

Malnutrition And Nutrition-Related Health Disparities in China

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ABSTRACT

Does China have problems link to malnutrition? With explicit focuses on the Chinese population, this paper conducts a systematic review of malnutrition and nutrition-related health disparities in China. It was observed that there were remarkable reductions in malnutrition, but most reductions were related to undernutrition. Moreover, China is currently going through a nutrition transition and it is facing more forms of malnutrition than ever before. Undernutrition still sparks concern and overnutrition increases rapidly. In addition, it is the combination of social, economic, political, and environmental factors shaped nutrition-related health disparities among the Chinese population. Some groups, especially the rural poor, are extremely vulnerable. This paper indicates that while current health care and nutrition policies are creditable, they did not play their maximum efficacy. Current nutrition and health-related policies need to be improved and adjusted to reduce malnutrition and to promote equity in nutrition and health. Specifically, controlling the costs of health care, reducing relative poverty, promoting lifestyle education, loosening or abandoning the Hukou system, strictly supervising the implementation of National Nutrition Plan (2017-2030) at local level, and strengthening the vertical coherence within the nutritional governance system should be taken into consideration.

Keywords: Malnutrition, undernutrition, overnutrition, health disparities, nutrition policies

1. INTRODUCTION

There is an old saying in China, "Min Yi Shi Wei Tian", which means food is the paramount necessity of the people. Because of significant economic and agricultural achievements in recent decades, China becomes more capable of supplying nutritious food to its population than ever before. As a geographically expansive country, a country with the largest population in the world, the world's largest developing economy, malnutrition and nutrition-related health disparities are always significant considerations in China. To analyze these considerations, this paper takes advantage of the definition of malnutrition from the World Health Organization (WHO). According to WHO(2018), malnutrition is defined as "deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients", which has four major components: (1) undernutrition; (2) overweight and obesity; (3) micronutrient-related malnutrition; (4) diet-related noncommunicable diseases (DR-NCDs) [1]. WHO reclassified malnutrition into 3 broad categories of conditions on their updated fact sheets in April 2020, where "overweight and obesity" and "diet-related noncommunicable diseases" are merged into 1 category. In this paper, these two conditions are still studied separately. This paper focuses on each component of malnutrition and nutrition-related health disparities in China and discusses them according to China's specific social background. The

author argues that although economic growth and nutrition policies have improved the nutritional conditions of the Chinese population remarkably, malnutrition and nutrition-related health disparities are still severe problems in China. This paper indicates that nutrition-related health disparities are driven by a list of social, economic, and political forces, and current nutrition policies must be adjusted.

While previous research either documented improvements in nutritional and health conditions of the Chinese population as a result of developments or analyzed a single form of malnutrition in China, none of them reviewed malnutrition and nutrition-related health disparities systematically. This paper starts with the nutritional improvements in the general Chinese population and highlights some most severe forms of malnutrition that China faces. The author then reviews nutrition-related health disparities in China. Specifically, who are the groups suffering from malnutrition, what kinds of problems they are suffering, and most importantly, what are the forces that formed the current condition? The author will also review nutrition and health policies that the Chinese government adopts, show the ineffectiveness of some of these policies, and develop some policy suggestions and adjustments in the end.

2. MALNUTRITION: PAST AND PRESENT

Chronologically, nutrition and health in China are tied with the political structure, social structure, social productivity, and economic system of production. In other words, the overall well-being of the Chinese population in terms of health is closely related to the guiding ideology, and individuals' health is always reflected by social health. During 1949-1978, China was under a strict command economy, and the government had made fatal mistakes in central planning. During the Great Leap Forward campaign between 1958 and 1962, agricultural production declined sharply, which directly triggered the Great Chinese Famine. Statistically, total grain dropped more than 30% during the campaign, and the estimated total deaths exceeded 30 million [2]. Also, farmers did not own lands and were prohibited from producing their own goods; instead, all the agricultural activities were gathered in the People's Communes, where workers share total output evenly. Agricultural production was extremely inefficient in communes because this mode of production diminished laborers' incentives, which should also be responsible for massive starvation in China. Malnutrition, especially undernutrition, was extremely serious during that period, but the central and local governments were helpless.

Since the economic reform and opening up (1978-present), the central government shifted to a system called socialism with Chinese characteristics, where central planning and market forces coexist. Since broad marketization, the Chinese population has not only experienced catch-up in income per capita but also in nutrition and health. With a reduction in poverty, people could consume more nutritious food and ensure their calory intake. The nutrition condition of the Chinese has constantly risen since the reform, and most improvements are related to undernutrition. For example, based on Song et al.(2018), the prevalence of stunting among Chinese school-aged children fell from 16.4% in 1985 to 2.3% in 2014[3]. Besides, there is evidence of constant improvements in undernutrition among the entire population. According to World Bank Open Data, the prevalence of undernourishment among the total Chinese population dropped from 16.2% in 2000 to 6.8% in 2017[4]. Recent improvements can also be explained by development and further marketization.

Many scholars indicate that while the problem of undernutrition has become a lot better, other forms of malnutrition arose quickly. Dearth-Wesley et al. (2007)

studied under-and over nutrition dynamics in the Chinese population[5]. They pointed out that "the trend for increased overweight was more pronounced than the trend for decreased underweight"[5]. Similarly, in a study that focused only on the overweight dynamics in Chinese children and adults, it was found that the prevalence of obesity and overweight has an apparent upward trajectory in the past 20 years, accompanied by the country's modernization[6]. Yang et al.(2007) described the seriousness of micronutrient-related malnutrition in China—approximately 20% of the Chinese population was influenced by selenium deficiency, and 15.2% had severe iron deficiency[7]. Micronutrient-related diseases like anemia are therefore common in China. The last component of malnutrition is DR-NCDs, which include obesity-related chronic diseases, cardiovascular diseases, diabetes, etc. Such diseases always have direct or indirect connections with overweight, so some of the previous studies also have found rapid increases in the prevalence of DR-NCDs. Chen & Zhao (2012) states that when non-communicable diseases (NCDs) have replaced infectious disease to become the major causes of diseases and death in China, many of these NCDs are diet-related[8]. For example, it was estimated in 2012 that 200 million Chinese, or 14.3% of the Chinese population, had conditions of hypertension, and the prevalence of diabetes was 9.7% among Chinese adults in 2010[8].

While plenty of research highlighted the improvements in undernutrition due to the growth of income or focused on other forms of malnutrition, the author argues that undernutrition is still a problem that China cannot afford to ignore, despite progressive improvements over time. Using data from the World Bank, a cross-country comparison of the prevalence of undernourishment(figure 1) is plotted, which presents the prevalence of undernourishment in countries at different UN-classified income levels[4]. The most straightforward information in the graph is China's relative level of undernourishment. Although China has a much lower prevalence of undernourishment than the least developed, low-income, and lower-middle-income countries, the rate is slightly higher than that of upper-middle-income countries and significantly higher than high-income countries. One thing that should be noticed from this graph is that China has a greater prevalence of undernourishment than the average of upper-middle-income countries, even though the GDP per capita of China is also greater. These facts and comparisons indicate the possible room for improvements.

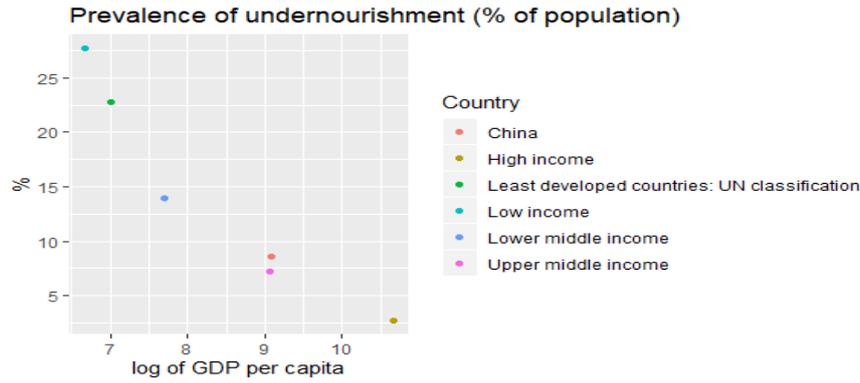


Figure 1. Prevalence of undernourishment (% of population)

China, or the Chinese population as a whole, is facing more diverse and more complicated malnutrition issues than ever before. Although economic development saved people from extreme poverty and lowered the rate of undernourishment, undernutrition is still a severe problem for the Chinese population. In addition to this, overnutrition, micronutrient deficiencies, and DR-NCDs are becoming more pronounced than ever before and bringing new challenges to the country. The remaining problems are as follows: Firstly, who are the groups that are most vulnerable to each form of malnutrition? Secondly, what are their individual or demographic characteristics? Thirdly, what are the factors that shape observed nutrition-related health disparities in China?

3. VULNERABLE POPULATIONS TO MALNUTRITION AND DRIVING FORCES

In a geographically expansive and populated country like China, egalitarianism in health and nutrition may never be the theme. Individuals' social and economic backgrounds determine the problems they face and their levels of vulnerability. To find out the victims of malnutrition, This paper follows the discussion on four major forms of malnutrition defined by the WHO. At the end of this section, it turns out that the observed disparities in nutrition and health are shaped by the combination of social, economic, political, and environmental factors.

3.1. Undernutrition

Despite great overall reductions in undernutrition, undernutrition is still nonnegligible for China as a country, based on the international comparison. A possible explanation is that one or several particular groups are much more vulnerable than others. Stone (2012) used the most visible manifestation of undernutrition, stunting, to argue that undernutrition "sparks concern" among the rural poor[9]. Stone's article listed some data, which displayed a rise in stunting in poor rural areas of China after 2008, especially among children; for example, the infant stunting

rate in the poor rural area almost doubled from 2008 to 2009, and the stunting rate under age 5 in similar areas rose from 18.9% in 2008 to 20.3% in 2010[9]. Some other studies had similar findings; many of them emphasized rural-urban disparities and provincial disparities in undernutrition, and some of them pointed out that undernutrition in China mainly concentrates in less developed provinces. Combing the findings by Stone (2012) with conclusions drawn from other research, those from poor rural areas, especially children, are vulnerable to undernutrition.

The first and foremost driving force of disparities in undernutrition is socioeconomic inequalities. Undernutrition directly relates to the capability of food consumption, so poverty is a direct explanation for it. Ever since the reform and opening up, various kinds of disparities have increased, which include rural-urban income disparities and provincial disparities[10]. This statement is well supported by plenty of research and empirical evidence. Income inequalities between rural and urban China are the chief culprits of nutrition-related health disparities. A social factor that causes a high prevalence of stunting in poor rural China is seasonal migration. In many poor rural areas, people at working age temporarily migrate to cities to work so that there are many so-called left-behind children, who are the major victims of undernutrition due to lack of care. There was founded evidence of poor nutritional status among children in less-developed provinces, and these places are the main suppliers of labor in seasonal migration. While seasonal migration of labors contributed to the undernutrition among left-behind children, institutional barriers of rural-urban migration is an important factor that led the rural poor to worse health conditions. The major institutional barrier, or political factor, that enlarged the rural-urban disparities in nutrition and health is the Hukou system, a household registration system that regulates urban-rural migration and eligibility for welfare benefits. According to a study explained the role of the Hukou policy in nutritional disparities, regression results showed that the "Hukou system exacerbates urban-rural disparities in child nutrition-related health outcomes", and it is even more decisive than the well-known rural-urban residence status[11].

3.2. Overnutrition

The author has mentioned in the previous section that overnutrition is being a major concern for China in recent decades; in other words, the Chinese population is experiencing a nutrition transition. In terms of disparities, overnutrition is less age-related compared to undernutrition. In a study on nutritional transition in China, Zhai et al.(2009) pointed out that overweight is increasing rapidly among both children and adults[12]. The findings are also consistent with other studies. In detail, the prevalence of overweight almost tripled from 11.7% in 1991 to 29.2% in 2009 among adults and also almost tripled from 6.3% in 1991 to 17.1% in 2011 among children between 6 and 18 years old[12]. The rising obesity among children implies that overweight among adults can get even worse in the future because more and more children are entering their adulthood with higher body weight. Although the pattern of overnutrition is less age-related, it also has the characteristic of rural-urban disparities. Findings are very interesting when comparing different studies. In Dearth-Wesley et al.(2007), poor adults from rural areas were said to have the most rapid increase in the prevalence of overweight[5]. According to Zhai et al.(2009), rural adults had the fastest increase in overweight, which was consistent with that of Dearth-Wesley et al.(2007), but it also indicated that urban adults have the highest prevalence[12]. Another characteristic of overnutrition is sex disparities. Generally, males were found to have a higher prevalence than females in their adulthoods, and boys have a higher prevalence than girls. To find out the driving forces of disparities in overnutrition, the author takes advantage of the findings from Zhai et al.(2009) and summarizes them into three key points[12]. First, the overweight prevalence kept increasing in the time series, which was an outcome of being wealthier in the early stage of economic development. Second, the prevalence was initially higher in urban than rural, which is reasonable because urban residents benefited more and earlier from the economic reform started in the late 1970s. Third, the rate of increase in urban overweight prevalence instantly dropped in the 21st century, while the rate became higher in rural areas. The first and second key points demonstrate the potential impacts of economic catch-up on nutrition transition; another takeaway from these two key points is that the observed distribution of overnutrition can be a result of uneven development. The author thinks the third key point is more valuable than the other two because of its enormous implications. The third key point implies that some factors other than income are correlated to overnutrition, and this hypothesis emphasizes the importance of social determinants of health. Some exemplary determinants include education, housing, and recreational opportunities. In fact, Previous studies on the causal effect of education on overweight had positive outcomes. For instance, lifestyle education has resulted in modest but sustained weight loss among randomized trials[13].

3.3. Micronutrient-related malnutrition and DR-NCDs

Most studies in micronutrient-related malnutrition focused on the Chinese population as a whole, rather than the distribution among the population. The population distribution of micronutrient-related malnutrition is hard to predict unless the patterns of dietary and food consumption are well known. However, some researchers discussed malnutrition with environmental factors in their study, and they proposed that some micronutrient deficiencies among the Chinese population are caused by the deficiency of micronutrients in the major Chinese soils, calcareous and acidic. Therefore, the author predicts that disparities in micronutrient-related malnutrition may be associated with soils types in China. For micronutrient-related malnutrition, it was also indicated by some studies that other factors, such as the uneven distribution of social capital and insufficient education on the importance of supplements, are determinants.

The lack of current research and empirical evidence prevents the author from summarizing the disparities in DR-NCDs and concluding relevant driving forces. However, the distribution of DR-NCDs among the Chinese population is relatively more predictable than micronutrient-related malnutrition because they are closely related to under- and overnutrition. Thus, the author predicts that the distribution of DR-NCDs among the Chinese population can be driven by inequalities in social and human capital, uneven development, migration barriers, and various social determinants of health.

4. EVALUATION OF CURRENT HEALTH AND NUTRITION-RELATED POLICIES

Economically, China's strategy was "the rich first pushing those being rich later", according to Xiaoping Deng, the director of China's economic reform. This approach indeed increased the GDP per capita, but it did not necessarily lead to better nutrition for all. In fact, it enlarged disparities in income, health, and nutrition. For example, in a study of disparities in child nutrition in China, Wu & Qi(2016) showed that the most successful reduction in nutritional deprivation motivated by rising per capita income was in the group of children who were moderately undernourished, rather than severely undernourished[14]. Current policies that aim at transformation malnutrition and lifting the overall health condition of the Chinese population deserve credits for their positive outcomes, but if they have played their maximum efficacy and if they are the most effective ones worth discussing.

The trade-off between growth and equity is hard, but the Chinese government has to take the poorest households into account. China does have a plan of eliminating absolute poverty in 2020, and the target is to lift all citizens above the poverty line, which is defined as having

an annual income of 2300 yuan, or 340 US dollars[15]. However, the author argues that there are conceptual drawbacks of the absolute poverty line as a measurement. First, the absolute poverty line defines a fixed amount of money that an individual needs to survive economically, and it does not depend on the average living standards in an economy. Instead, a relative poverty line that defines well-being as being able to participate fully in society is a better measurement. Second, the author thinks income is a crude measure of material well-being since income is not equivalent to consumption. Measuring consumption is much better than measuring income when dealing with subsistence workers, or poor people in general. In an era when the prices of health care and nutritious food keep rising, understanding the corresponding consumer behavior becomes more critical for battling against malnutrition. In brief, the author wants to point out that rescuing poor people out of absolute is far from enough.

China adopts universal coverage in its health care system, which enabled millions of poor Chinese to receive care cheaply. However, as China transformed from central planning to market socialism, the government began to rely on market forces, and the health care system moved toward privatization and fee-for-service[16]. Besides, according to Hsiao & Liu(1996), economic growth did not translate into better health for all in China because market forces in the health care system imposed barriers for the poor and enlarged health disparities[17].

China has a long-term plan on reducing malnutrition, The National Nutrition Plan(2017-2030), which targets four forms of malnutrition defined by the WHO; actions of the plan include nutrition monitoring, screening programs, standardize nutrition labeling, and so on[18]. However, provincial disparities imply different executive abilities among provinces, and if the plan is strictly followed in the most underdeveloped areas remains a concern. Because reducing malnutrition does not benefit the career of local leaders, there will be a disconnect between the central plan and local-level practices[19].

There is also an emerging nutrition governance system in China, where institutional coordination is the theme. Such multisectoral coordination is showing benefits, but there are obvious limitations. Chen & Wang(2018) indicates that the decision-making power remains in departments directly under the central government, and most institutions only serve as advisor bodies that lack "the authority to facilitate and monitor inter-sectoral policies and actions"[19]. Moreover, the system is not efficient by itself; coordination failures always occur due to weak coherence between institutions and policymakers.

5. SUGGESTIONS FOR FUTURE POLICIES

To make policy suggestions, a comprehensive understanding of different forms of malnutrition, vulnerable populations, driving forces, and limitations of current policies are crucial. Above all, the health-care

system matters in the battle against malnutrition. A competitive health-care system can cause inflation, block the poor out of care, and therefore expand disparities in health. The government should instead adopt policies to standardize the health care system and allow poor households to access health care optimally. Government interventions are of great necessity to ensure insurance coverage and reduce costs of care.

Authorities should remember that income distribution is more important than income per capita. Policies aimed at reducing the prevalence of malnutrition should take the poorest areas into account; for example, instead of following "the rich first pushing those being rich later", programs with the view of reducing poverty should be promoted. In addition to lifting people out of absolute poverty, reducing relative poverty is also of great necessity. Government at all levels and research institutions should precisely measure poor people's consumption bundles, in order to improve their health and nutrition status.

There should be stricter policies that focus on the most vulnerable groups of malnutrition, such as children from poor rural areas. Policies that focus on building a healthier environment for left-behind children, such as expanding students' access to free school meals, are of great significance. Loosening the barrier of urban-rural migration is possible to reduce nutrition-related health disparities, according to the regression results from Liu et al.(2015)[11]. Therefore, Alleviating or abolishing the Hukou system should be seriously considered because the Hukou system exacerbates rural-urban inequalities in welfare, as well as inequalities in social, human, and physical capital.

Besides, prevention is as important as treatment. Education is critical for reducing malnutrition, and governments at all levels can request schools to launch lifestyle education and promote dietary guidelines to residents by themselves. Supply-side policies that aim at transforming food production from quantity into quality should also be implemented; such policies enable Chinese residents not only to ensure their energy intake but also to satisfy their nutritional requirements and to avoid possible nutrient deficiencies.

It is also of great importance to keep and optimize what has proved to be beneficial. Governments at all levels should strictly execute the National Nutrition Plan(2017-2030), and the central government should strengthen supervision on local governments. At the same time, institutional coordination within the nutritional governance system should continue, but the vertical coherence between authorities and the advisory body should be enhanced.

6. CONCLUSION

This paper analyzes the evolution, the status quo, and solutions of malnutrition in China. There are improvements in nutritional conditions for the Chinese population, but most gains are undernutrition-related. Currently, China is facing not only more diverse forms of

malnutrition but also serious nutrition-related health disparities. It is the combination of social, economic, political, and environmental factors that shaped the pattern and distribution of malnutrition in the Chinese population. Existing health care and nutrition policies deserve credits, but their limitations should not be neglected. There is no best policy for malnutrition, but the gist should be raising overall welfare and reducing the costs of health care. Furthermore, China should learn from historical mistakes, insist on effective measures, and close loopholes.

ACKNOWLEDGMENT

I want to express my great appreciation to Professor Parfait M. Eloundou-Enyegue at Cornell University for his exceptional support and encouragement. His wealth of knowledge about sociology and social demography inspired me to carry out a study on population health issues. I would also like to express my gratitude to Yilin Zhu, a master student at Zhejiang Normal University, for her constructive suggestions and support on this project. Finally, I wish to extend my thanks to Ryan Steel at the University of Minnesota for his previous instructions on the sociology of health and illness. Ryan's instructions fostered my research interests in health disparities and social determinants of health.

REFERENCES

- [1] Fact sheets - Malnutrition. (2020, April 1). Retrieved from <https://www.who.int/news-room/fact-sheets/detail/malnutrition>
- [2] J.Y. Lin, & D.T. Yang. On the causes of China's agricultural crisis and the great leap famine. *China Economic Review*, 1998, 9(2), pp. 125-140. Doi: 10.1016/s1043-951x(99)80010-8
- [3] Y.S. Song, A.J. Agardh, J. Ma. L. Li, Y. Lei. R. Stafford, & J. Prochaska. National trends in stunting, thinness and overweight among Chinese school-aged children, 1985-2014. *International Journal of Obesity*, 2018, 43(2), pp.402-411. Doi: 10.1038/s41366-018-0129-7
- [4] World Bank Open Data. Retrieved from <https://data.worldbank.org/>
- [5] T. Dearth-Wesley, H. Wang, & B.M. Popkin. Under- and overnutrition dynamics in Chinese children and adults (1991-2004). *European Journal of Clinical Nutrition*, 2007, 62(11), pp. 1302-1307. Doi: 10.1038/sj.ejcn.1602853
- [6] P. Gordon-Larsen, H. Wang, & B.M. Popkin. Overweight dynamics in Chinese children and adults. *Obesity Reviews*, 2013(15), pp. 37-48. Doi: 10.1111/obr.12121
- [7] X. Yang, W. Chen, & Y. Feng. Improving human micronutrient nutrition through biofortification in the soil-plant system: China as a case study. *Environmental Geochemistry and Health*, 2007, 29(5), pp. 413-428. Doi: 10.1007/s10653-007-9086-0
- [8] J. Chen, & W. Zhao. Diet, nutrition and chronic disease in Mainland China. *Journal of Food and Drug Analysis*, 2012, 20(1). Doi:10.38212/2224-6614.2146
- [9] R. Stone. Despite Gains, Malnutrition Among Chinas Rural Poor Sparks Concern. *Science*, 2012, 336(6080), pp. 402-402. Doi: 10.1126/science.336.6080.402
- [10] D. Dollar. Poverty, Inequality, And Social Disparities During Chinas Economic Reform. *Policy Research Working Papers*. 2007. Doi: 10.1596/1813-9450-4253
- [11] H. Liu, J.A. Rizzo, & H. Fang. Urban-rural disparities in child nutrition-related health outcomes in China: The role of hukou policy. *BMC Public Health*, 2015, 15(1). Doi: 10.1186/s12889-015-2517-4
- [12] F. Zhai, H. Wang, S. Du, Y. He, Z. Wang, K. Ge, & B.M. Popkin. Prospective study on nutrition transition in China. *Nutrition Reviews*, 2009(67). Doi: 10.1111/j.1753-4887.2009.00160.x
- [13] Y. Wu. Overweight and Obesity in China. *The BM J*, 2006(333), pp.362. Doi: 10.1136/bmj.333.7564.362
- [14] Y. Wu, & D. Qi. Urban-Rural and Provincial Disparities in Child Malnutrition in China. *Social Work in Public Health*, 2016, 31(6), pp. 574-588. Doi: 10.1080/19371918.2015.1137524
- [15] CGTN. China has ability to eliminate 'absolute poverty' by 2020. 2019. Retrieved from <https://news.cgtn.com/news/3d3d514f7a63544d33457a6333566d54/index.html>
- [16] R. Weitz. *The Sociology of Health, Illness, and Health Care: A Critical Approach* (6th ed.). Cengage Learning. 1996, pp. 176-231

[17] C.W. Hsiao, & Y. Liu. Economic Reform and Health—Lessons from China. *The New England Journal of Medicine*, 1996(335), pp. 430-432. Doi: 10.1056/NEJM199608083350611

[18] General Office of the State Council.. *The National Nutrition Plan (Year 2017 - 2030)*. 2017. Retrieved from <https://extranet.who.int/nutrition/gina/en/node/24710>

[19] K. Chen, & Z. Wang. New nutrition policies for China. 2018 *Global Nutrition Report: Shining a light to spur action on nutrition*. Bristol, UK: Development Initiatives. 2018, pp. 36-37.