-10000 yuan.

Therefore, the non-pharmaceutical part of the cost of the total medical expenses takes up 50%-70%, patients have paid 30% fee for treatment without even realizing what exactly causes this disease, the proportion will be bigger for major diseases. We assume it is 30%.

We conduct scenario simulation.

Table 1. Per capita premium income （AP）

	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
120	310	310	310	310	310	310	310	310	310	310	310
130	330	330	330	330	330	330	330	330	330	330	330
140	350	350	350	350	350	350	350	350	350	350	350
150	370	370	370	370	370	370	370	370	370	370	370
160	390	390	390	390	390	390	390	390	390	390	390
170	410	410	410	410	410	410	410	410	410	410	410
180	430	430	430	430	430	430	430	430	430	430	430

Table 2. Combined Ration (CR)

	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
120	92.81%	92.45%	92.08%	91.72%	91.36%	90.99%	90.63%	90.27%	89.91%	89.54%	89.18%
130	87.18%	86.84%	86.50%	86.16%	85.82%	85.48%	85.14%	84.80%	84.46%	84.12%	83.78%
140	82.20%	81.88%	81.56%	81.24%	80.92%	80.60%	80.27%	79.95%	79.63%	79.31%	78.99%
150	77.76%	77.45%	77.15%	76.85%	76.54%	76.24%	75.94%	75.63%	75.33%	75.02%	74.72%
160	73.77%	73.48%	73.19%	72.91%	72.62%	72.33%	72.04%	71.75%	71.46%	71.18%	70.89%
170	70.17%	69.90%	69.62%	69.35%	69.08%	68.80%	68.53%	68.25%	67.98%	67.70%	67.43%
180	66.91%	66.65%	66.39%	66.12%	65.86%	65.60%	65.34%	65.08%	64.82%	64.56%	64.29%

Table 3 Fund Transfer Rate (TTR)

	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
120	96.06%	95.15%	94.24%	93.33%	92.42%	91.52%	90.63%	89.73%	88.84%	87.96%	87.08%
130	84.86	84.02	83.18	82.34	81.50	80.67	79.85	79.02	78.20	77.38	76.57

0	%	%	%	%	%	%	%	%	%	%	%
14	74.94	74.16	73.38	72.60	71.83	71.06	70.30	69.53	68.77	68.02	67.27
0	%	%	%	%	%	%	%	%	%	%	%
15	66.09	65.36	64.64	63.92	63.20	62.49	61.78	61.07	60.37	59.67	58.97
0	%	%	%	%	%	%	%	%	%	%	%
16	58.15	57.47	56.80	56.13	55.46	54.80	54.14	53.48	52.82	52.17	51.52
0	%	%	%	%	%	%	%	%	%	%	%
17	50.98	50.35	49.72	49.10	48.47	47.85	47.24	46.62	46.01	45.40	44.80
0	%	%	%	%	%	%	%	%	%	%	%
18	44.48	43.89	43.30	42.72	42.14	41.56	40.98	40.41	39.84	39.27	38.70
0	%	%	%	%	%	%	%	%	%	%	%

Table 4 Local Financial Burden Rate (FBR)

	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
120	3.89%	3.86%	3.84%	3.81%	3.78%	3.76%	3.73%	3.71%	3.68%	3.65%	3.63%
130	3.66%	3.63%	3.60%	3.58%	3.55%	3.53%	3.50%	3.47%	3.45%	3.42%	3.40%
140	3.42%	3.40%	3.37%	3.35%	3.32%	3.29%	3.27%	3.24%	3.22%	3.19%	3.16%
150	3.19%	3.17%	3.14%	3.11%	3.09%	3.06%	3.04%	3.01%	2.98%	2.96%	2.93%
160	2.96%	2.93%	2.91%	2.88%	2.86%	2.83%	2.80%	2.78%	2.75%	2.73%	2.70%
170	2.73%	2.70%	2.68%	2.65%	2.62%	2.60%	2.57%	2.55%	2.52%	2.49%	2.47%
180	2.50%	2.47%	2.44%	2.42%	2.39%	2.37%	2.34%	2.31%	2.29%	2.26%	2.24%

Above analysis indicates with the increase of the proportion of the financial subsidy from the central government and the comprehensive drug price adjustment, the combined rate can be decreased from 92.81% to 64.29%, fell by 30.72%, which will greatly improve the fund transfer rate, reduce local financial burden, according to our test results, local financial burden ratio fell from 3.89% to 2.24%, decreased by 42.48%. Draw 3D graphics as follows:

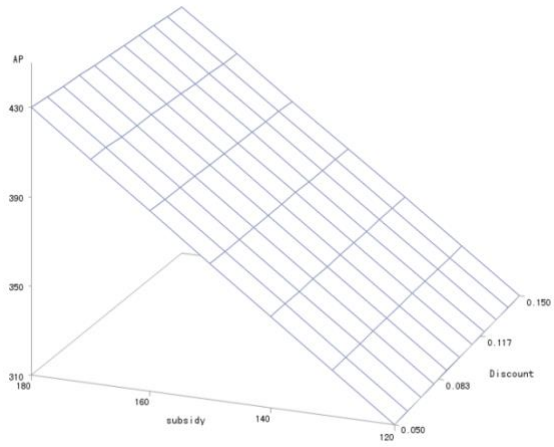


Figure 1. Per capita premium income（AP）

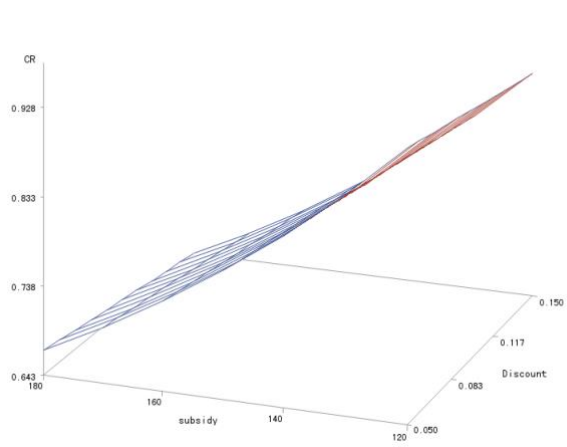
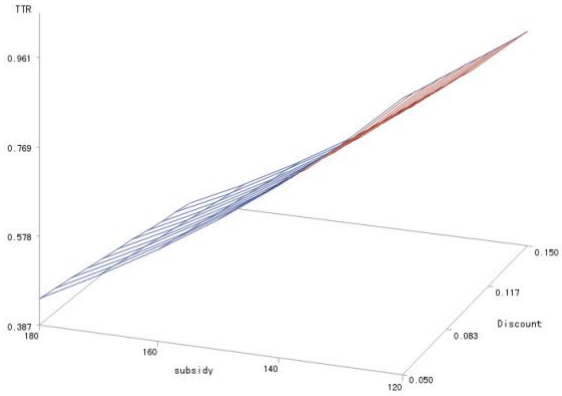


Figure 2. Combined Ration (CR)



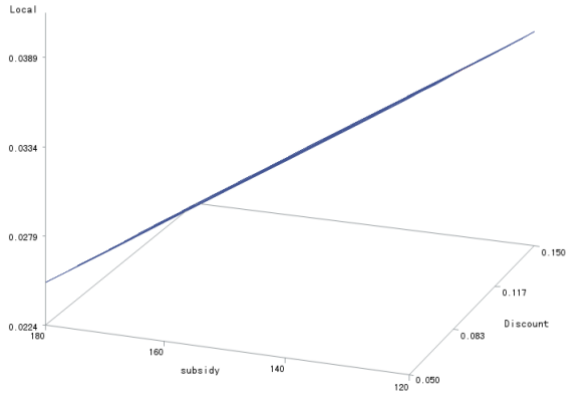


Figure 3. Fund Transfer Rate (TTR) Figure 4. Local Financial Burden Rate (FBR)

Conclusion and recommendations

Based on the above analysis, consolidating the basic drug system and increasing financial support will have a significant impact on the operation of the NRCMS fund, reduce comprehensive payment rate, improve fund conversion rate and reduce the local fiscal burden. Under the reform of the new rural cooperative medical system, there are still some problems in our country's rural medical system, and we put forward some policy recommendations.

Problem

There are some problems in the new rural cooperative medical system:

1. Medical expenses accounted for the high proportion of total personal income, does not match people's income. According to our preliminary estimation, medical expenses accounted for about 16.2% of the total income of the individual. For major diseases, low-income residents could hardly afford the huge medical expenses.

2.The expense of drugs and treatments are too high, the existing “drug-maintaining-medicine” situation is ubiquitous, in the druggist - hospital - patients pyramid link, about 20% of the income from pharmaceuticals remains in the hospital, 30% return pharmaceutical producing enterprises, 50% earned by circulation business / medical representatives (drug dealers). China's current Western medicine production cost is equivalent to ¼ of the world’s average, but in the hospital or pharmacy, its price is 2-14 times of the European and American markets. Chinese medicine cost is extremely low, even if the added western medicine ingredients are very cheap, but the price of some drugs are far higher than the ex-factory price’s 20-40 times.

3. The medical expense has always been accounting for more than 80% of national health total costs. According to the Ministry of Health's statistics, during 2007-2014, the national average per capita outpatient expenses increased by 13% annually, the average annual growth rate of hospitalization expenses increased by 11%, while the per capita income growth rate increased by less than 5%. Hospital benefit drives as well as government health policy implementation deviation, resulting in medical institutions concerns treatment more than prevention. On the one hand, disease prevention and public health service funds are in shortage, serious lack of talent, mechanism shrinks; on the other hand, medication overuse during diagnosis and excessive examination phenomenon are serious.

4. The distribution of medical resources is not balanced, embodied in: one is unfair financing, different members of society, health care needs are met largely polarization; the second is new rural cooperative medical reimbursement is still not nationally connected on the net, remote reimbursement is still impossible. While majority rural residents work in faraway cosmopolitans, thus the actual proportion of people who enjoyed the NRCMS’s compensation is very low. Globally, China’s health system performance ranks 144th (192 countries) and the equality of health financing ranked the fourth countdown.

5. From the perspective of government’s support structure, above the third-grade hospitals obtain 5-8% from state appropriations, the secondary (counties) and above hospital account for 2-4%, below second grade is less than 1%. Good hospital distribution is unbalanced, good doctor distribution is

more uneven. The people in less developed areas could not enjoy the medical resources fairly.

To sum up, China's medical security system is imperfect, the medical resources allocation is irrational, medical costs are rising sharply. This is the crux of the medical system reform our country is facing.

Recommendations

In order to solve the existing problems in the reform of the medical system, this paper puts forward the following policy recommendations:

1. Health insurance should change from the angle of payment full coverage to benefit full coverage.

From payment's point of view, most of the rural areas of our country have achieved full coverage. But most peasants do not benefit in the emergency treatment. At present medical insurance fund is relatively independent, payment standard is not the same, but the treatment level is the same. Medicare funds across the country only connect local hospital network, hindering the flow of personnel. Therefore, the new rural cooperative medical reimbursement should be able to connect nationally to the net, to achieve remote reimbursement, and effectively protect the rights and interests of farmers.

As a national welfare, medical care should not become a source of revenue, instead, the government should take the responsibility. The medical reform in our country is not to focus on drug fee, but on how to realize free treatment, how to improve medical facilities, to effectively protect people's right to life and health. The government should reasonably plan, precisely charge, provide medical benefits.

2. Explore feasible mode of commercial medical insurance

All over the world, commercial medical insurance should take on important missions, with the community medical insurance pattern as supplements. For example, commercial insurance plays the main role in the United States and supplemented with social insurance, social insurance, provide medical assistance (Medicaid).

Commercial medical insurance faces the problem of "adverse selection", which restricts the development of the commercial medical insurance. The government should intervene appropriately, through mandatory medical savings, direct handling medical insurance, compel citizens to join the private medical insurance, or directly get investment from tax, to establish a redistribution mechanism. It can also provide medical insurance through the establishment of a voluntary medical insurance system.

3. Medical system unification

China's national health expenditure is about 800 billion yuan every year, of which used for the hospital is less than 300 billion yuan, but state administration and institutions workers' NHS reached at least 150 billion yuan, this causes medical resources allocation unfairness and low efficiency. State administration and institutions' free medical care should unify with urban residents' basic medical insurance system.

330 thousand central unit civil servants join the health insurance system for urban workers in 2013. 80% of the 31 mainland provinces (municipalities) entirely abolish free public medical care. July 1, 2014 "public institutions personnel management regulations" was formally implemented, established a basic system for personnel management, and pointed out institutions and their staff should participate in social insurance. This promoted public health insurance unification

4. Using economic management means to realize the reasonable allocation of medical resources

The current economic investment of the government could not fully meet the needs of the medical market. The government should regulate with a goal and appropriately adjust the distribution of medical resources, establish a clear hierarchical medical network from top to bottom. Large provincial hospital bring in high-tech equipment to overcome major difficult disease, to avoid redundant construction and waste of resources; city and county level hospital investment just need to meet the clinical equipment needs, with the goal of conquering major illness; urban communities and township primary hospitals input general equipment, mainly to overcome common disease, frequently-occurring disease. Among provinces, cities and counties and township hospitals, conduct the premise of the region, establish a medical mutual green channel. (Jing Yuan Jing, 2013[13])

Government level should refer to the density of the crowd, rationally plan hospital's layout, implement a mobile system for doctors, so that people in different regions could fairly enjoy good medical conditions. Simultaneously expanding medical talents, trying to exempt from tuition, work distribution, encouraging students to study medicine and healthcare major.

5. Multi-means and multi-subject cooperation to curb medical costs rise too fast

The medical mechanism, medicine purchase and sale, hospital "big prescription" and excessive

medical treatment, cause medical expenses rise too fast, controlling medical expenses' fast rise is an important way to adjust the hospital evaluation index. Hospital managers should disconnect performance and economic benefits, change from the pursuit of economic benefits to the pursuit of "people-oriented" and "take the patient as the center", and put them into practice. Using special funds to ensure the welfare of the doctor and their skill level, to eliminate all the gray income. The state, hospital, urban and rural residents establish long-term cooperation mechanism to control medical costs and optimize the allocation of medical resources.

Strengthening medical behavior supervision, increasing government supervision and investment in prevention and security system, reducing market's interest–oriented behavior. To censor the qualification of drug manufacturers, to ban the production qualification of unqualified manufacturers according to law; to implement the maximum limit of the drug price; to improve the transparency of the process of drug procurement, to increase the choice of drug use.

National policy level, from advocating medicine separation, controlling medical fees, to now releasing the signal of the medical examination of the construction and reform, the medical examination will be expected to become the next focus of health care reform (Feng Xiaoqin, 2013[14]).

6. Encourage the development of private hospitals

The State Council promulgated the Health Development Twelfth Five Year Plan pointed out that "guide social capital to participate in the restructuring and reorganization of public hospitals", encourage the development of private hospitals, hospital differentiation's unfavorable factors should be cancelled, improve health insurance quota, reduce the tax burden on the private hospitals, implement the policy of independent pricing, countries should formulate relevant policies to support the development of private hospitals.

According to the 18 reports of the party, "sound system of national health insurance system, establish major disease insurance and relief mechanism"; the combination of "improve the rural three-tier network of health services and urban community health service system and actively promote the reform of public hospitals" NCMS will improve greatly, will completely solve the " left back disease", "all night queuing for registration" and "could not find a bed without relationship" phenomenon.

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Conflict Statement

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

References

[1] Gu, X. *The Trend of Global Medical System Reform*. Chinese Academy of Social Science Graduate, 2005, (06).

[2] Yu, X., Leng, H. *China's Contemporary Medical System Review*. Chongqing Technology and Business University Journal (West Forum), 2007, (01).

[3] Li, L., Guo, S. *Market Research of China's Medical System Reform*. Contemporary Managers(a), 2006, (21).

[4] Fan, Y., Wang, X., Xie, Y. *Rethinking the problems and reasons of the medical and health system reform in China*. China Health Service Management, 2006, (5): 295-297.

[5] Gu, X., Fang, L. Voluntary and compulsory between the Chinese rural cooperative medical care system and analysis of the sustainable development. *Sociological Research*, 2004(5).

[6]Guo, G. *Thinking about fairness and efficiency of China's medical system reform -- Shaanxi Shenmu medical reform*. Journal of graduate students of Huazhong Normal University, 2013,01:160-163.

[7] Wang, L., Wei, F. *Research on the factors influencing the satisfaction of the new rural cooperative medical care reform from the perspective of farmers*. Guizhou Agricultural Science, 2013,04:191-194.

[8] Zhu, Q. *A brief discussion on the problems in the reform of rural health care.* Management, 2013,03:57.

[9] Xie, H. and Li, Z. *Politics in The Social Security Budget: Analysis of the American medical insurance reform*. Journal of Harbin University (SOCIAL SCIENCE EDITION), 2013,05:35-42.

[10] Zhao, Y., Jiang, F. *China's Medical Reform Policy Selection*. Economic Research, 2002, (19).
[11] Peng, X. *Paths Government Medical Reform Relies on*. China Insurance News, 2013-11-27008.
[12] Zhang, C. *Analysis of Chinese Medical Reform and Countermeasures*. Economic Perspective,2013,09:170-171.
[13] Ruan, J. *Innovative Explore of Public Hospital Management System in the Context of new Medical Reform*. Science and Technology Vision, 2013,18:123.
[14] Feng, X. *Analysis of the Direction of Chinese Medical Reform*. Era Finance, 2013,12:326-329.
[15] Zhou, Chengchao, et al. The effect of NCMS on catastrophic health expenditure and impoverishment from tuberculosis care in China. *International Journal for Equity in Health*, 2016,15(1):172.
[16] Zuo, T., Xu X.Y. vicious circle of poverty and disease in rural areas, and chain health guarantee system in precise poverty alleviation. *Journal of Southwest University for Nationalities (Humanities And Social Sciences Edition)*,2017(1):1-8.

Author's Picture & Biography

	Yuantao Xie is currently Professor of Statistics and Actuarial Science, Vice-Dean of School of Insurance and Economics, University of International Business and Economics. Dr. Xie received his PhD degree from Renmin University of China. He was a post doctor of School of Public Health, Boston University. He was a research scholar for United States Department of Veterans Affairs (VA) in US, as well as an research in Shriners Hospitals for Children in Boston. He is now a member of the American Risk and Insurance Association, member of the Mathematical Finance and Financial Engineering Specialized Committee in China Society for Industrial and Applied Mathematics, member of the Health Insurance Specialized Committee in Chinese Preventive Medicine Association, as well as the expert and consultant on Statistical Analysis System of Beijing Health Insurance Information Platform.

	Juan Yang is the researcher of Chinese Academy of Science and Technology for Development (CASTED) affiliated to the Ministry of Science and Technology of China (MOST). Before joining MOST, she has four years working experience on statistics and data analysis in e-commerce field in Beijing. Ms. Yang holds a doctorate degree in economics from the Renmin University of China. She used to be a visiting scholar in Boston University and the Shriners Hospitals for Children based in Boston of the United States. She was a fellow of the World Intellectual Property Organization (WIPO) based in Geneva for a joint research project between MOST and WIPO.

Domestic Violence and Child's Health: Evidence from India

Debayan Pakrashi, Indian Institute of Technology, Kanpur[1]
Sarani Saha, Indian Institute of Technology, Kanpur[2]

Abstract

In this paper we empirically examine the association between incidences of maternal domestic abuse and the nutritional status of her under-five child.Using detailed dataset from the National Family Health Survey, the overall results suggest that any violence experienced by the mothers significantly increases the likelihood of her child being stunted and underweight. Our estimate is robust to different econometric specifications employed in the paper. The detrimental effect of such violence ever faced by the mother is found to be more pronounced for children living in nuclear families and in urban areas and particularly for those children born to mothers who have acquired less education as well as for a girl child and relatively younger children.

Introduction

Crime against women has been increasing at an alarming rate over the past two decades all over the world and more so in developing countries, including India. According to the National Crime Records Bureau (NCRB) of India, reported crime against women has been continuously on the rise between 2010-2014, with a 9.2% increase, alone during 2014. One of the most common forms of crime against women is domestic violence. Domestic violence, also referred to as intimate partner violence (IPV) includes cruelty such as verbal, physical and sexual abuse of women by current or former male intimate partners and is punishable by law under the Domestic Violence Act, 2005; Section 498A of the Indian Penal Code (IPC). The prevalence of domestic violence, however, has magnified by a substantial extent and hence has emerged as a growing and serious concern among researchers as well as policymakers. Strikingly, 65% of Indian men believe that their better halves have to be subjected to abuse so that their family remains together (International Men and Gender Equality Survey, 2011)[3].

Domestic violence of women by their husbands or his relatives has detrimental health, psychological and emotional effects, which can severely affectthese women's quality of life. According to a study, IPV tends to affect 10-69% of women all over the world (Kruger, 2002). Not only does domestic abuse have an impact on women's health and psychology but it may have a trickle-down effect on the health of their children as well, through several direct and indirect pathways.

There are two models which can explain the link between domestic violence and the nutritional status of a child. The first is the risky family environment model that describes how domestic violence inflicted on women may cause a disturbance in their child's stress-responsive biological regulatory systems that are crucial for maintaining physical and mental well-being (Yount et. al., 2011). Moreover, such exposure could have a direct impact on the child's intellect, attitude, health, and overall development (Panchanadeswaran et. al., 2005; Yount et. al., 2011). On the other hand, the family disruption model suggests that domestic abuse may have an indirect effect on children through "spillover" effects on other family practices (Yount et. al., 2011). Exposure to domestic violence may lead to health risky behaviours, such as smoking, excessive consumption of liquor and drugs, as well as psychological (fear, depression) and physical stress (injury, disability, fatigue) and poor nutritional status (anaemia, poor weight gain) among mothers(Campbell, 2002;Yount et. al., 2011). These effects in turn may cause variations in a child's stress-responsive regulatory systems. Since mothersare primarily responsible for childcare, any

[1] Assistant Professor, Department of Economic Sciences, Indian Institute of Technology, Kanpur, India; Phone- + 91-512-679-7870; Email – pakrashi@iitk.ac.in

[2] Associate Professor, Department of Economic Sciences, Indian Institute of Technology, Kanpur, India; Phone - +91 – 512-679-7064; Email – sarani@iitk.ac.in

[3] See https://www.icrw.org/publications/international-men-and-gender-equality-survey-images/

imbalance in her life may have an adverse effect on the growth and overall development of the child. This can be due to negligence in maternal prenatal and delivery care, infant and toddler care — such as improper feeding practices, exposure to infection, and inadequate psychosocial care (Yount et. al., 2011). Till date, there have been very few empirical analyses that explored the effect of intimate partner violence or domestic violence on the health outcomes of young children. Our paper fills this gap in the literature by conducting a rigorous study to establish the link between domestic violence experienced by married women (15-49 years) and child health outcomes, particularly of those aged 0-59 months. Using data from the National Family Health Survey(NFHS) in India, we examine the relationship between various forms of domestic violence such as verbal and physical abuse and differentanthropometric indicators used to capture the nutritional status of children below five years of age, namely, incidence of stunting, wasting and underweight. Since, no single indicator can capture all aspects of growth and body composition of young children, the use of multiple measures seems appropriate. To account for the potential endogeneity problem between child nutritional status and domestic violence and to provide causal estimates, we use the instrumental variable (IV) approach in addition to the usual ordinary least squares (OLS) methodology.

The overall results presented in the paper suggest that there is a significant association between domestic violence experienced by the mothers at the hands of their partner and various indicators used to capture the nutritional status of a child. Any violence experienced by the mothers significantly reduces the height-for-age Z-score and the weight-for-age Z-score, while it also leads to a significant increase in the incidences of stunting and being underweight. Furthermore, the results of a number of heterogeneity analyses show that these effects are more pronounced for children living in nuclear families, in urban areas as well as of those born of mothers with less than 12 years of education. The detrimental effect of domestic violence is also more in case of a girl child and particularly younger children.

The remainder of the paper is organised as follows. The next section presents the relevant literature. The description of the data along with adetailed discussion of the empirical methodology employedin the paper is discussed in the following section. The next section presents the findings of our empirical model and finally the last section concludes.

Background and Literature Review

There is a small but growing literature that considers the various causes and implications of domestic violence. Theoretical models have been developed in a few papers that shed some insight into the determinants as well as the consequences of domestic violence. In a first such attempt, Tauchen et a1. (1991) developed a model in which the husbands decide on the amount of abuse and income to transfer to their wives by maximizing their utility subject to a reservation utility level of the wife. This underlying theoretical framework has been used in this paper as well in a few others to empirically estimate the extent of violence in abusive marriages using various datasets (Farmer et. al., 1997; Macmillan et. al., 1999).

Bowlus et. al. (2006) used a dynamic model to explain marriage, abuse, divorce and employment decisions of married couples. The model wasthen estimated using the Canadian Violence Against Women Survey (VAWS) data. The results provided meaningful insights into: who abuses or who is abused and the implications of such abuse on women's decision to work. Aizer (2010)incorporates violence in her theory of household bargaining, which suggests that an increase in the relative wage of a woman increases her bargaining power andeventually lowers the level of abuse experienced by her. Sheexploited the exogenous variation in demand for labour in female-dominated industries to estimate the impact of male-female wage gap on domestic violence and found evidence consistent with the findings of her model. Koeing et. al. (2003)on the other hand found that a higher autonomy for women in Bangladesh actually increased the risk of exposure to Intimate Partner Violence (IPV) in areas that were culturally conservative. In contrast, in liberal areas, no such effect was found. Furthermore, the authors found, that in such liberal societies, community variables like higher proportion of educated women or women who are members of community credit/savings group actually reducedthe risk of abuse.

Most of the above papers have highlighted the role of economic status of women in determining the risk of IPV. Apart from economic status, socio-economic and demographic factors like education level of the wife, age of partner, age at first marriage, and alcohol consumption of husband have also been found to have a relationship with the risk of facing domestic violence (Schuler et. al., 1996; Jejeebhoy et. al.,1997;Koeing et. al.,2003).

A few papers have also investigated the effect of domestic violence on mental, physical as well as reproductive health of women exposed to such abuse (Heise et. al., 1998; Watts et. al., 2002). The effect of IPV on a range of pregnancy outcomes and infant health is also well documented in the literature (Yount et. al., 2011). There, however, exists limited research on the effect of IPV on the nutritional status or growth of young children.As Yount et. al. (2011) pointed out there are distinct pathways through which domestic violence can affect the nutritional status of infants and young children. Hence, there is a need to closely examine the relationship between these two variables. Till date, there have only been a few papers in this regard.

In five national samples of children aged 6–59 months that were studied, the adjusted odds of stunting and severe stunting were found to be higher for children of Kenyan mothers who had experienced some form of physical domestic abuse (Rico et. al., 2011). Sobkoviak et. al. (2012) did a comprehensive analysis to explore the relationship between domestic violence and child nutrition in Liberia. Using the cross-sectional dataset from the Liberian Demographic and Health Survey, the authors found significant positive association between odds of stunting and underweight and maternal reports of sexual domestic violence in the prior year.

Our paper falls in this literature and examines the relationship between domestic violence and indicators of child's nutritional status like stunting, underweight and wasting for another developing country, namely India. In this study, for the first time, apart from estimating the nature of this relationship, our paper also focuses on the pathways that may lead to such an association. We ran a number of heterogeneity analyses to identify such pathways. From the methodological point of view as well, we ensured that the results are robust to a range of econometric concerns. First we ran a placebo test to rule out the possibility of any spurious correlation between domestic violence and child's nutritional status. We also conducted an IV regression to address any potential endogeneity problems.

Data and Methodology

Our objective is to quantify the association between a number of measures of domestic violence experienced by the mother in the household and different indicators for child malnutrition such as stunting, wasting and underweight, of children aged below five years. In the first instance, this involves running a series of ordinary least squares regressions with child health as the dependent variable and one measure of domestic violence as an explanatory variable. To isolate the impact of domestic violence, we also control for other factors that may determine child health. That is, we estimate the following model in this paper:

$$H_{ij} = \alpha + \gamma DV_j + \vartheta H_j + \beta C_{ij} + \delta M_{ij} + \varepsilon_{ij} \quad (1)$$

where, H_{ij} is the health outcome used to capture the nutritional status of child i (from household j) ; and ε_{ij} is the random error term. The parameter of interest in this paper is therefore γ associated withDV_j,which measures the type of domestic violence—physical or verbal abuse—that the mother of child i from household$j$ is subjected to.For the purpose of our analysis, we only consider married mothers who are aged 15-49 years and have atleast one child aged below 5 years.

In addition, we alsocontrol for householdlevel variables (H_j) such as age and gender of the household head, household size, wealth index of the household, type of residence and family structure, number of living children, number of children aged 0-5 years, and number of women in the household. On the other hand, we also net out the effect of child specific characteristics(C_{ij}) such as age, gender and birth order of the child and maternal characteristics (M_{ij}) like age of the respondent mother, highest education level attained by the respondent and her partner, age of the mother at the time of marriage, whether respondent is currently working and the body mass index of the mother. To account for any correlations in errors across primarily sampling units (PSU), we compute clustered–robust standard errors at the PSU level.

We use data from the National Family Health Survey (NFHS) Survey for the study and focus on only Round III, which was carried out in 2005-06. The NFHS survey is a household-level survey conducted throughout India every 6-10 years, starting from 1992. The third survey in the NFHS series, preceded by NFHS-1 in 1992-93 and NFHS-2 in 1998-99, was conducted in 29 states of India and interviewed women aged 15-49 years and men aged 15-54 from over 120,000 households.

The NFHS-3 survey is a household level survey that combines information collected through a face-to-face interview and a medical examination. NFHS-3 used three different type of questionnaires to collect

overall data regarding the household, and specific information regarding the women and men in the household. The women specific questionnaire contains detailed data on the status of women within the household. The status of women and spousal violence module of the women questionnaire asks a series of questions on verbal, spousal and sexual violence experienced by women while height and weight measurements were taken to cover anthropometric assessment of the nutritional status of ever-married women aged 15-49 years and their children born in the five years preceding the survey.

Finally, to account for the potential endogeneity problem between child nutritional status and domestic violence and provide causal estimates, we employ the instrumental variable (IV) approach. We propose to use an *assault dummy*constructed using the National Crime Records Bureau (NCRB) data for the years 2005-06 as an IV for domestic violence. The *assault dummy*takes a value of 1 if the number of reported cases of assault on women with an intent to outrage her modesty (based on Section 354 of Indian Penal Code) in the state is above the national average and 0 otherwise. The identifying assumption isthat, whether the statehas high incidence of assault against women should have no effect on child health outcomes, except through cases of domestic violence. The key idea behind arguing that the *assault dummy* is a good instrument is that attitude towards women outside the residence is a strong predictor of attitude towards women within a household, but need not necessarily affect child health outcomes directly.In order to check the robustness of our results estimated using the IV approach with the *assault dummy*, we also estimate our regression model using an alternative strategy that uses a *rape dummy*[4] as an instrument for domestic abuse of women within the household.

Outcome variables

The anthropometric indicators that we use to measure the impact of intimate partner violence experienced by married women (15-49 years) on the nutritional status of children under the age of five are based on weight-for-height z-scores (wasting), weight-for-age z-scores (underweight) and height-for-age z-scores (stunting).Each of these indicators capture different information about growth and body composition of the children. Acute malnutrition for children under the age of five is estimated using anthropometric measurements (height and weight measurements collected during the survey) expressed in standard deviation (SD) units (z-scores) measured in terms of deviations from the median of the reference population and specifying cut-offs (presented as z-scores) in line with WHO recommendations(WHO, 2006). Children are classified as malnourished if their z-score is less than -2 standard deviations (SD) and “severely” malnourished if the z-score lies below -3 SD.

A child is referred to as stunted or having low height-for-age (HAZ), when he/she is too short for his/her age but need not be thin. This is a result of chronic malnutrition and may lead to risks related to long term development of the child. Overall, stunted growth is an important indicator as it reflects the inability of a child to reach his growth potential due to improper health and/or nutritional factors. Moreover, it is also a cause of concern as it may lead to higher risk for illness and premature death; delayed mental development and hence bad performance in school and lower productivity in the work force in future and lower mental ability. According to the World Health Organisation (WHO), a child is referred to as stunted when the height-for-age z-score of the child is less than two standard deviations of the WHO child growth standards median.[5]

Similarly, wasting implies low weight-for-height, i.e., when a child is thin given his/her height but may not be short. This is an indicator for acute malnutrition and may lead to a higher risk of morbidity and mortality. Unlike stunting, which occurs as a result of numerous different acute and chronic factors, such as micro- and macro-nutrient deficiencies, wasting is considered to be a short-term condition that represents failure to receive adequate nutrition during the period immediately before the survey, due to malnutrition or a recent episode of illness. Wasting occurs when the weight-for-height z-score is less than -2.[6]

[4]Rape as discussed in Section 376 of the Indian Penal Code (IPC) is an extreme form of crime against women compared to assault on woman with intent to outrage her modesty (Sec. 354 IPC) and so we use assault dummy as the instrument of interest and use the rape dummy as a robustness check. Results using the rape dummy will be made available upon request.

[5] The exclusion criteria used for the HAZ-score is less than -6 and greater than +6.

[6] We exclude all WHZ-scores in our data which are less than -5 and greater than +5.

The last indicator used in our analysis is the incidence of underweight, which also means a child has low weight-for-age, i.e., the case when a child is either too short or thin for her/his age. Weight-for-age is a composite index of height-for-age and weight-for-age and takes into account both acute and chronic malnutrition. Being underweight can also be a serious cause of concern as it may lead to severe effects such as an immune system that is weak, slower than expected linear growth, or difficulties with learning. The criteria for underweight is a weight-for-age z-score that is less than -2.[7]

Measures of Domestic Abuse

After defining the key outcome variables, we shift our focus towards the variables of interest, i.e., in our case, variables capturing the incidence and extent of abuse of mothers at the hands of their husbands. We primarily focus on two specific categories of domestic abuse: (i) verbal or emotional and (ii) physical abuse. We do not include extreme cases of sexual violence in our analysis. Each of these variables will be discussed in much detail next.

The verbal or emotional abuse variable is constructed using the responses of the mothers to a set of questions related to being subjected to verbal or emotional violence. This type of violence does not lead to physical harm but may cause emotional damage to any women. Women's responses to the following questions "Now if you will permit me, I need to ask some more questions about your relationship with your (last) husband. Does/did) your (last) husband ever: (a) say or do something to humiliate you in front of others? (b) threaten to hurt or harm you or someone else close to you? (c) insult you or make you feel bad about yourself?" were used to create a 0-1 dummy which captures whether the woman ever faced verbal violence at the hands of her (last) husband.

On the other hand, the physical violence variable is a 0-1 dummy based on a host of variables capturing their responses to a set of physical violence related questions, where the severity of the violence varies from mild (less severe) to extremely harsh (severe)physical abuse experienced by the women. Similar to the verbal abuse variable, women's responses to the following questions "Now if you will permit me, I need to ask some more questions about your relationship with your (last) husband. Does/did) your (last) husband ever do any of the following things to you: (a) slap you? (b) twist your arm or pull your hair? (c) push you, shake you or throw something at you?, (d) punch you with his fist or with something that could hurt you? (e) kick you, drag you or beat you up?, (f) try to choke you or burn you on purpose? and (g) threaten or attack you with a knife, gun or any other weapon?" were used to create a 0-1 dummy which captures whether the woman ever faced physical violence at the hands of her (last) husband.

Finally, we combine all the questions related to physical abuse and verbal abuse to create a 0-1 dummy denoting whether there was any evidence of domestic violence, either verbal or physical violence, at the household level. We use it as a proxy for incidence of any type of domestic violence within the household.

The descriptive statistics on the child health outcomes are reported in the top panel of Table 1, while the lower panel summarizes the relevant domestic abuse variables. In Panel A, we find that that there are significant occurrences of stunting, wasting and underweight among children aged 0-59 months in our sample. About 45% of children were found to be stunted and 39% underweight, compared to only 18% of such children being wasted. Such high incidence of stunting and underweight as compared to wasting among young children is indicative of stunting and underweight being relatively long term phenomenon compared to only short term effects in the case of wasting.

In Panel B, we note that there are a significant number of cases in our sample that have experienced some form of domestic abuse at the hands of their partner—either physical or verbal. Around 36% of married women aged 15-49 years in our sample have been through some form of household abuse or the other. On an average, while 34% of respondents in our sample have experienced physical abuse, 14% have experienced verbal violence.Figure 1 and Table 2 on the other hand confirms that poor nutritional status among children aged 0-59 months is more common among households who have ever experienced some form of domestic violence.

Table 1: Descriptive Statistics

[7] The exclusion criteria for WAZ-scores are less than -6 and greater than +5.

Figure 1: Child nutritional status and incidence of domestic violence

Variables of Interest	No. of Observations	Mean	Std. Dev.	Min	Max
Panel A: Outcome variables					
Height-for-age Z-score	31701	-1.74	1.74	-6.00	6.00
Incidence of stunting	31701	0.45	0.50	0.00	1.00
Weight-for-height Z-score	31426	-0.89	1.38	-4.99	5.00
Incidence of wasting	31426	0.18	0.39	0.00	1.00
Weight-for-age Z-score	32536	-1.69	1.34	-5.99	4.91
Incidence of underweight	32536	0.39	0.49	0.00	1.00
Panel B: Domestic violence variables					
Any violence	32663	0.36	0.48	0.00	1.00
Verbal violence	32663	0.14	0.35	0.00	1.00
Physical violence	32663	0.34	0.47	0.00	1.00

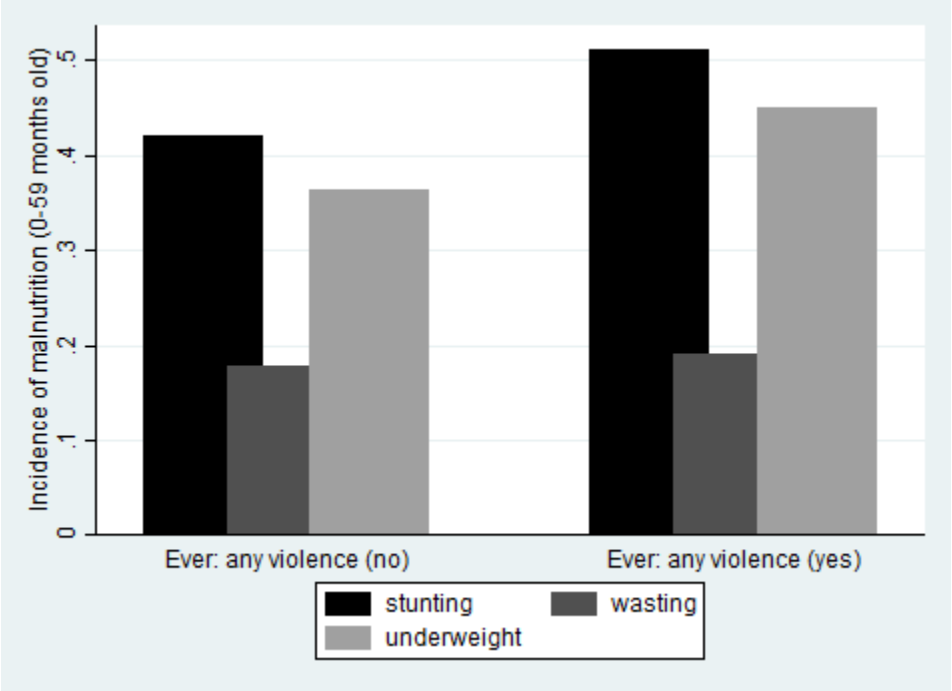

Table 2[8]: Incidence of malnutrition by treatment status

8

Variables of Interest	Any violence			Verbal violence			Physical violence		
	No	Yes	Difference	No	Yes	Difference	No	Yes	Difference
Height-for-age Z-score	-1.61	-1.97	-0.36***	-1.70	-1.96	-0.26***	-1.61	-1.99	-0.38***
Incidence of stunting	0.42	0.51	0.09***	0.44	0.51	0.07***	0.42	0.52	0.10***
Weight-for-height Z-score	-0.84	-0.97	-0.13***	-0.87	-0.99	-0.12***	-0.84	-0.99	-0.15***
Incidence of wasting	0.18	0.19	0.01***	0.18	0.20	0.02***	0.18	0.19	0.01***
Weight-for-age Z-score	-1.59	-1.86	-0.27***	-1.66	-1.88	-0.22***	-1.59	-1.88	-0.29***
Incidence of underweight	0.36	0.45	0.09***	0.38	0.46	0.08***	0.37	0.45	0.08***

Regression Results

We setup a linear regression model and run regressions separately for each combination of the health outcomes and the domestic violence variables, after controlling for the other household, maternal and child level characteristics. The OLS regression results are presented in Table 3.[9]According to the results presented in Table 3, we find that domestic abuse (in any form) tends to have a significant association with child health outcomes—HAZ and WAZ-score, stunting and wasting. When we focus on the coefficients associated with *any violence,* presented inPanel A of Table 3, we find that incidence of violence of any form within the household reduces HAZ-score by 0.11 SD and WAZ-score by 0.032 SD. On the other hand, domestic violence increases incidence of stunting by 1.7 percentage points, while it reduces incidence of wasting by 1.2 percentage points. When we attempt to separate out the effects by the type of violence experienced by the women —verbal and physical violence, we find that while physical violence affects all the four health outcomes mentioned earlier, verbal violence only has a significant effect on HAZ-score and even then physical violence seems to dominate the verbal violence effects and it has a much stronger negative influence on child's health. While physical violence reduces HAZ-score by 0.111 SD, verbal violence reduces it by only0.079 SD. Similarly, while an instance of physical violence increases occurrence of stunting among children aged 0-59 months by 1.7 percentage points,verbal violence increases occurrence of stunting among children by 1 percentage point, though the effect is not statistically significant. Similarly, significant results are also seen in case of WAZ, where the effect is only significant for physical violence.

The placebo results as presented in the last column of Table 3 confirm that these are not spurious correlation as we do not find any evidence of any significant relationship between different measures of domestic violence and likelihood of having a twin, as expected. Additionally, in order to account for the potential endogeneity problem between child nutritional status and domestic violence, we use the *assault dummy* as an instrument for the incidence of domestic violence, and believe that the IV results provide causal estimates that are more conclusive than the OLS results and is therefore our preferred approach. We find that the overall IV results presented in Table 4 are much stronger than the OLS regression results in Table 3.*Any violence* against the mother is found to significantly reduce HAZ-score by 1.015 SD, WHZ-score by 0.567 and WAZ-score by 0.784 SD. Similarly, it is found to increase incidence of stunting and underweight by 19.4 and 19.2 percentage points respectively. We do not however find any significant effect on the incidence of wasting. The F-stats presented in the last row of Table 4 suggest that *assault dummy* is indeed a very good IV for domestic violence.[10] With IV regressions, we re-do the placebo test and find that there is again no effect of domestic violence on birth of twins, as expected.

Note: "Difference" is the difference between those households which faced violence and those which did not. Differences are statistically significant at 1% level.

[9] Regression results with the full set of controls will be made available upon request.

[10]First stage regressions will be made available upon request.

Contrary to the OLS results presented in Table 3, the coefficients associated with verbal violence in Table 4 are significantly larger than thoseassociated with physical violence. The results from our preferred IV approach suggests that even verbal violence experienced by mothers can be unfavourable to a child's health and the effects can be much more serious compared to extreme forms of physical violence, when often friends, family and neighbours interfere to sort out matters between the mother and her partner. Results using the alternative IV—the *rape dummy*—are very similar to those presented in Table 4 and will be made available upon request.

Table 3: OLS Regression results

Panel A: OLS Regressions	HAZ-score	WHZ-score	WAZ-score	Stunted	Wasted	Underweight	Twins
Any violence	-0.110***	-0.009	-0.032*	0.017**	-0.012**	0.009	-0.003
	(0.023)	(0.019)	(0.019)	(0.007)	(0.005)	(0.007)	(0.002)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495
Panel B: Pathways - OLS Regressions	**HAZ-score**	**WHZ-score**	**WAZ-score**	**Stunted**	**Wasted**	**Underweight**	**Twins**
Verbal violence	-0.079**	-0.012	-0.038	0.010	-0.001	0.015	-0.003
	(0.031)	(0.026)	(0.024)	(0.009)	(0.007)	(0.009)	(0.003)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495
Physical violence	-0.111***	-0.018	-0.036*	0.017**	-0.014**	0.009	-0.003
	(0.023)	(0.019)	(0.019)	(0.007)	(0.005)	(0.007)	(0.002)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495

Note: The following controls are included in the regressions: age of household head, whether respondent is currently working, wealth index of the household, size of the household, type of residence, number of living children, number of children aged 0-5 years, number of women in the household, gender of household head, age and gender of child, age of respondent,highest education level attained by respondent, highest education level attained by partner, type of family structure, age of mother at time of marriage, birth order of child and body mass index of mother. Clustered standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: IV Regression results

Panel A: IV Regressions	HAZ-score	WHZ-score	WAZ-score	Stunted	Wasted	Underweight	Twins
Any violence	-1.015***	-0.567*	-0.784***	0.194*	-0.035	0.192*	0.026
	(0.373)	(0.333)	(0.294)	(0.103)	(0.088)	(0.100)	(0.029)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495
F-stat from first stage	51.52	46.95	54.75	51.52	46.95	54.75	55.06
Panel B: Pathways - IV Regressions	HAZ-score	WHZ-score	WAZ-score	Stunted	Wasted	Underweight	Twins
Verbal violence	-2.012**	-1.126*	-1.663**	0.385*	-0.070	0.406*	0.056
	(0.818)	(0.677)	(0.678)	(0.215)	(0.176)	(0.222)	(0.061)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495
F-stat from first stage	22.01	20.01	20.48	22.01	20.01	20.48	20.74
Physical violence	-1.024***	-0.571*	-0.787***	0.196*	-0.036	0.192*	0.027
	(0.377)	(0.336)	(0.295)	(0.104)	(0.088)	(0.100)	(0.029)
Number of observations	29,623	29,361	30,392	29,623	29,361	30,392	30,495
F-stat from first stage	52.92	48.48	57.08	52.92	48.48	57.08	57.36

Note: The following controls are included in the regressions: age of household head, whether respondent is currently working, wealth index of the household, size of the household, type of residence, number of living children, number of children aged 0-5 years, number of women in the household, gender of household head, age and gender of child, age of respondent,highest education level attained by respondent, highest education level attained by partner, type of family structure, age of mother at time of marriage, birth order of child and body mass index of mother. Clustered standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Heterogeneity Analysis

In this section, we run a number of heterogeneity analysis to identify the channels through which incidence of domestic violence at the household level impacts the nutritional outcomes of children under the age of five. We try to determine if the effect of household
violence on child health is less pronounced in situations wherein the mother is a victim of domestic abuse but the child is more likely to receive care and support from other people. We test this by observing if there exist any significant differences in regression results across different sub-sample groups, namely, urban population vs. rural population and individuals belonging to nuclear vs. joint family and maternal characteristics such as whether the mothers have at least completed secondary schooling or are currently working or not. We also compare health outcomes across children of different age groups to check which age group gets impacted the most. The results from the heterogeneity analysis are summarised in Tables 5A-C.

One may argue that even if the mother is a victim of domestic abuse, if the child is likely to receive care and support from other people, the negative effects of domestic violence on children health will be less pronounced. To understand this channel of care, we did our first heterogeneity analysis by running the regressions separately for two sample groups—urban population versus rural population. Rural communities are thought to be very closely knit. Neighbours in such societies would be more willing to help when any child in the neighbourhood gets sick and does not get the requisite attention from the parents due to the incidence of domestic violence. This effect is rarely observed in urban communities, where the bond between people living in a particular area is perceived to be not so strong. Thus, in situations of domestic violence, lack of help by surrounding households may lead to more significant

health consequences for the child in an urban region than in a rural region. The results for this heterogeneity analysis are represented in the panels A and B of Table 5A. As expected, presence of any violence in a household has a negative effect on HAZ, WHZ and WAZ-score and positive effect on incidences of stunting and underweight in urban societies. For instance, presence of *any violence* within an urban household reduces HAZ-score by 1.111 SD, WHZ-score by 1.8 SD and WAZ-score by 1.724 SD, while belonging to a rural household only reduces HAZ-score by 0.817 SD, though significant at only 10% level. On the other hand, *any violence*increases occurrence of stunting among children from urban regions by 26.7 percentage points and being underweight by 50.7 percentage points. However, no such effect is found among children from the rural region. Thus, our hypothesis that the effect on child growth and nutrition during domestic abuse should be relatively weaker for rural households, where families are closely knit than urban households, holds true.

Table 5A: Heterogeneity Analysis- Family structure

Panel A: Region of Residence	**Urban region**			**Rural region**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-1.111*	-1.800***	-1.724***	-0.817*	0.341	-0.006
	(0.587)	(0.655)	(0.563)	(0.457)	(0.399)	(0.341)
Number of observations	10,898	10,801	11,201	18,725	18,560	19,191
Panel B: Region of Residence	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.267*	0.180	0.507***	0.114	-0.192	-0.059
	(0.159)	(0.134)	(0.180)	(0.130)	(0.119)	(0.122)
Number of observations	10,898	10,801	11,201	18,725	18,560	19,191
Panel C: Type of Residence	**Nuclear family**			**Joint family**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-0.921**	-0.548	-0.702**	-0.993*	-0.528	-0.816*
	(0.440)	(0.392)	(0.340)	(0.548)	(0.465)	(0.419)
Number of observations	16,905	16,749	17,365	12,718	12,612	13,027
Panel D: Type of Residence	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.153	-0.068	0.213*	0.224	0.013	0.135
	(0.122)	(0.109)	(0.120)	(0.157)	(0.122)	(0.146)
Number of observations	16,905	16,749	17,365	12,718	12,612	13,027

Note: The following controls are included in the regressions: age of household head, whether respondent is currently working, wealth index of the household, size of the household, type of residence, number of living children, number of children aged 0-5 years, number of women in the household, gender of household head, age and gender of child, age of respondent,highest education level attained by respondent, highest education level attained by partner, type of family structure, age of mother at time of marriage, birth order of child and body mass index of mother. Clustered standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The importance of presence of other caregivers can also be seen in our next analysis where we divide the households into two groups—nuclear and joint families. In a joint family, there are more people,especiallygrand-parents and other relatives to look after the children. Hence, even if the mother is being subject to violence and therefore cannot take proper care of her child, the grandparents and other members of the joint family can provide the requisite care and attention to the child, thereby ensuring better health outcomes for him/her. The children from nuclear family do not get such attention if the

mother fails to care for them. Hence, one can expect worse nutritional outcomes for children from nuclear families in comparison to those from joint families. The regression results inpanelsC and D of Table 5A are in accordance with our expectations. The negative consequences of domestic violence on child nutrition is either similar or significantly moreamong nuclear families, as compared to that of joint families.The HAZ-score and WAZ score for nuclear families reduces by 0.921 SD and 0.702 SD while it reduces the same for joint families by 0.993 SD and 0.816 SD respectively. Moreover, the results presented in Panel C of Table 5A for the nuclear family are found to be statistically significant while those associated with the joint family scenario are barely significant. Similarly, the results from Table 5A Panel D suggest that domestic abuse increases the likelihood of being underweight among children from nuclear families by 21.3%, while no such effect on stunting, wasting or underweight is found among children from joint families, thereby confirming our caregiver theory.

Table 5B: Heterogeneity Analysis- Maternal characteristics

Panel A: Respondent's employment status	**Respondent not working**			**Respondent working**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-1.163***	-0.343	-0.803**	-0.848	-1.021*	-0.830*
	(0.441)	(0.375)	(0.336)	(0.575)	(0.549)	(0.483)
Number of observations	20,661	20,464	21,195	8,962	8,897	9,197
Panel B: Respondent's employment status	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.200	-0.092	0.115	0.226	0.094	0.377**
	(0.122)	(0.100)	(0.113)	(0.171)	(0.145)	(0.185)
Number of observations	20,661	20,464	21,195	8,962	8,897	9,197
Panel C: Respondent's level of education	**Less than 12 years of education**			**Higher (more than 12 years)**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-1.092***	-0.468	-0.734**	1.557	-3.291	-2.322
	(0.376)	(0.328)	(0.289)	(2.547)	(2.742)	(2.285)
Number of observations	27,616	27,373	28,344	2,007	1,988	2,048
Panel D: Respondent's level of education	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.201*	-0.040	0.196**	-0.049	0.052	-0.037
	(0.104)	(0.088)	(0.100)	(0.616)	(0.551)	(0.573)
Number of observations	27,616	27,373	28,344	2,007	1,988	2,048

Note: The following controls are included in the regressions: age of household head, whether respondent is currently working, wealth index of the household, size of the household, type of residence, number of living children, number of children aged 0-5 years, number of women in the household, gender of household head, age and gender of child, age of respondent,highest education level attained by respondent, highest education level attained by partner, type of family structure, age of mother at time of marriage, birth order of child and body mass index of mother. Clustered standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Next, we look at the importance of maternal characteristics in the context of domestic violence, by focussing on two sub-samples of mothers—working mother vis-à-vis mothers who are not working.This case is particularly interesting as the employment status of a mother can affect the nutritional status of a child via two different pathways: firstly, a working mother has more autonomy and is able to maintain a higher socio-economic status within the household, which eventually translates into improved health outcomes for her children. On the other hand, a working mother usually has less time to devote to her children. So, in case the mother is subject to domestic abuse, the working mother may find it even more

difficult to take care of the children, thereby leading to worse health outcomes for her children. If the first effect dominates, then we can expect that lack of autonomy derived from not being employed can negatively affect the children of non-working mothers. On the other hand, if the second effect dominates then children of working mothers will have comparatively worse health outcomes. The results presented in panel Aof Table 5B show that while HAZ and WAZ-score reduces significantly by 1.163 and 0.803 SD respectively for children of mothers who are not working, the incidence of domestic violence as in Panel B of Table 5B only has a positive effect on the chances of being underweight, where children are 37.7% more likely to be underweight, when their mother is working.

In addition, when we focus on the role of mother's education in mitigating the effect of domestic violence, we find that if mothers are more educated, they may be more aware of the negative health consequences of domestic violence on children and hence may pay more attention to their children. Furthermore, more educated women may have more autonomy and therefore may be better able to cope with domestic violence compared to mothers who are less educated. Results in Panels C and D of Table 5B show exactly the same effect as hypothesised. There is a significant negative effect of domestic violence on HAZ and WAZ-score to the tune of 1.092 SD and 0.734 SD respectively and positive effect on incidences of stunting and underweight for mothers with less than 12 years of education (did not complete secondary level of schooling) but no such effect is seen among mothers with more than 12 years of education. Hence from all of the above analyses, absence of care or neglect of the children, whose mothers were targets of abuse turns out to be an important pathway via which intimate partner violence adversely affects the nutritional outcomes of these children.

Next, we pay particular attention to the relevance of the gender of the child. Results in panels A and B of table 5C show that a female child is found to have significantly lower HAZ and WAZ-scores and has 30.4% and 29.5% higher chances of being stunted and underweight respectively.However, such effects completely die down in case of a male child. In a typical Indian household, a girl child usually receives less attention than a boy and hence may be more susceptible to any domestic violence experienced by their mothers. These results presented in Panels A and B of Table 5C are in direct compliance with our care story discussed so far.

Finally, in order to study the differential effect of intimate partner violence on child growth and nutritional outcomes across children from various age groups, we perform regressions separately for different age groups (in months)of children: 0-24 and 24^{+}-59, and present the results in Panel C and D of Table 5C. The overall results suggest that younger children aged 0-24 months are particularly at risk of being stunted and underweight, compared to older kids.Newborn and very young children, particularly those less than two years old are more susceptible to nutritional variation resulting from domestic violence as any instance of abuse of mother in a household can result in improper feeding of the children, which in turn can, too a large extent, be reflected in their weight. As the child grows older, his weight isn't as uncertain as earlier and since, the child can feed himself or herself when hungry, they are less likely to be as vulnerable and malnourished. As a result, we find higher changes ofbeing stunted and underweight from domestic violence, usually among younger cohorts.

Table 5C: Heterogeneity Analysis – Child characteristics

Panel A: Gender of child	**Male**			**Female**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-0.536	-0.716*	-0.559	-1.544***	-0.389	-1.012***
	(0.450)	(0.417)	(0.351)	(0.518)	(0.411)	(0.375)
Number of observations	15,446	15,318	15,850	14,177	14,043	14,542
Panel B: Gender of child	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.091	0.019	0.090	0.304**	-0.097	0.295**
	(0.131)	(0.113)	(0.126)	(0.141)	(0.113)	(0.131)
Number of observations	15,446	15,318	15,850	14,177	14,043	14,542
Panel C: Age of child	**0-24 months**			**24-59 months**		
	HAZ-score	WHZ-score	WAZ-score	HAZ-score	WHZ-score	WAZ-score
Any violence	-1.321***	-0.987**	-1.347***	-0.710	-0.251	-0.287
	(0.466)	(0.437)	(0.367)	(0.472)	(0.414)	(0.358)
Number of observations	11,380	11,200	11,841	18,243	18,161	18,551
Panel D: Age of child	Stunted	Wasted	Underweight	Stunted	Wasted	Underweight
Any violence	0.321***	0.017	0.236**	0.078	-0.070	0.150
	(0.122)	(0.117)	(0.112)	(0.143)	(0.111)	(0.137)
Number of observations	11,380	11,200	11,841	18,243	18,161	18,551

Note: The following controls are included in the regressions: age of household head, whether respondent is currently working, wealth index of the household, size of the household, type of residence, number of living children, number of children aged 0-5 years, number of women in the household, gender of household head, age and gender of child, age of respondent,highest education level attained by respondent, highest education level attained by partner, type of family structure, age of mother at time of marriage, birth order of child and body mass index of mother. Clustered standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Conclusion

From our analysis so far, it is evident that there exists a linkage between domestic abuse of mothers and the overall growth and development of their children. In particular, mothers' experience of partner violence not only significantly reduces HAZ, WHZ and WAZ-score but also has a considerable impact on child stunting and underweight. From the overall results of our preferred model, which uses the instrumental variable approach, we find that not only instances of any form of domestic violence ever experienced by mothers significantly reduces HAZ, WHZ and WAZ-score by 1.015 SD, 0.567 SD and 0.784 SD respectively, but it also increases the chances of being stunted and underweight by 19.4 and 19.2 percentage points respectively. We also observe that while an instance of verbal violence in a household increases occurrence of stunting among children by 38.5 percentage points and occurrence of underweight among children by 40.6 percentage points (Table 4), the magnitudes are significantly larger than the effect of physical violence, suggesting that verbal or emotional abuse can have significantly larger effect on child nutritional status than physical violence. This is particularly true as friends, family and neighbours often interfere during spells of physical violence while verbal or emotional abuse by the husband or partner can continue within the boundaries of the residence for years without any intervention of any form. Moreover, the reported findings are important as they lend support to the direct and indirect pathways through which domestic violence can affect child stunting and underweight in the case of India.

The results of heterogeneity analysis also presented in the paper show that domestic violence has an impact on child health and the results are pronounced for urban regions and nuclear families suggesting that the requisite care and support from friends, neighbours and other family members, particularly in a close knit society or household can to a large extent reverse the negative health effects of domestic violence experienced by mothers at the hands of their partners. A common and consistent result exists across heterogeneity analysis of nuclear vs. joint family sub-populations and urban vs. rural sub-populations. We also find that if the primary caregiver—in this case the abused mother is also working or is less educated, the child may be particularly susceptible to poor nutritional status and health outcomes, such as higher incidences of stunting and being underweight as the mother may have limited time or may be less aware of the negative health consequences from such abuse and how to cope with them. When we focus on child characteristics—such as age and gender of the child—we find that a girl child, who already receives less attention and is neglected in the Indian culture and infants or younger children under the age of two are particularly susceptible to any domestic violence experienced by the mother. The overall results presented through the different heterogeneity analysis suggest that the absence of crucialcare or neglect of the already vulnerable children, when the mother is abused, may turn out to be a relevant pathway through which domestic violence could affect child nutritional status.

Overall, substantial evidence obtained for the association between partner violence and child growth and development is a major cause of concern for India and calls for immediate policy intervention by the government. Coordinated efforts can be made to increase awareness about domestic violence and its impact on child health, using channels such as media and newspapers. Also, non-governmental organisations can be setup to take care of young and vulnerable children during family troubles so as to ensure that the requisite care and support reaches these children in times of need. Future research could address issues, such as, the impact of partner abuse on child's education, the role of media to counter domestic violence, etc. Moreover, our study can also be expanded by looking at the impact of domestic violence on child health, particularly when an older sibling is also present within the household.

References

Aizer, A. (2010). The gender wage gap and domestic violence. *The American Economic Review*, *100*(4), 1847-1859.

Bowlus, A. J., and Seitz, S. (2006). Domestic violence, employment, and divorce. *International Economic Review*, *47*(4), 1113-1149.

Farmer, A., andTiefenthaler, J. (1997). An economic analysis of domestic violence. *Review of Social Economy*, *55*(3), 337-358.

Campbell, Jacquelyn C.(2002): Health consequences of intimate partner violence.*The Lancet* 359.9314,1331-1336.

Heise, L. L. (1998). Violence against women: an integrated, ecological framework. *Violence against women*, *4*(3), 262-290.

Jejeebhoy, S. J., and Cook, R. J. (1997). State accountability for wife-beating: The Indian challenge. *The Lancet*, *349*, S10-S12.

Kruger, Karen J., and Nicholas G. Valltos.(2002)Dealing with domestic violence in law enforcement relationships.*FBI L. Enforcement Bull.* 71: 1.

Koenig, M. A., Ahmed, S., Hossain, M. B., &Mozumder, A. K. A. (2003). Women's status and domestic violence in rural Bangladesh: individual-and community-level effects. *Demography*, *40*(2), 269-288.

Koenig, M.A., Lutalo, T., Zhao, F., Nalugoda, F., Wabwire-Mangen, F., Kiwanuka, N., Wagman, J., Serwadda, D., Wawer, M. and Gray, R. (2003). Domestic violence in rural Uganda: evidence from a community-based study. *Bulletin of the World Health Organization*, *81*(1), pp.53-60.

Macmillan, R., and Gartner, R. (1999). When she brings home the bacon: Labor-force participation and the risk of spousal violence against women. *Journal of Marriage and the Family*, 947-958.

Panchanadeswaran, S., and Koverola, C.(2005)The voices of battered women in India.*Violence against women* 11.6, 736-758.

Rico, E., Fenn, B., Abramsky, T., & Watts, C. (2011). Associations between maternal experiences of intimate partner violence and child nutrition and mortality: findings from Demographic and Health Surveys in Egypt, Honduras, Kenya, Malawi and Rwanda. *Journal of Epidemiology and Community Health*, *65*(4), 360-367.

Schuler, S. R., Hashemi, S. M., Riley, A. P., & Akhter, S. (1996). Credit programs, patriarchy and men's violence against women in rural Bangladesh. *Social science & medicine*, *43*(12), 1729-1742.
Sobkoviak, R. M., Yount, K. M., & Halim, N. (2012). Domestic violence and child nutrition in Liberia. *Social Science & Medicine*, *74*(2), 103-111.
Tauchen, H. V., Witte, A. D., & Long, S. K. (1991). Domestic violence: A nonrandom affair. *International Economic Review*, 491-511.
Watts, C., & Zimmerman, C. (2002). Violence against women: global scope and magnitude. *The Lancet*, *359*(9313), 1232-1237.
World Health Organization (WHO). (2006) Child growth standards based on length/height, weight and age, *ActaPaediatrica Supplement*, 450, 76–85.
Yount, K. M., DiGirolamo, A. M., &Ramakrishnan, U. (2011). Impacts of domestic violence on child growth and nutrition: A conceptual review of the pathways of influence. *Social Science & Medicine*, *72*(9), 1534-1554.