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Agricultural Mechanization and BMI for Rural Workers: A Field Experiment in China

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Keywords
agricultural mechanization, BMI, rural China

Disciplines
Agricultural and Resource Economics | Behavioral Economics | Growth and Development | International Economics

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Abstract

This paper examines whether and how agricultural mechanization affects the BMI of farmers in rural China using a unique data set. We conducted a field experiment with face-to-face interviews in 135 counties of 12 provinces in China in 2013. It includes 4,229 individuals from 1,024 rural households, of which 1,033 of the 2,165 workers are farmers. The BMI of farmers who utilize agricultural mechanization is about 10 percent larger than those who don't at a 1 percent significance level. Our results suggest that the adoption of agricultural mechanization has a positive and statistically significant effect on farmers' BMI in China: it increases the BMI of farmers by 7.8 percent. Agricultural mechanization significantly reduces hours of farm work. The reduced hours of farm work due to the adoption of agricultural mechanization explain 30 percent of the BMI increase of rural farmers. Understanding BMI in rural China is important in order to define what public policies are most likely to be effective in preventing and reducing obesity in rural China.

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1.Introduction

The increase in the world's food production is attributable to modern agricultural evolution, including motorization, mechanization, biological selection, and the use of chemicals. The average daily intake of calories has increased over the years, which has led to overweight, obesity, and related chronic diseases worldwide (WHO, 2017). This is leading to serious public health concerns in developed and developing countries. Over the past three decades, China has recorded impressive economic development. The modernization and rising incomes were propelling rapid lifestyle changes, including a shift from traditionally healthy diets to westernized diets, in China. These changes are often associated with an increase in weight and chronic deceases. Agricultural mechanization helped enhance agricultural productivity and lowered the unit costs of agricultural production. Major technological advances in farming also have emerged, such as increasingly mechanized farm work, which is associated with a decrease in energy expenditures. In recent years, agricultural mechanization is utilized in Chinese rural households. The main questions to be addressed in this study are, "Does agricultural mechanization affects the Body Mass Index (BMI) of the rural resident in China, and "If so, how?"

There is a large body of literature on overweight and obesity, and the negative effects on health of the citizens in developed and developing countries. Overweight, obesity, and related chronic diseases are becoming serious public health concerns worldwide. According to the World Health Organization, the definition of overweight I s individual with BMI > 25, and obesity with BMI>30. Studies have shown that there is an increase in the overweight and obesity in China (Weng, et al, 2007; Wu, 2006; Levine, 2007). The reasons for this epidemic increase in weight include changes in diet, reduced levels of physical activity, and increased sedentary lifestyles. In China decades of food scarcity were replaced by abundance. The prevalence of obesity and overweight more than doubled during the last decades of the 20th century, moving from famine to feasting in less than a generation. In 2012, the Chinese minister of health estimated that as many as 300 million Chinese were obese in a population of 1.2 billion (Reports on Chinese Nutrition and Chronic Diseases in 2015). China, the world's second largest economy, now vies with the US as the nation with the largest number of overweight citizens. Data from the Chinese national surveys of nutrition indicate big changes in proportions and sources of dietary macronutrients over the past 20 years (Wu, 2006). Energy intake from dietary fat among urban Chinese residents increased from 25% to 35%, which is above the 30% recommendation from the WHO. Energy intake from animal sources has increased from 8% in 1992 to 25% in 2002 (Wu, 2006).

Due to economic development and modernization, people are reducing physical activity and labor intensity in urban and rural areas. Contrary to studies that find people who live on farms in Australia and the USA to be heavier (Brumby et al. 2013, Chen et al. 2009), the study by Gao et al., 2011, finds that urban residents have higher rates of overweight and obesity in China. In addition, Chinese data shows that the BMI for urban Chinese is slightly higher than that of rural Chinese, 23.70 and 23.56 respectively (Figure 1). However, the growth rates of BMI for rural Chinese are higher than those for urban Chines (Figure 2).

Agricultural mechanization in China grew significantly from 34.5 percent in 2004 to 65 percent in 2016 (Yearbook of Agricultural Mechanization in China 2016, p.145). The Law of the People's Republic of China on Promotion of Agricultural Mechanization was launched on November 1, 2004, and the government started to subsidize agricultural mechanization. Major technological advances in farming production have emerged, which led to work that is increasingly mechanized and associated with a decrease in energy expenditures. During the period from 1982 to 2012, calorie intakes decreased for urban Chinese residents. For the rural population, the calorie intakes decreased from 2509 to 2294 from 1982 to 1992, but during the next decades the calorie intake did not change (only 10 calories decrease). The growth rates of the Body Mass Index (BMI) during the period of 1992-2012 are higher for rural residents compared to urban residents (Figure 2). The increase for rural BMIs is 4.72 percent during the decade of 1992-2002, and 5.77 percent during 2002-2012, while for urban residents, the rates are 3.58 percent and 2.85 percent. Therefore, the increase in rural BMIs is not explained by the calorie intake of rural people since the calories have not changed much during 1992-2012.

Agricultural mechanization decreases hours of farm work. This could have negative consequences to farmers' health, such as obesity, which has been associated with chronic diseases. Picket et al. 2015 find that increases in obesity of Saskatchewan farm people were related to higher amounts of mechanized but not non-mechanized farm work. While mechanization of farm work has benefits in terms of increased productivity, its potential negative effects of risks for overweight and obesity must also be pointed out. Our data show that the BMI of farmers who are using agricultural mechanization is higher than the farmers who do not use agricultural mechanization, and the hours of farm work of farmers utilizing agricultural mechanization are significantly lower than those who don't (Figure 3).

A recent study by Zhang, et al. 2016, finds that overweight and obesity have been increasing continually in rural areas for the 1985-2014 period. The authors use data for rural children and adolescents in Shandong, China, and find that the prevalence of overweight and obesity rose for boys from 0.74% and 0.03% in 1985 to 16.35% and 17.20% in 2014, and for girls, from 1.45% and 0.12% in 1985 to 13.91% and 9.11% in 2014.

To our knowledge, there is no study that had been conducted in China on the effects of mechanization on BMI of rural citizens. In the present study, we investigate the impacts of farm mechanization on rural residents in China. The paper is organized as follows: the first section describes the data and variables used in the economic analysis. The next section discusses the empirical model, and the third section presents the results and discussion. The last section concludes the study.

2. Description of data and variables

The data for this paper come from a field experiment on 1,024 rural households in 135 counties of 12 provinces in China. Our sample consists of 4,229 individuals; 2,165 of them are workers and 1,033 of all workers are farmers. The field experiment is conducted in east (Jiangsu, Zhejiang, and Shandong provinces), central (Hubei, Henan, and Anhui provinces) and west (Gansu, Shanxi, Ningxia, Sichuan, Yunnan, and Shannxi provinces) China in 2013. We use a standardized structured questionnaire and stratified random sampling method to collect the data from face-to-face interviews with rural households. The project is funded by the National Social Fund of China.

The data on weight and height is self-reported. The variance of data on height and weight is large. From a cultural perspective, most Chinese do not consider height and weight private, especially rural residents. Also, we get data from face-to-face interviews with the human subjects. The data on height and weight do not deviate from the true values significantly, since it is easy to observe from the appearance and the data is recorded by interviewers. We compare our weight, height, and BMI data with the weight, height, and BMI data from the China Health and Nutrition Survey (2011) and at the National Bureau of Statistics of China 2015. The data from both surveys is very similar to our data.

The dependent variable in this study is the Body Mass Index (BMI). We used the reported weight and height to calculate the BMI, and to explore the effects of mechanization on BMI in rural China. BMI is a person's weight in kilograms divided by the square of height in meters. We use two measures for agricultural mechanization: First, a dummy variable dum_mechanization, indicates whether agricultural mechanization is utilized in farming (sowing, ploughing, or harvesting) for the individual. It is equal to one, if agricultural mechanization is utilized in farming by the individual, and zero otherwise. Agricultural mechanization in China is defined as the use of machines instead of hand tools and animal power in farming. From the standards of the Ministry of Agriculture of China: If mechanization is used in three stages: sowing, ploughing, and harvesting, it is called “Agricultural Mechanization.” Also, due to topography different types of machines may be used in farming—large, medium, or small. Therefore, if mechanization is used in the three stages of sowing, ploughing, or harvesting, we consider that there is “agricultural mechanization."

Second, we use a continuous variable indicating farming land size utilizing agricultural mechanization called agricultural mechanization areas. To summarize, if mechanization is used in three stages: sowing, ploughing, or harvesting (instead of hand tools and animal power), we consider that there is "agricultural mechanization." Table 1 presents the definitions and the descriptive statistics for the variables used in the study. Table 2 presents the descriptive statistics for the farmers by mechanization utilization.

3. The Empirical Model

In this study, we focus on testing the following three hypotheses:

Hypothesis 1: Agricultural mechanization affects the BMI of rural farmers in China.

Hypothesis 2: Agricultural mechanization negatively affects the hours of farm work of rural farmers in China.

Hypothesis 3: Reduced hours of farm work contribute to the rise of BMI of rural farmers in China.

To test these hypotheses, we establish our empirical model based on economic theory foundation. We consider the economic forces that affect weight. To test *hypothesis 1,* the empirical relationship between *BMI* and agricultural mechanization *AM* is specified by the following equation:

$$BMI_i = \alpha_i + \beta_1 AM + X_i\gamma + Z_i\delta + \varepsilon_i \quad (1)$$

where subscript *i* refers to an individual *i*, AM_i is agricultural mechanization, and Z_i is a vector of other exogenous variables, including some socio-economic characteristics such as age, disability, education, income, etc. The random disturbance term ε_i represents the impact of all other factors and has a zero-expected mean.

To test *hypothesis 2,* we establish the following empirical equation:

$$AGtime_i = \alpha_i + \beta_2 AM + X_i \gamma + Z_i \delta + \varepsilon_i \quad (2)$$

where $AGtime_i$ is hours of farm work for individual i. And finally, to *test hypothesis 3*, we establish the following empirical equation:

$$BMI_i = \alpha_i + \phi_i AGtime_i + \beta_3 AM + X_i \gamma + Z_i \delta + \varepsilon_i \quad (3)$$

Agricultural mechanization has two types of effects on BMI: direct and indirect. The direct effect measures the impact of mechanization directly on BMI. The indirect effect of agricultural mechanization on BMI is through the reduced hours of farm work. Agricultural mechanization increases marginal productivity of farmers and reduces the hours of farm work. The direct effect of agricultural mechanization is measured by estimating the coefficient β_3, the indirect effect is measured by estimating the coefficient $\phi_i\beta_2$, and the total effect is equal to the sum of the direct and indirect effects, $=\beta_3 + \phi_i\beta_2$.

Our economic model has an endogeneity issue. The mechanization variable AM_i is an endogenous variable, i.e. it is correlated with the disturbance term ε_i. Ordinary Least Squares (OLS) is not capable of delivering consistent parameter estimates. To solve the problem of endogenous regressors, we will use the instrumental variables (IV) estimator. A popular form of that estimator, often employed in the context of endogeneity, is known as Two-Stage Least Squares (2SLS). The first-stage OLS predicts farm mechanization using age, age squared, education, disability, ratio dependency, provincial dummy variables, and the exclusion variable that will be discussed next.

To account for endogeneity of the mechanization variable, we use in the first stage the following exclusion variable: slope for cultivated land (or geography). Technically, whether to use or not use mechanization is affected by the slope of cultivated land. The slope of cultivated land measures the degrees of steepness and is calculated by dividing the altitude distance by the horizontal distance, and multiplying by 100%. The geography of China includes mountain land (33%), plateau (26%), basin (29%), plain (12%) (best for mechanization), and hills (10%).

According to the "Technical Specifications for Land Use Investigation" launched by the Commission of Agricultural Zoning of China in 1984, five categories of slopes of cultivated land are: 1) slope less or equal to 2°, 2) slope between 2° and 6°, 3) slope between 6° and 15°, 4) slope between 15°and 25°, and 5) slope above 25°. According to the Department of Agriculture of China, it is best for the land to use mechanization when the slope is less than 6°; small and mini machines could be used for farming when the slope is 6°～15°; it is very difficult to use mechanization when the slope is higher than 15°, and farming is difficult and not recommended when the slope is higher than 25°. Therefore, we consider slope as an important factor for deciding whether there is mechanization in farming. When the slope is low, it is easier to use machines in farming. Regressions on our study show that the slope is negatively affected by the use of mechanization（p=0.000）, and slope does not affect income（p=0.657). The data for slopes of cultivated land comes from the GIM-Cloud or (Geographical Information Monitoring Cloud Platform). Data is collected by four international satellites and three domestic satellites, and covers all provinces of China. We follow the five categories of slopes of cultivated land from Ministry of Land and Resources of China : ≤2°, 2°～6°, 6°～15°, 15°～25°, >25° and label them by "slope" with ID: 1, 2, 3, 4, and 5 (see Table 1).

4. Results and Discussion

The estimated coefficients from equations 1, 2, and 3 with dummy variable for agricultural mechanization, and using the IV estimator, are presented in Table 3. The results show that agricultural mechanization has a significantly positive effect on BMI, and significantly negative effect on farmers' hours of work. The predicted probability of agricultural mechanization reduces farm work by 268 hours per year, and increases the farmers' BMI by 5.4%. This is the direct effect of mechanization on BMI. The adoption of mechanization significantly reduces hours of farm work. More physical farm work decreases the BMI. One hundred additional farm work hours per year decrease the farmers' BMI by 0.2. A similar conclusion is drawn based on the results from estimating equations 1, 2, and 3 with the area of mechanization continuous variable (see Table 3). An increase by 1 unit (mu) of area of mechanization, decreases the annual farm work hours by 107 and increases BMI by 2.2%. Therefore, agricultural mechanization affects positively the BMI of rural farmers in China and negatively the hours of farm work of Chinese rural farmers.

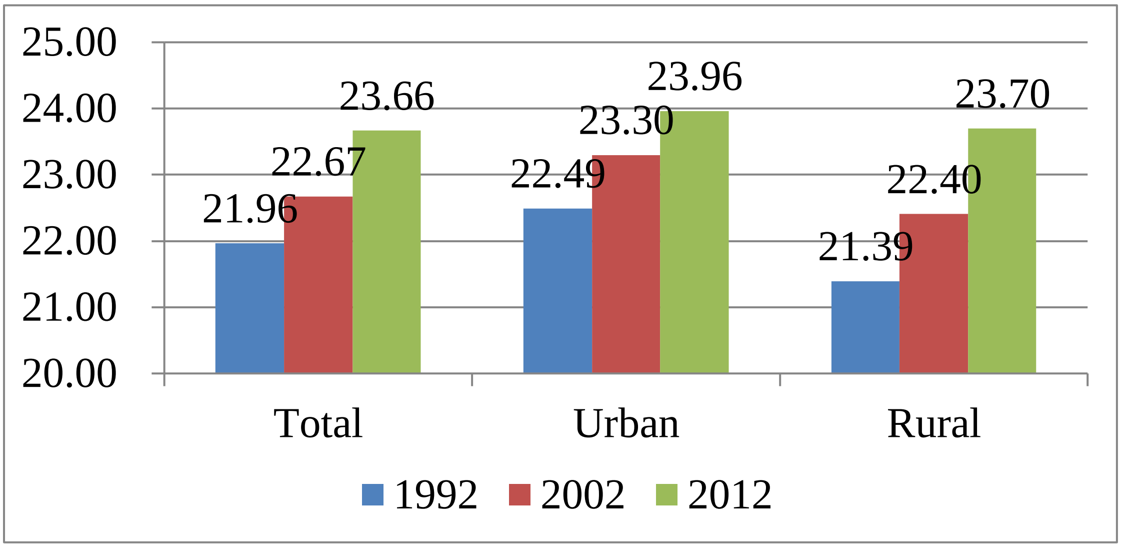
Agricultural mechanization increases the productivity of farmers and reduces the hours of farm work. Therefore, agricultural mechanization has two types of effects on BMI: direct and indirect. The indirect effect of agricultural mechanization on BMI is through the reduced hours of farm work. Table 4 presents the calculated total effect equal to the sum of the direct and indirect effects, or $\beta_3 + \phi_i\beta_2$, the direct β_3, and indirect effect $\phi_i\beta_2$, of agricultural mechanization on rural Chinese BMI. The total effect of agricultural mechanization (probability of agricultural mechanization) on BMI is 1.774, which is about 7.78% increase in BMI. The calculated indirect effects using agricultural mechanization dummy variable (0.537) and areas of mechanization (0.213) suggest that the reduced hours of farm work due to the adoption of agricultural mechanization explain about 30 percent of the BMI increase of rural farmers in China.

5. Conclusion

This paper develops an empirical model to investigate the impacts of mechanization adoption on rural individuals in China. Agricultural mechanization has a positive and significant effect on BMI of rural workers in China. The findings of the paper suggest that the BMI of farmers who utilize agricultural mechanization is about 10 percent larger than those who don't at a 1 percent significance level. Our results show that the adoption of agricultural mechanization has a positive and statistically significant effect on farmers' BMI in China: it increases the BMI of farmers by 7.8 percent. The average annual hours of work are about 810 for individuals adopting agricultural mechanization and 1399 without it. Agricultural mechanization adoption reduces hours of farm work by 589 hours annually. And finally, the reduced hours of farm work explain 30 percent of the BMI increase of rural farmers.

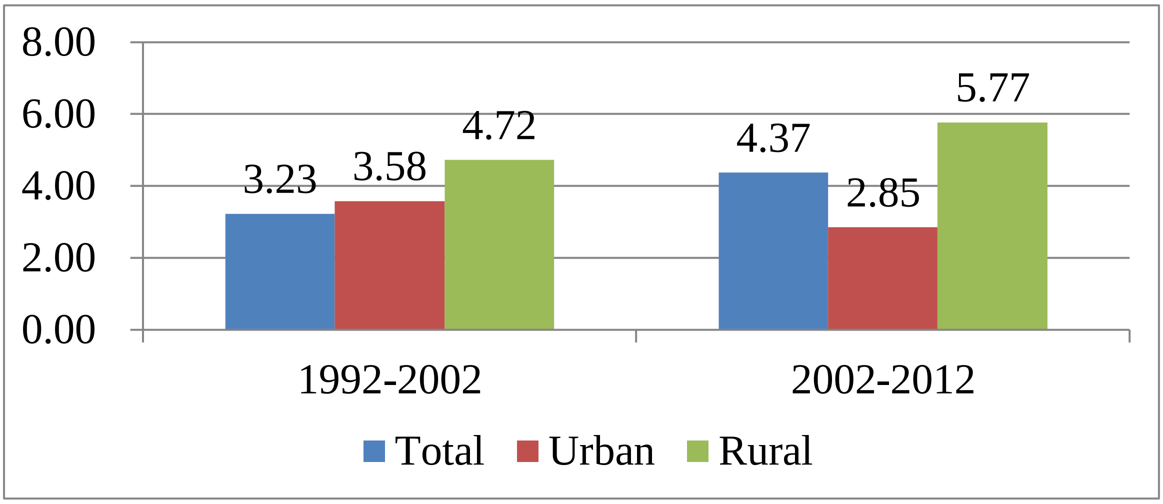
The modernization and rising incomes in China are propelling rapid lifestyle changes, including a shift from traditionally healthy diets to westernized diets. As in other countries in the world, a Chinese epidemic of overweight and obesity poses a considerable public health problem that needs to be addressed by the policy makers. Understanding BMI in rural China is important in order to define what public policies are most likely to be effective in preventing and reducing obesity in rural China.

Figure 1: BMI for Urban and Rural Chinese



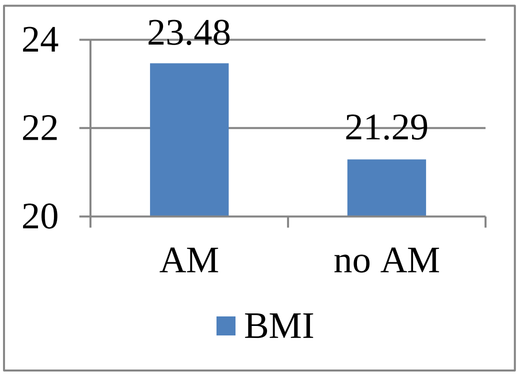
Notes: 2002 and 2012 data is from reports on Chinese Nutrition and Chronic Diseases, 2015 by the National Health and Family Planning Commission of the People's Republic of China. The 1992 data is from the "Study on weight and height of the Chinese people and the differences between 1992 and 2002," *Chinese Journal of Epidemiology*, 2005, Vol.26, No.7.

Figure 2: BMI Growth Rates for Urban and Rural Chinese (in percent)



Notes: 2002 and 2012 data is from reports on Chinese Nutrition and Chronic Diseases, 2015 by the National Health and Family Planning Commission of the People's Republic of China. The 1992 data is from the "Study on weight and height of the Chinese people and the differences between 1992 and 2002," *Chinese Journal of Epidemiology*, 2005, Vol.26, No.7.

Figure 3: BMI and Hours of Farm Work by Agricultural Mechanization (AM)



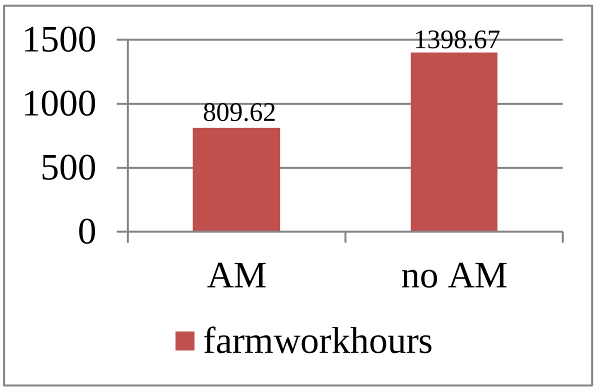


Table1: Definitions and Descriptive Statistics of the Variable

Variable		Obs	Mean	Std. Dev
Weight（kg）	Self-reported weight in kilograms	1,033	61.525	10.421
BMI (kg/m^2)	BMI= weight in kg / height squared	1,033	22.810	3.039
Dum_mechanization	= 1 if agricultural mechanization is used in farming; and =0 otherwise	1,033	0.694	0.461
Mechanization_areas（mu）	Size of farm land with mechanization	1,033	3.804	4.729
Farm work hour/year	Hours per day for farming*30days*months for farming	1,033	989.82	722.13
Gender	Dummy variable =1 if male, and =0 otherwise	1,033	0.502	0.500
Age	Individual's age in years	1,033	45.908	12.719
Age_squared/100	Squared term of age/100	1,033	22.692	11.695
Disabled	Dummy variable =1 if disabled; and =0 otherwise	1,033	0.011	0.103
Height(m)	Self-reported height in meters	1,033	1.640	0.082
Education	Years of education	1,033	5.567	3.402
Slopes of land (1-5 level)	=1 if slope ≤2°; =2 if slope 2°～6°; =3 if slope 6°～15°; =4 if slope 15°～25°; =5 if slope >25°.	1,033	2.173	1.421
Ratio dependency	(household population-labor population)/ labor population	1,033	0.528	0.585
ln Family income	Logarithm of nonfarm income	1,033	10.312	0.912

Note: Land in China is measure by unit of mu and 1 mu = 0.1647 acre.

Table 2: Descriptive statistics for Farmers by Mechanization Utilization

	Farm labor	
Variables	**Mechanization**	**No mechanization**
Farm Labor population	717	316
Height (m)	1.638	1.645
Weight（kg）	63.158	57.818
BMI	23.479	21.292
Age	46.582	44.380
Disability rate (disabled/non-disabled)	0.011	0.009
Education	5.703	5.258
Farm land size (mu)	5.976	13.700
Ratio dependency	0.486	0.623
ln Family income(RMB)	10.472	9.947
Farm work hours/year	809.623	1,398.671

Table 3: Coefficient Estimates for Chinese Farmers, 2013

Variables	(1) dum_mechanization	(2) Farm hour/year	(3) BMI	(4) Mechanization	(5) Farm hour/year	(6) BMI
Slope of land	-0.207***(0.010)			-0.520***(0.154)		
Predicted probability of		-268.465***	1.237***			
mechanization		(94.199)	(0.443)			
Predicted areas of mechanization					-106.704***	0.492***
					(37.440)	(0.176)
Farm work hour/year			-0.002***			-0.002***
			(0.001)			(<0.001)
Age	0.003	-36.752***	0.237***	-0.005	-38.115***	0.243***
	(0.004)	(8.313)	(0.039)	(0.065)	(8.292)	(0.039)
Age_squared	-0.003	33.034***	-0.214***	0.012	35.086***	-0.224***
	(0.005)	(9.055)	(0.043)	(0.071)	(9.044)	(0.043)
Disabled	-0.063	-101.249	-0.399	1.492	74.746	-1.210
	(0.087)	(164.468)	(0.771)	(1.304)	(174.957)	(0.820)
Education	-0.005	-0.552	0.004	-0.071	-6.840	0.033
	(0.003)	(5.470)	(0.026)	(0.043)	(5.952)	(0.028)
Ratio_dependency	-0.029*	14.452	0.039	0.102	33.090	-0.047
	(0.016)	(31.270)	(0.146)	(0.241)	(30.817)	(0.144)
ln_Familyincome		-34.444	-0.129		-34.444	-0.129
		(21.076)	(0.099)		(21.076)	(0.099)
Constant	1.148***	2,005.858***	18.752***	5.650***	2,300.556***	17.394***
	(0.102)	(285.756)	(1.371)	(1.525)	(328.294)	(1.574)
Observations	1,033	1,033	1,033	1,033	1,033	1,033
R-squared	0.621	0.450	0.319	0.193	0.450	0.319
Adj. R-squared	0.616	0.442	0.309	0.182	0.442	0.309

Notes: *** p<0.01, ** p<0.05, * p<0.1; The provincial dummies are included in the regression but not reported. Standard errors in parentheses.

Table 4: Total, Direct, and Indirect Effects of Agricultural Mechanization on BMI

Agricultural Mechanization	Total Effects	Direct Effects	Indirect Effects
Dum_AM	1.774	1.237 （69.7%）	0.537 （30.3%）
Areas of AM	0.705	0.492 （69.8%）	0.213 （30.2%）

References:

Brubmy, A., A. Kennedy, and A. Chandrasekara, 2013. "Alcohol consumption, obesity, and psychological distress in farming communities-an Australian study." *Journal of rural health* 29: 311-319.

Chen, Y., D. Rennie, and J. Dosman, 2009. "Changing prevalence of obesity in a rural community between 1977 and 2003: a multiple cross-sectional study. *Public Health* 123: 15-19.

Commission of Agricultural Zoning, China, 1984. "Technical Specifications for Land Use Investigation."

Gao, Y., X. Ran, X. Xie, H. Lu, T. Chen, Y. Ren, Y. Long, and H. Tian, 2011. Prevalence of overweight and obesity among Chinese Yi nationality: a cross-sectional study." *BMC Public Health* 11: 919-928.

GIM-Cloud Geographical Information Monitoring Cloud Platform http://www.dsac.cn/

Levine, J. 2007. Obesity in China and solutions." *Chinese Medical Journal* 120: 1043-1050.

National Bureau of Statistics of China, 2015. "Nutrition and chronic disease status of Chinese Residents."

National Health and Family Planning Commission of the People's Republic of China, 2015. "Reports on Chinese Nutrition and Chronic Diseases in 2015"

Picket, W., N. King, J. Lawson, J. Dosman, C. Trask, R. Brison, L. Hagel, I. Janssen, 2015. "Farmers, mechanized work, and links to obesity." *Preventive Medicine* 70: 59-63.

Popkin, B., and S. Du. 2003. "Dynamics of nutrition transition toward the animal food sector in China and its implications: a worried perspective." *Journal of Nutrition* 133: 3898S-38906S.

The Agricultural Mechanization Information Network of China (http://www.amic.agri.gov.cn/)

Yearbook of Agricultural Mechanization in China, 2016.

Wang, Y., J. Mi, X. Shan, QJ Wang, and K. Ge, 2007. "Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China." 31: 177-188.

World Health Organization, 2000. "Obesity: preventing and managing the global epidemic." WHO Technical report series 894.

Wu, Y. 2006. “Overweight and Obesity in China.” *British Medical Journal* vol 333.

Zhang, Y., Z. Wang, J. Zhao, and Z. Chu, 2016. “Trends in overweight and obesity among rural children and adolescents from 1985 to 2014 in Shandong, China.” *European Journal of Preventative Cardiology*, vol.23, issue 12.

Yang X., Li Y., Ma G., Hu X., Wang J. Cui C., Wang Z., Yu W., Yang Z. and Zhai F., 2005. “Study on weight and height of the Chinese people and the differences between 1992 and 2002.” *Chinese Journal of Epidemiology*, vol.26 , No.7.