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Animal-based vs plant-based protein quality. A survey of millennial students nutritional knowledge and food preferences

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Introduction

The food system around the mass production of meat and by-products constitutes a major driver of global warming, diminution of Earth's resources, land degradation and deforestation, as well as contamination of aquatic and terrestrial ecosystems (IPCC, 2019; UN Environment Programme, 2018). At its current levels, worldwide food consumption practices are high, and particularly so in meat products. Proof lies in the environmental data, which is swiftly accumulating on the unsustainability of meat (Sabaté *et al.*, 2014).

At the present day, meat production is accountable for occupying over half of the Earth's cultivable land resources and for driving greenhouse gas emissions. Supporting those findings is Eshel's research (2014), which found that meat eaters employ over 160 percent of land resources when compared to those people who are reliant on a plant-based diet. In fact, although varying across several crop categories and regions, the global average water footprint related to crop production is remarkably lower when compared to the effect of meat production over freshwater sources (Mekonnen *et al.*, 2012).

Meat production necessitates around 2422 Gm^3 of water per year, the provision of just 1 kg of animal protein demands almost 100 times more water than producing 1 kg of grain protein (Lonnie and Johnstone, 2020). As a result, only a mitigated, global shift in dietary changes that are mainly reliant on nutritionally balanced, plant-based sourced of protein could sustainably feed 10 billion people by 2050. This would guarantee nutritional adequacy, food security and food sufficiency (LEAP, 2020; Willet *et al.*, 2019). According to the European Environment Agency (2019) there are increasing concerns related to the linkage between an excessive consumption of animal-derived proteins and issues related to health and environment. Within this context, 1 in 5 people living in the UK have already stopped or reduced their meat consumption (The Vegan Society, 2020).

Currently, there is increased awareness, particularly popular within millennials, regarding the adoption of a healthy, balanced diet which includes plant-based

sources of protein. A conscious consumerism is in fact driving the trend towards the consumption of novelty food, more particularly plant-based, protein-rich products. In fact, according to data collected by Proveg Int. (2019) the UK's purchase and consumption rates of vegan products, more specifically milk, meat, margarine, cheese, readymade meals, and seafood, are amongst the highest in Europe. Within this frame of perpetual development, consumers are looking beyond the label. Eager to experiment with the inclusion of a wider variety of food options into their diet, their interest in converting and expanding their palate is increasing and subject to a continuous evolution (Mintel, 2018).

What used to appeal to a niche sector, is guaranteed to have a prosperous future within the food and beverage industry. In fact, vegans and vegetarians is projected to be a quarter of the British population by 2025, and flexitarians just under half of all UK consumers (Sainsbury's, 2019). Despite the increase in the number of people switching to a plant-based diet, meat consumption remains highly ingrained in Western culture and the disposition to stop or reduce consumption of animal products therefore remains relatively low. Consumers often describe plant-based products to have unappealing taste, texture, and appearance. Meat substitutes are difficult to find, often highly priced and more challenging to cook than their meat counterparts (Forbes, 2019; Mintel, 2020).

The lack of a wide array of studies conducted on the subject might be due to the concept of protein quality that remains a "grey area". The consumption of proteins-enriched products is nothing but a relatively recent trend. The significance of this research ties back to the fact that there is a limited amount of evidence and literature related to familiarity with the concept of protein content and perceptions related to healthfulness and wellbeing. More importantly, no past research has taken into consideration millennial university students.

This study aims to assess millennial university students' nutritional knowledge and preferences related to food regimes, with a particular insight on the protein quality content of food, which focuses and distinguishes mainly between plant-based and animal-based protein sources.

Method & Design

The current study is a cross-sectional exploratory survey of university students (millennial and generation z) of multi-ethnic background. The tool was a validated, semi-structured survey (Huges *et al.*, 2014), adapted to fit the population millennial population and it was launched via the onlinesurvey tool provided by the University of West London (UWL) which is compliant with GDPR regulations. The questionnaire used was used by Huges *et al.*, (2014) and modified to fit the aim of the current research. The adapted questionnaire was piloted to 10 students. Participants were recruited via email announcements with the participant information forms and link to the online questionnaire for the students that agree to participate (convenience and

snowball sampling was used for students to enhance the possibilities of accessing a broader audience). Students were therefore asked to inform their colleague about the study (snowballing sampling). Students did not receive any form of compensation for participating to the research. The research received an ethical approval from the University of West London. A total count of 106 people completed the questionnaire.

The data were analysed using the excel programme for descriptive statistics on demographics and frequencies were determined for the relevant questions, as well as statistically evaluated (chi square test) on factors of gender differences, education level, and culinary knowledge.

Results

106 people responded to the study; the majority of whom identify as male (52%). The population of this study is ethnically diverse such as Indian (13%) Pakistani (9.4%), Asian (6%) even though the majority describes themselves as belonging to a white background (36%). Most of the participants (39.6%) live alone in a private accommodation and relies on a total annual income of £20,000 to £29,999.

It was expected the population of the respondents are millennials, and therefore between the ages of 22-37 years old. Almost half of the respondents have obtained a degree (47.2%), followed by a 38.7% of the population who has attained a post-graduate degree. Most of respondents (84%) are students studying at the hospitality sector. Only a small minority are attending the science and health sector (11.3%). The fact that the demography mainly consists of students belonging to the hospitality suggests that they are involved by trade in the food and beverage sector and may already be knowledgeable to the topics covered in the questionnaire, or on plant-based diets. However, the rest of the participants may not be receive nutritional education in nutrition.

Results revealed that most of participants are responsible for the food shopping, planning of meals, and cooking. Regarding their activity level, 74.5% of the population defines themselves as leading a moderately active lifestyle. 60.4% of the respondents rate their cooking knowledge as being good, while a 39.6% defines it as being excellent. It emerged that most of the participants believes to be very knowledgeable in healthy eating. In addition, 70.8% of the respondents describes their diet as being healthy and balanced. These findings correlate to literature, which highlights that millennial are leading a revolutionary approach to food, represented by a shift towards a healthier, more mindful relationship with food itself. Not only they want to limit themselves in acknowledging where their food has been sourced from, but they desire feeling good about the food they consume (FSA, 2020).

From the cross-sectional study emerged that 44.3% respondents are adopting a flexitarian diet, followed by 40.6% of respondents who defines themselves as being meat eaters. The rest of the population define themselves to be vegan or fall under

the vegetarian or vegan diet. Those findings are also in line with the literature, highlighting that Millennials and Gen Z are leading the shifting away from an excessive consumption of meat, by adoption of plant-based diets, particularly the flexitarian dietary regime (YouGov, 2021; Rosenfield et al., 2020). It emerged that the most popular protein sources are eggs (20.8%), plant sources (18.3%) and fish (15.8%). Those finding are in line with the fact that 44.3% of the population identify as flexitarian. Protein sources which are being currently avoided are meat (23.6%) and poultry (20.4%), followed by meat substitutes (18.4%) and soy products (11.6%). 70.8% of the respondents acknowledges consuming protein-rich foods an average of 2 to 4 times a day, followed by 18.9% who eats 5 to 7 portions. Only 10.4% of participants actively consumes one or less protein sources per day. This is confirmed from the literature that protein is viewed as a “positive” macronutrient by consumers, who generally think that a higher intake is therefore to be preferred (Possidonio *et al*., 2021).

The respondents were familiar with methods for measuring protein quality. Data revealed that almost half of the population (44.4%) is not familiar with any of those methods. The measuring methods respondents are the most familiar with are the biological value (21.5%) and the amino acid score (19.4%), followed by the protein efficiency ratio (11.8%). Only 2.8% of the respondents are familiar with the concept of protein digestibility. 33.8% of respondents believe that a high protein diet would be most beneficial for professional athletes, followed by a moderately 31.8% of people who believe that anyone can benefit from a diet high in protein.

We have assessed the knowledge of the participants in relation to the definitions of a vegetarian, plant-based, and vegan diet. It emerged that 86.8% of the population associates a vegetarian regime with the exclusion of any type of meat and fish, but the possible inclusion of animal-derived products. None of the respondents stated that it allows the consumption of any animal product. 55.7% of the population states that a plant-based diet is best described as being like vegan/vegetarian diet, followed by a 33% of respondents who believe it may just limit or exclude meat. 88.7% of respondents indicates veganism as a dietary lifestyle involving the total exclusion of red/white meat, fish, and animal derived products from the diet. Finally, respondents state that a plant-based diet correlates the most with the vegan dietary regime (55.7%), followed by a 37.7% of people who associate it with a vegetarian diet.

The current study highlighted those multi-ethnic millennials are the leaders of a global shift away from meat consumption and towards the adoption of a plant-based diet, more specifically flexitarianism. The findings illustrate that the majority of respondents are already adopting a flexitarian lifestyle and experiment with plant-based diet or has already done so in the past. Plant-based products also appear to be a flavourful, nutritious alternative to animal products. Food knowledge, as well as the preferences, perceptions, and decisions of the individual confirmed to be unique and strictly connected to their own history, experiences, and personal background.

Plant proteins are the least limiting factors that stop them from regularly consuming plant-based foods. According to the majority of the respondents, factors influencing their own buying behaviour towards the purchase and consumption of proteins often assume different forms. However, the main factors being related to specific dietary requirements such as allergies and intolerances to specific foods, as well as ethical or environmental concerns. Moreover, plant-based diet is generally perceived as being healthier, even of not as an ideal solution for losing weight. It has also to be noticed how most respondents is aware of the key role played by TV advertising and media in affecting their purchasing behaviour and perceptions around protein quality. While palatability and taste appear not to be issues associated with the consumption of plant-based proteins, price inaccessibility as well as a lack of interest in going plant-based are crucial obstacles faced by respondents.

There is a limitation of generalising the data from the current study as many of the millennials have university education. Due to the educational selected population we have many respondents identifying as flexitarian, and are knowledgeable on plant-based proteins.