The proportion of people eating according to their traditional dietary patterns is declining in most continents, with cheap ultra-processed foods becoming more easily available and infiltrating the food chains of even the hardest-to-reach corners of the world. At the same time, intensive farming methods, inequities in food distribution, and the high rate of food wastage raise concerns about the sustainability and environmental impact of food production at the scale required to feed the globe. International shocks such as the COVID-19 pandemic and regional conflicts have a palpable effect on food production, storage and distribution and exacerbate many of these issues. For these reasons, food and nutrition insecurity is a major global concern.

At the 8th Summit, this sub-theme generated discussion on many of these issues, particularly their implications for nutrition and health. In some cases, digital technologies are being used to protect and enhance traditional farming and dietary practices. In India, we heard about the use of participatory film-making and a digital voice response system as tools to empower local communities to record and share traditional dietary knowledge and practices. On a larger scale, the use of blockchain technology for increasing transparency and traceability in the food chain could become commonplace. Other key discussions centred on how digital technologies are being harnessed to shape future food systems and how such shifts will depend upon the evolution of agriculture and ecology, human culture, education and communication, and the technologies that underpin and span these domains.

One of the NNEdPro's flagship food-based projects is the Mobile Teaching Kitchen (MTK) initiative. First established in Indian slum communities, the MTK uses a microenterprise model to train local women to prepare nutritious traditional foods and, in turn, train others to do the same, thus providing education, employment and an income alongside potential health benefits. The 8th Summit included updates on the progress of this project. The MTK model is being replicated in Mexico and the USA, and strategies to utilise digital technology to magnify the impact of the model were explored. Other food-based initiatives such as 'kid's kitchens', 'digital kitchens', and digital apps to assist individuals and families in choosing healthy food options were all initiatives that garnered further discussion.

3 EMPOWERING GLOBAL NUTRITION WITH DIGITAL TECHNOLOGY – PRACTICAL IMPLEMENTATION IN CLINICAL PRACTICE AND RESEARCH

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Digital technologies can empower health and nutrition research but implementing them safely and effectively is a major challenge. Linking multiple datasets, such as administrative electronic health records plus biomarker data (from e.g. the UK Biobank) for health research is leading to novel insights into the biological mechanisms and social determinants of disease, and risk modelling. The quality of diet and nutrition data in such datasets, particularly from routinely collected administrative healthcare care is a key area for improvement that necessitates novel digital innovation in dietary assessment methods. Examples of technologies designed for this purpose that were showcased at the 8th Summit include the MyFood24 app for diet assessment, tracking and analysis (based in the UK), a Telegram Bot with food recognition capabilities (based in East and Central Asia), and GIBSONIFY for collecting quantitative dietary data (based in India). This sub-theme also included discussion on the burgeoning field of precision nutrition, using nutrigenetics, molecular determinants, and -omics to individualise nutrition advice. One example discussed was the work of ZOE, a company using large-scale biometrics and data science to investigate individualised responses to foods (PREDICT) to develop a machine learning based digital nutrition tool that individualises diet advice for users.

Crucially, to ensure their safe and effective implementation, such technologies should necessarily be subjected to practical validation in clinical and research settings using robust methods and with results reported in peer-reviewed publications. At the 8th Summit, key topics under this sub-theme included the practical, ethical, legal and regulatory issues involved in this process. Within this sector several actors are calling for these barriers to be minimised but the safety and quality assurances they were designed to ensure must be maintained. In Germany, for example, a mechanism (DiGA) has been developed to accelerate the regulatory approval process for digital health products into standard care.

Education remains a keystone in improving nutrition in clinical practice and research. Digital technologies have the potential to improve the quality and expand the reach of nutrition education. For example, NNEdPro members in Australia and Asia have been developing nutrition education frameworks for healthcare professionals, and online educational platforms to deliver teaching. In Portugal, PLATE is a digital, school-based food literacy program that utilises gamification to encourage healthy diets and prevent adolescent obesity.

8th International Summit on Nutrition and Health (2022) – Abstracts

Food systems; practical implementation

1 CONGRUITY BETWEEN CROP DIVERSIFICATION AND DIETARY DIVERSITY: STUDY OF AKOLE BLOCK IN MAHARASHTRA

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Background and Objectives We studied four tribal communities in two different geomorphological regions in Akole Block,

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Ahmednagar District, Maharashtra, the second most populated state in India. A comparison was made between socio-economic conditions, adoption of new technologies, changing cropping pattern, and market access to identify the drivers of dietary diversity in a transitional scenario moving from subsistence agriculture in upland regions towards commercial production in lowland regions. Hilly upland region has thick forests, sparse population, small land holdings and rainfed-organic subsistence agriculture. This region has poor transport, communication, and healthcare facilities. In contrast, lowland region scores better on these development parameters. Here, cropping pattern is dictated by market trends and farmers use irrigation facilities and modern farm implements for high productivity. Through our Nutrition Awareness Programme this study also focused on analysing dietary behaviours of primary school children in the villages.

Methods Qualitative methods used were semi-structured interviews, seasonal calendar, 24 hrs. dietary recall and focussed group discussions. The data was quantitatively analysed using Stata 12.0 and AnthroPlus 1.0.4.

Results Results (at 95% confidence) indicated a high household dietary diversity score (HDDS) and Women's Dietary Diversity Score (WDDS) amongst the adult population in both the regions – Upland: HDDS 6.4, WDDS 4.0; Lowland: HDDS 7.3 and WDDS 4.7. Upland students exhibited a balanced dietary pattern of different food groups with Dietary Diversity Score (DDS) of 7 whereas for lowland it stood at 6. However, over 50% of upland students were stunted with HAZ < -2; over10% risked being overweight; 50% were wasted with low BAZ scores. Higher percentage of upland students were malnourished despite higher DDS, especially, girls exhibited a lower DDS and were more severely wasted.

Conclusions The study establishes that improved irrigation, livestock ownership, crop diversification, and easy access to the markets have scope to increase dietary diversity in this region.

Food systems

2 ADDRESSING NUTRITIONAL GAPS AND SUGGESTING A PRACTICAL FRAMEWORK TO REDUCE THE RISK OF MALNUTRITION AND IMPROVE NUTRITION SECURITY IN SANTHAL TRIBAL COMMUNITIES IN INDIA

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Background The double burden of malnutrition is a growing problem, which is disproportionately represented across the Indian population, with undernutrition dominating rural areas. This study aimed to identify nutritional gaps in traditional recipes of Santhal tribes, create a recipe book to address deficiencies and support diet diversity.

Methods Food Frequency Questionnaires (FFQ) were conducted to analyse dietary patterns of Santhal communities. Recipes were collected from five villages and shortlisted into 37 dishes based on availability, acceptability and popularity. Commonly consumed templates were based on FFQ findings and individual dishes. Nutritics software was used to identify nutritional gaps. In total, 24 recommended templates, were created to satisfy adequate intake of nutrients. Mann-Whitney and unpaired t-test were performed and findings were presented as mean (standard deviation(SD)) and median (25th–75th percentile).

Results Less than one-fifth of consumed templates met energy requirements, 27% met protein recommendations, and 4% met requirements for fibre, total fat, monounsaturated and polyunsaturated fat. Other nutrients of concern included vitamins B12, B9, iodine, calcium and iron. Recommended templates significantly increased energy (Consumed (C): 996.0kcal (930-1090); Recommended (R): 1183.0kcal(1094-1341); $p<0.0001$), protein (C: 25.0g(8.4); R: 40.5g(33.2-52.3); $p<0.0001$), total fat (C: 7.4g(6.1-8.8); R: 17.2g(14.1-22.9); $p<0.0001$) and fibre (C: 5.0g(4.0-6.5); R: 8.2g(5.8-11.7); $p=0.0013$) compared to consumed templates. Additionally, calcium (C: 108.5mg(36.0-302.5); R: 245.5mg(152.3-528.3); $p=0.0121$), iron (C: 5.3mg(2.1-8.2); R: 10.7mg(8.2-13.2); $p=0.0002$), vitamin B6 (C: 0.4mg(0.3-0.7); R: 1.1mg(0.6-1.6); $p=0.0001$), B9 (C: 54.5ug(36.3-172.8); R: 252ug(179.4); $p=0.0026$) and B12 (C: 0ug(0-0); R: 1.0ug(0-2.1); $p=0.0001$) were also significantly increased.

Conclusion This study provides a novel insight on the nutritional adequacy of indigenous Santhal recipes and highlights the need to enhance the nutrition status of these communities. Concerted efforts should be made to increase communication for nutritional advocacy, both nationally and internationally. Future research should evaluate the acceptability, practicality, and uptake of this recipe book in addressing malnutrition in rural communities.

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3 COSTING A NUTRITIONALLY BALANCED THALI: IS AN ORGANIC DIET AFFORDABLE?

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Background and Objectives Affordability is probably an impediment to improving diets in India. However, evidence for the relationship between the healthfulness of foods and price is scarce. In addition, little is known about the underlying cost taxonomies for alternate food systems. To address these gaps in the literature, the present study endeavours to determine the cost of a nutritionally balanced, healthy North-Indian vegetarian thali (platter). Further, the price differential between organic and conventional thalis has been determined.

Methods This research is an exploratory attempt to quantify what it costs to prepare nutritionally balanced organic and conventional North-Indian vegetarian lunch and dinner thalis for an Indian adult male and female engaged in moderately

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