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India, Dietary Diseases

India: Reducing the Prevalence of Metabolic Syndrome

India's vibrant culture has always been characterized by its food. Whether that is the world known Butter Chicken, or the widely enjoyed treat, Gulab Jamun, Indian food consistently received international attention for its rich amalgam of flavor. However, a danger persists from the very consumption of these indulgences. Metabolic Syndrome (MetS), a complex disease process characterized by obesity, insulin resistance, and hypertension, has been shown to raise the risk for type II diabetes, cardiovascular diseases (CVD), and many other serious health problems ("What is Metabolic"). One in three adults suffer from this syndrome, where females living in urban areas seem to have the highest prevalence. In fact, a study conducted in the 11 large urban cities of India in 2010 reported the prevalence of MetS as high as 35% (Krishnamoorthy et al.) and about 20-25% worldwide among the adult population in 2019 (Eckel et al.).

India is a country located in the southern region of Asia, sharing borders with Nepal, China, and Bhutan in the north; Pakistan in the northwest; and Myanmar and Bangladesh in the east. ("India Culture"). The country itself is a peninsula surrounded by the Arabian Sea, Lakshadweep Sea, Bay of Bengal, and the Indian Ocean. India's geography greatly varies depending on the region, including deserts, tropical and temperate forest, plains, grasslands, mountains, swamplands, and an island archipelago. It is also home to the world's highest mountain range, the Himalaya ("Climate of India"). The country's year has four seasons: winter, from January to early April; summer or pre-monsoon, from April to June; Monsoon or rainy, from June to September; and post-monsoon, from October to December ("Profile - Climate"). India is home to almost 1.4 billion people, making it the most populous country in the world ("Overview"). Approximately 66% of the population live in rural areas (Paul et al.) and 34% of the population live in urban areas. India lies completely in the Northern Hemisphere and is considered the seventh-largest country in the world, with a total area of 3,287,263 km2 ("India Culture"). In total, approximately 51% of the land is cultivated. The percentage of agricultural land was 60% as of 2020, in which India's arable land is the second largest in the world, with an area of 1,597,000 km2 ("Agricultural Land"). In 2016, the number of farms in India has almost doubled from 71 million to 145 million in the past 45 years; meanwhile, the size of farms has halved, moving from 2.28 hectares (ha) to 1.8ha (Worstall). In comparison, the average farm size in the US is 178ha. Although agriculture accounts for only 23% of India's GDP, this sector employs nearly 59% of the country's total workforce, as of 2016 ("India at a glance"). Other common occupations include Medicine, Computer Science, and Engineering. Major crops and exports of India include rice, sugarcane, spices, coffee, wheat, cotton, and more ("Agriculture in India"). India's government consists of a federal parliamentary republic with a parliamentary form with unitary features. In this, the Prime Minister is the head of the Council of Ministers. The President is the constitutional head of the country. The government is modeled after the Westminster system, composed of the executive, the legislature, and judiciary branches ("Governance & Administration). Now, to fully assess the problem surrounding MetS, we need to delve into the lives of an average family living in India.

The average Indian household is 4.44 people, consisting of two parents and three children ("Average Size"). Approximately 66% of the population live in rural areas, where standards of living are much lower (Paul et al.) and 34% of the population live in urban areas. The average house size in India is 494 square feet (~103 square feet per person) in rural areas and 504 square feet (~117 square feet per person) in urban areas, which mostly consist of slums and self-constructed houses. Running water and sewage is almost non-existent, and families rely on free collection of water and cooking fuel to assist with everyday living (Choudhuri and Desai). An estimated 99.5% of the total population have access to electricity; however, even this is difficult to verify as it is unreliable due to the high frequency of power outages occurring in

both rural and major urban areas (“India - World FactBook”). The average household income is about ₹23,000 per month ($3314.52 annually). In 2015, however, the poorest 20% households saw income levels shrink by 52%, standing at ₹114,000 in 2023 (Gupta and Gupta). In terms of healthcare, as of 2017, approximately 71% of Indian inhabitants were paying out of pocket (Beerenahally). Furthermore, 50% of India’s children have little to no access to quality education after primary school, and 90% of those that do, do not have access to postgraduate courses as of 2023 (“50% of India’s”). For those who do have access, half of them do not show appropriate grades to display proper learning (“Education”). The dropout rate is approximately 29% before completing their full elementary education. This rate is high mainly due to lack of interest and economic commitments, such as jobs (Goyal). However, other problems, like high school student to teacher ratio seems to be another large contributor, as the average ratio is 30-35:1, where sometimes it can be as high as 60:1 in some secondary schools (Rathore).

The average household spends about 45% of its spending on food (“India Culture”). However, most of these spendings go towards processed foods rather than whole fruits and vegetables due to the cheapness and accessibility of fast foods. The archetypal Indian diet “consists of rotis, dals (lentils), beans and pulses, along with vegetables, rice, chicken and meat curries” (Gusain). These foods are mostly cooked above a gas stove with an open flame. This large consumption of poor quality carbs is one of the biggest contributions to obesity and metabolic syndrome. Specific barriers to unbalanced diets include standard supply-and-demand constraints such as unavailability, low-income, food restrictions, and taboos (Nguyen et al.), while other barriers come from lack of nutritional knowledge and guidance (Athavale et al.).

Metabolic Syndrome (MetS) is globally prevalent, however, it has a particular influence in India. MetS has been documented to increase the risk of heart disease by two to three times and of type 2 diabetes mellitus (T2DM) by five times, with cardiovascular disease being the single largest cause of death in South Asia (Eckel et al.). The country ranks second in the global diabetes epidemic, with 77 million people diagnosed in 2021 (Pradeepa and Mohan). The two largest contributors to MetS are increased body fat (i.e. obesity) and physical inactivity. Obesity may be caused by many things, including an unhealthy diet, attributed to a higher accessibility to fast foods and processed foods, tobacco use, excessive alcohol intake, and genetics. Although traditional Indian food is generally known to be healthier than most other diets, a recent shift has been observed throughout the years, with trends toward higher sugar and caloric content and larger amounts of processed foods like chocolates, soft drinks, and fast foods (Bishwajit). An increased amount of cross-border food trade, advancement in local food technology, and increased food marketing for the processing industry has greatly increased the availability of processed food products, even in the rural areas. Additionally, almost 70% of the calories in a typical South Asian diet come from carbs, poor quality, that is, as it includes lots of sugar, flour, starch, and more. It is also seen that the average Indian consumes at least 15 teaspoons of sugar found in juices, sweets, and other sugar-filled drinks and snacks (“What is wrong”). Moreover, females seem to have a higher prevalence of this disease due to the common trend of the lack of general education and physical activity. As India continues to experience remarkable economic growth, rising disposable income levels continue to drive the nutrition away from the traditional high-carbohydrate and low-fat Indian diets towards a lower carbohydrate and higher proportion of saturated fat, sugar and salt–contributing to obesity (Bishwajit). Urbanization, which is currently at a 2.33% annual rate of change (“India - World FactBook”) has also increased intake of energy-dense food, decreased physical activity, elevated stress levels, and promoted accessibility to processed food by making it cheaper (Gupta). As a result, more children in urban areas are exposed to a new food environment in which cheaper, but riskier, alternatives are available. These factors are “cookie-cutter” promoters for MetS and obesity, making those who live in urban areas more susceptible to diseases like CVD and diabetes. In an attempt to shrink the proportion of people suffering from these symptoms, India does have several food programs with the primary goal of reducing food insecurity, and consequently the national prevalence of MetS.

Food-based programs such as POSHAN Abhiyaan, National Health Mission, Anemia Mukt Bharat

program, Task Force on Healthy and Balanced Diets, National Rural Livelihoods Mission, Food Safety and Standards Authority of India, Pradhan Mantri Matru Vandana Yojana (PMMVY), and Task Force on Healthy and Balanced Diets, aim to improve conditions of food insecurity, like improving nutritional status of maternal and adolescent populations, reducing hunger and nutritional deficiencies reducing consumption of junk food (Nguyen et al.). There have also been policies focused on helping children avoid unhealthy and unbalanced diets. For example, under the Ministry of Human Resource Development (MHRD), India has started to require all schools to have a kitchen garden, in order to increase the availability of fresh and healthy greens and grains (Appel). Despite these efforts, loopholes and lack of enforcement in these programs seem to aid the increase in the number of MetS diagnoses, worsening the health burden in India. This may largely be due to the fact that obesity, a significant contributing factor to MetS, remains an unaddressed target of the aforementioned policies. Due to the strong association between obesity and MetS, by targeting the causes of obesity in India, we can reduce the burden of MetS. This can be addressed in a multifaceted approach: by educating the youth in healthy nutritional practices, implementing taxes to reduce consumption of processed foods that have a direct effect on the likelihood of developing MetS, and creating a ministry to organize all the current food programs.

First, India must focus on educating its youth on the importance of a nutritious diet. Only 190 out of the 58,000 institutions in India offer one or more courses on nutrition or other health and dietary sciences (Miller). It was also found that within those institutions, mostly girls–if anyone–were found taking these courses, as nutrition-based courses are not mandated in any core curriculum across India. This highlights a disparity between the education of males and females that exists regarding nutritional knowledge. Additionally, studies show that men tend to be responsible for procurement of food from the market, often themselves deciding what food items to buy (Nguyen et al.). Thus, men, proven to have limited knowledge on nutrition, clearly have a strong influence in their family's dietary habits. Furthermore, this problem is exacerbated by the findings from a 2021 empirical analysis, which states that females with a highschool education or higher were three times more likely to consume dairy and animal food sources, and they were 5.6 times more likely to consume dark green leafy vegetables when compared to females without that level of education, alluding to the influence of education on dietary choices (Nguyen et al.). This provides a possible explanation of the higher prevalence of MetS among females compared to males, and it clarifies that education plays a large role in determining what foods a person in India is likely to eat.

Thus, an efficient way to target the discrepancy present in the knowledge of nutrition is to implement a diet-and-health-focused curriculum in Indian schools to provide guidance on nutritional choices, specifically for children in primary and secondary school, as they "drive the future education on nutrition" (Miller). In the status quo, as nutrition and health science "is often optional and not comprehensive" (Miller), this solution proposes that nutrition will now be mandated in all public schools across India. To create curriculum, teachers can work in conjunction with some of the 190 institutions that already offer courses on the topic, to create one that is suitable for their specific school. Additionally, this curriculum can be created by existing local food programs. For example, Akshaya Patra, the World's Largest NGO School Meal that is invested in child nutrition and education in India, can collaborate with teachers and staff to develop and learn a curriculum fit for the student body. Within these nutrition-based topics, ideas on sustainable nutritional practices to prevent food waste (one of the driving factors that have sky-rocketed the prices of organic food), exercise, diet, financing food, and cooking will be covered (Miller). This collaboration can help avoid having teachers left in the dark about determining ways to teach the curriculum. Next, according to the Center for Disease Control in order to affect behavior change, 40 to 50 hours of class-time is needed for any given topic. Most schools do 8 to 9 hours when they first introduce a curriculum and gradually increase it throughout the years. This equates to approximately one week of school learning, making it feasible to seamlessly weave into subjects such as physical education, social science, or even science, effectively communicating the basics of a proper diet in order to avoid obesity, MetS, and a cascade of other dietary diseases.

In order to implement this, barriers to nutritional education, or education in general, must be overcome. The most prevalent drawbacks that exist in education lie less in the actual number of the schools, and more in the quality, where factors such as the high dropout rate, low quality of teaching, and the "teacher shortage", make it especially hard to implement new curriculum into the system. There are a few ways to overcome this. First, it is essential to realize that there is actually not a teacher shortage in India. An Oxford study in 2021 discovered that when analyzing the number of teacher vacancies and number of teacher surpluses in India, there is actually a net surplus of about 239,800 when the student to teacher ratio is limited to 25.1:1 for all public schools (Datta and Kingdon**)**. The study also mentions, "[b]y mandating this ratio as the maximum student to teacher ratio, teachers would not be as overburdened, and India's education system would not have to be bombarded with perpetuating shortages in certain areas. Additionally, to account for the low quality of teaching, cascade systems, which were proven to increase quality in Delhi by almost 11% ("Lessons from the Delhi"), could be implemented nationally. In this, Primary Teachers, teachers that are selected to attend a teacher training as part of the state to improve quality of lessons, are required to train teachers in the rest of the school to increase the overall quality of teaching in public schools in India. According to a UDIDE report from 2021-22, lack of infrastructure, such as limited spaces and teaching staff attention, and lack of interest, are the main reasons dropping out is more common (Goyal). Thus, increasing the quality of teacher education is likely to decrease the dropout rate, allowing for more students to gain firsthand, quality education on nutrition.

Next, it is evident that processed foods and soft drinks are becoming cheaper and easier to purchase. Specifically, it was found that high-income individuals were more likely to eat at Western-style fast food restaurants and chains, whereas their low-income counterparts were more likely to buy food sold by street vendors as fast food (Aloia et al.). Additionally, further studies show that street vendors have about 28-29% of fat—in which trans fat was about 0.1% to 30% of total fatty acids—whereas most Western food outlets with larger fast food chains tend to have 48-50% (Gupta et al.). Thus, taxing processed foods and soft drinks is likely to limit the consumption of such products. In 2014, after the implementation of taxes on processed foods and soft drinks, Mexico saw a consumption trend that curved away from soft drinks and fast foods (Hyman). Other countries such as Denmark, Hungary, and the UK have adapted such taxes and have seen similar results. Although a similar "fat tax" had been introduced in Kerala, a South Indian state, in July 2016, this tax, unlike other countries, was an indirect tax of 14.5% "levied on burgers, pizzas[…]and bread fillings sold by restaurants with a brand name or registered trademark" (Agarwal et al.). This failure was characterized as such because of its tax on "the type of restaurant instead of ingredients," creating a massive outburst (Agarwal et al.). Still, this tax in Kerala reduced the consumption of fast foods by 5.6% after only having a fat tax for one year, further proving its positive effect. An ideal tax rate would be 10% on foods with energy density ≥275 kcal/100g (like Mexico's), 5% more than the tax on other types of food. This is a more effective tax rate than before as it is significantly lower than the original 14.5% in Kerala, and it is similar to that of Mexico's and other countries' that hover at around 8% (Belluz). Furthermore, similar to the methods of other countries, any revenue generated from this tax can be put towards subsidies for the production of healthy foods from small farms and towards coupons that can be utilized by those households who qualify as middle or lower income. This makes more nutritional alternatives even cheaper (Brownell), reducing the price of organic foods and making them more accessible without the need for food coupons in the long-term (Franck). This tax can pressure street vendors to turn towards healthier alternatives to keep their business from dwindling, also granting middle and lower income households consumption of a healthier diet in the future. Although, many of those that lie in the high-income range may continue to get these processed foods, they will pay the price of a higher tax, indirectly subsidizing small farmers and providing food to food deserts.

Drawbacks to this taxation will mainly be a barrier to the government: people will be opposed to paying a larger sum for food. A way the government would be able to overcome this barrier is to more quickly ease the economy of India into this change. India can accomplish this by investing a large initial sum of money towards organic food coupons distributed to lower and lower-middle income homes, allowing these

individuals to more quickly access healthier alternatives in a cheap manner. Additionally, although governmental engagement with small farms has been low, recent changes following the election resulted in the government considering a 33% increase in cash support to small farmers (Shrivastava), ensuring that the government will likely aid small farms following this solution as well. This money going towards small farms will eventually assist small farmers in gaining revenue, as mentioned before (Miller). Here, as fewer people purchase unhealthy, highly processed fast foods, curbs in diets, similar to those seen in Denmark, Mexico, and Hungary, all of which have already implemented a "fat tax", will be especially prominent, reducing overconsumption, unbalanced diets, and other factors that lead to MetS.

Hundreds of food policies, programs, and organizations exist in India aiming to reduce food insecurity, obesity, and improve the overall nutritional status of Indians to prevent the increasing burden of dietary diseases promoted by MetS. However, the sheer number of programs that exist make their attempts of reaching their goals convoluted (Sharma). This is especially attributed to the large diversity of issues that food insecurity has caused, making symptoms range from completely opposite sides from the spectrum. More specifically, as issues concerning malnutrition haven't been shown to get significantly better, there have also been issues concerning obesity and over-consumption (Sharma). For example POSHAN Abhiyaan, Anemia Mukt Bharat, and The National Nutrition Mission, some of the more notable food programs established in India, have a main goal of eradicating malnourishment and hunger in India nationally, while entirely ignoring the highly prevalent obesity issues (Bera et al.). This has made other food programs such as Food Safety and Standards Authority of India (FSSAI), who employ campaigns attempting to curb junk food consumption and promote exercise, harder to enforce its goals (Bera et al.). Therefore, to maximize their efficiency, it is crucial that India develops an agency to oversee these programs and other efforts to aid in the problem of MetS and other dietary diseases. I propose that this government agency functions in correspondence with the Ministry of Health and Family Welfare (MoHFW), and works in correlation with the Food Corporation of India (FCI), a food security company. MoHFW is the ministry under which the Indian government has the focus of handling all of the health policies in India. The overall goals of this agency would be to amplify and organize the effects of existing programs that may, on its own, have limited effect. More specifically, this ministry will employ representatives from each state and relevant food insecurity related organizations to coordinate the allocation and implementation of policies and programs to cater towards the region, centering food insecurity and factors contributing to MetS as a national problem. This formation will cover loopholes presented by programs such as POSHAN, Abhiyan, and PMMVY when addressing their vague policy guidelines. Also, as this Ministry now works with the government, it will be able to source government funds, allowing the agency to coordinate the initial and ongoing funding towards organic food coupons provided to the appropriate households once my solution of a fat tax goes in place. Additionally, it will work in correspondence with the Ministry of Finance to coordinate the allocation of income formed by taxes, and it will help coordinate the curriculum planning on nutrition while working parallel to the Ministry of Education to implement policies to reduce the student to teacher ratio mentioned previously.

Furthermore, to allow for greater impact directly through civic engagement, this method will allow citizens to voice their opinions by contributing to and joining various food programs that will be represented in this agency, further incentivizing the government to invest money towards creating cheaper and nutritional alternatives to fast food. Thus, this agency is crucial to ensure the success of my other two solutions to prevent Metabolic Syndrome from affecting more individuals at such a high rate.

MetS is a prominent disease with symptoms that are direct indicators for diabetes and CVD, significant causes of mortality in India for years. It is vital that India takes steps to promote health diets and avoid significant health burdens such as MetS. By prioritizing a youth-focused, nutrition-based curriculum, taxing unhealthy and highly processed foods, and establishing an agency designed to efficiently organize programs surrounding food insecurity, India will likely see a significant decrease in the proportion of people diagnosed by highly preventable diseases.

Works Cited

Agarwal, Sumit, et al. "Association between a State-Level Fat Tax and Fast Food Purchases." JAMA Network Open, U.S. National Library of Medicine, 2 Oct. 2023, www.ncbi.nlm.nih.gov/pmc/articles/PMC10580107/#:~:text=In%20the%20first%20budget%20of,brand%20name%20or%20registered%20trademark.

"Agricultural Land (% of Land Area) - India." *World Bank Open Data*, United States Census Bureau, 2021, data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=IN. Accessed 08 Apr. 2024.

"Agriculture in India: Agricultural Exports & Food Industry in India: IBEF." *India Brand Equity Foundation*, Nov. 2023, www.ibef.org/exports/agriculture-and-food-industry-india. Accessed 08 Apr. 2024.

Aloia, Christopher Robert, et al. "Differences in Perceptions and Fast Food Eating Behaviours between Indians Living in High- and Low-Income Neighbourhoods of Chandigarh, India." Nutrition Journal, U.S. National Library of Medicine, 7 Jan. 2013, pubmed.ncbi.nlm.nih.gov/23289746/.

Appel, Deirdre. "India Requires All Schools to Have Kitchen Gardens." *NYC Food Policy Center (Hunter College)*, 11 Mar. 2021, www.nycfoodpolicy.org/food-policy-snapshot-india-kitchen-gardens/. Accessed 08 Apr. 2024.

Athavale, Priyanka, et al. "A Qualitative Assessment of Barriers and Facilitators to Implementing Recommended Infant Nutrition Practices in Mumbai, India - Journal of Health, Population and Nutrition." *SpringerLink*, BioMed Central, 27 July 2020, link.springer.com/article/10.1186/s41043-020-00215-w. Accessed 08 Apr. 2024.

"Average Size of Households in India (2010 - 2021)." Global Data, 2021, www.globaldata.com/data-insights/macroeconomic/average-household-size-in-india-2096125/#:~:text=Size%20in%20India-,India%20had%20an%20average%20household%20size%20of%204.44%20people%20in,2021%2C%20between%202010%20and%202021. Accessed 08 Apr. 2024.

Beerenahally, Thriveni Shivanna. "No Free Bed with Ventilator: Experience of a Public Health Specialist." *Indian Journal of Medical Ethics*, U.S. National Library of Medicine, 2017, pubmed.ncbi.nlm.nih.gov/28190791/. Accessed 08 Apr. 2024.

Belluz, Julia. "Mexico and Hungary Tried Junk Food Taxes - and They Seem to Be Working." Vox, 17 Jan. 2018, www.vox.com/2018/1/17/16870014/junk-food-tax.

Bera, Om Prakash, et al. "Optimizing the Impact of Health and Related Programmes / Policies to Address the Issue of Childhood Obesity in India----A Narrative Review." Journal of Family Medicine and Primary Care, U.S. National Library of Medicine, Apr. 2021, www.ncbi.nlm.nih.gov/pmc/articles/PMC8144758/#:~:text=Other%20than%20health%20programmes%2C%20FSSAI,main%20culprits%20for%20childhood%20obesity.

Bishwajit, Ghose. "Nutrition Transition in South Asia: The Emergence of Non-Communicable Chronic Diseases." *F1000Research*, U.S. National Library of Medicine, 12 Jan. 2015, www.ncbi.nlm.nih.gov/pmc/articles/PMC4706051/. Accessed 08 Apr. 2024.

Brownell, Kelly D, et al. "The Public Health and Economic Benefits of Taxing Sugar-Sweetened Beverages." *The New England Journal of Medicine*, 15 Oct. 2009,

www.nejm.org/doi/full/10.1056/NEJMhpr0905723. Accessed 09 Apr. 2024.

Choudhuri, Pallavi, and Sonalde Desai. "Lack of Access to Clean Fuel and Piped Water and Children's Educational Outcomes in Rural India." *World Development*, Pergamon, 18 May 2021, www.sciencedirect.com/science/article/pii/S0305750X21001479. Accessed 08 Apr. 2024.

Climate of India, New World Encyclopedia, 7 Jan. 2024, www.newworldencyclopedia.org/entry/Climate_of_India. Accessed 08 Apr. 2024.

Datta, S, and G Kingdon. "The Myth of Teacher Shortage in India." UCL Discovery - UCL Discovery, Research on Improving Systems of Education (RISE), 1 Dec. 2021, discovery.ucl.ac.uk/id/eprint/10128735/.

Eckel, R.H., et al. "Metabolic Syndrome: The Indian Public Health Perspective." *Medical Journal Armed Forces India*, Elsevier, 13 Jan. 2020, www.sciencedirect.com/science/article/abs/pii/S0377123719301297. Accessed 08 Apr. 2024.

"Education." *UNICEF India*, www.unicef.org/india/what-we-do/education. Accessed 08 Apr. 2024.

"50% of India's Children Don't Have Access to Quality Education after Primary School: Development Economist Amir Ullah Khan." The Hindu, 15 Dec. 2023, www.thehindu.com/education/50-of-indias-children-dont-have-access-to-quality-education-after-primary-school-development-economist-amir-ullah-khan/article67641574.ece. Accessed 08 Apr. 2024.

Franck, Caroline, et al. "Taxing Junk Food to Counter Obesity." *American Journal of Public Health*, U.S. National Library of Medicine, Nov. 2013, www.ncbi.nlm.nih.gov/pmc/articles/PMC3828689/. Accessed 08 Apr. 2024.

"Governance & Administration| National Portal of India." *Government and Administration*, www.india.gov.in/topics/governance-administration. Accessed 09 Apr. 2024.

Goyal, Anurag. "School Dropout Rate in India - Reasons & How to Prevent Them." Extramarks Blogs: Weaving Stories for Schools, Students, and Parents, 13 May 2024, www.extramarks.com/blogs/how-to-prevent-school-dropouts-in-india/.

Greenwood, Michael. "School-Based Nutritional Programs Reduce Student Obesity." *ScienceDaily*, 17 Dec. 2018, www.sciencedaily.com/releases/2018/12/181217101814.htm#:~:text=Students%20in%20schools%20with%20enhanced,of%203%25%20to%204%25. Accessed 08 Apr. 2024.

Gupta, Shivranjani. "Organic Products India: Why Does Organic Food Cost More than Conventional Food? - Pure & Eco India - Organic Magazine & Organic Directory." *Pure & Eco India - Organic Magazine & Organic Directory - Organic Magazine & Organic Directory since 2015*, 29 Sept. 2023, pureecoindia.in/why-does-organic-food-cost-more-than-conventional-food/. Accessed 08 Apr. 2024.

Gupta, Sidhartha, and Surojit Gupta. "Incomes up since Covid, but Poorest 20% Still below FY16 Level: Study: India News - Times of India." *The Times of India*, TOI, 25 Jan. 2024, timesofindia.indiatimes.com/india/incomes-up-since-covid-but-poorest-20-still-below-fy16-level-study/articleshow/107124541.cms. Accessed 08 Apr. 2024.

Gupta, Vidhu, et al. “Unhealthy Fat in Street and Snack Foods in Low-Socioeconomic Settings in India: A Case Study of the Food Environments of Rural Villages and an Urban Slum.” Journal of Nutrition Education and Behavior, U.S. National Library of Medicine, 9 Feb. 2016, pubmed.ncbi.nlm.nih.gov/26872553/.

Gusain, Sasha. “How Healthy Is Indian Food?” *IndiaTimes*, 28 June 2011, www.indiatimes.com/health/healthyliving/how-healthy-is-indian-food-238388.html. Accessed 08 Apr. 2024.

Ha, Emily. “Food Marketing.” *UConn Rudd Center for Food Policy and Health*, 20 Apr. 2020, uconnruddcenter.org/research/food-marketing/#:~:text=More%20than%2080%25%20of%20this,for%20Disease%20Control%20and%20Prevention. Accessed 08 Apr. 2024.

“Healthy Eating Learning Opportunities and Nutrition Education.” *Centers for Disease Control and Prevention*, 10 Jan. 2023, www.cdc.gov/healthyschools/nutrition/school_nutrition_education.htm#:~:text=US%20students%20receive%20less%20than,needed%20to%20affect%20behavior%20change.&text=Additionally%2C%20the%20percentage%20of%20schools,74.1%25%20between%202000%20and%202014. Accessed 08 Apr. 2024.

Hyman, Mark, MD. “Four Ways Other Countries Are Successfully Tackling Obesity. Take Note, America.” HuffPost, HuffPost, 30 Nov. 2014, www.huffpost.com/entry/four-ways-countries-obesity_b_5845336.

“India at a Glance | Food and Agriculture Organization of the United Nations”, Food and Agriculture Organization (FAO), www.fao.org/india/fao-in-india/india-at-a-glance/en/. Accessed 1 Sept. 2024.

“India Culture : Language, Religion, Food - Original Travel.” *India Culture : Language, Religion, Food - Original Travel*, www.originaltravel.co.uk/travel-guide/india/culture. Accessed 08 Apr. 2024.

“India - World FactBook.” *Central Intelligence Agency*, 3 Apr. 2024, www.cia.gov/the-world-factbook/countries/india/. Accessed 08 Apr. 2024.

“Kids and Digital Media | CS Mott Children’s Hospital | Michigan Medicine.” *Kids and Digital Media*, www.mottchildren.org/posts/your-child/kids-and-digital-media. Accessed 09 Apr. 2024.

Krishnamoorthy, Yuvaraj, et al. “Prevalence of Metabolic Syndrome among Adult Population in India: A Systematic Review and Meta-Analysis.” *PLOS ONE*, Public Library of Science, 19 Oct. 2020, journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0240971. Accessed 08 Apr. 2024.

“Lessons from the Delhi Education Reform Journey”, Dream a Dream, 24 Apr. 2023, dreamadream.org/lessons-from-the-delhi-education-reform-journey/#:~:text=The%20performance%20of%20government%20schools,71.6%25%20in%202018%E2%80%9319.

Miller, Emily. “Nutrition Education in India.” Child Family Health International (CFHI), 12 Aug. 2022, www.cfhi.org/nutrition-education-in-india/.

Nestle, Marion. “Food Marketing and Childhood Obesity — A Matter of Policy.” *New England Journal of Medicine*, 15 June 2006, www.nejm.org/doi/full/10.1056/NEJMp068014. Accessed 09 Apr. 2024.

Nguyen, Phuong Hong, et al. “Maternal Diets in India: Gaps, Barriers, and Opportunities.” *MDPI*, Multidisciplinary Digital Publishing Institute, 9 Oct. 2021, www.mdpi.com/2072-6643/13/10/3534. Accessed 08 Apr. 2024.

“Overview.” *World Bank*, United States Census Bureau, 27 Sept. 2023, www.worldbank.org/en/country/india/overview. Accessed 08 Apr. 2024.

Paul, Sohini, et al. “Maternal Education, Health Care System and Child Health: Evidence from India.” *Maternal Education, Health Care System and Child Health: Evidence from India*, ScienceDirect, 22 Jan. 2022, www.sciencedirect.com/science/article/pii/S0277953622000430. Accessed 08 Apr. 2024.

Pradeepa, Rajendra, and Viswanathan Mohan. “Epidemiology of Type 2 Diabetes in India.” *Indian Journal of Ophthalmology*, U.S. National Library of Medicine, Nov. 2021, pubmed.ncbi.nlm.nih.gov/34708726/#:~:text=The%20estimates%20in%202019%20showed,of%20these%20individuals%20remain%20undiagnosed. Accessed 08 Apr. 2024.

“Profile - Climate.” *National Portal of India*, Know India, 2020, knowindia.india.gov.in/profile/climate.php. Accessed 08 Apr. 2024.

Rathore, Manya. “India - Student Teacher Ratio by School Types 2022.” Statista, 3 Nov. 2023, www.statista.com/statistics/661182/student-teacher-ratio-india-by-school-types/.

“Rural Population (% of Total Population) - India.” *World Bank Open Data*, United States Census Bureau, 2019, data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=IN. Accessed 08 Apr. 2024.

Sharma, Manika, et al. “A Comparison of the Indian Diet with the Eat-Lancet Reference Diet - BMC Public Health.” *BioMed Central*, 29 May 2020, bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-08951-8. Accessed 08 Apr. 2024.

Shrivastava, Shruti, et al. “Prime Minister Modi Weighs Giving Small Farmers More Cash before 2024 Elections.” The Economic Times, 11 Oct. 2023, economictimes.indiatimes.com/news/economy/finance/prime-minister-modi-weighs-giving-small-farmers-more-cash-before-2024-elections/articleshow/104328072.cms?from=mdr#google_vignette.

“What Is Metabolic Syndrome?” *National Heart Lung and Blood Institute*, U.S. Department of Health and Human Services, 2022, www.nhlbi.nih.gov/health/metabolic-syndrome#:~:text=About%201%20in%203%20adults%20have%20metabolic%20syndrome. Accessed 08 Apr. 2024.

“What Is Wrong with the Indian Diet? Apparently a Lot, Claims UK-Based Cardiologist Dr. Aseem Malhotra.” *The Times of India*, TOI, 15 May 2020, timesofindia.indiatimes.com/life-style/health-fitness/diet/what-is-wrong-with-the-indian-diet-apparently-a-lot-claims-uk-based-cardiologist-dr-aseem-malhotra/articleshow/75742419.cms. Accessed 08 Apr. 2024.

Worstall, Tim. “The Average Indian Farmer Is Poor Because the Average Indian Farm Is Small.” *The Average Indian Farmer Is Poor Because the Average Indian Farm Is Small* , Adam Smith Institute, 9 Feb. 2021,

www.adamsmith.org/blog/the-average-indian-farmer-is-poor-because-the-average-indian-farm-is-small. Accessed 08 Apr. 2024.