

## CONSUMPTION OF NOODLES AND UTILIZATION OF AMARANTHUS AT THE UNIVERSITY OF ZULULAND, SOUTH AFRICA

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### ABSTRACT

Over the years there have been significant increases in the global consumption of instant noodles. This trend has been notable among young people in colleges and is due to the convenience attributes associated with the product. Overconsumption of instant noodles is however said to compromise consumer health, especially when used as the main meal. *Amaranthus* is one of the most abundant traditional vegetables in South Africa and a good source of nutrients. However, the vegetable is underutilized and is often overlooked compared to exotic vegetables. The main objective of this study was to investigate the patterns of instant noodles consumption and utilization of *Amaranthus* among students at the University of Zululand. This was done to gauge the potential for using *Amaranthus* to improve the nutritional profile of noodles. A quantitative research approach was followed by using self-administered questionnaires. One hundred students were sampled using a quota sampling method. Results showed that a majority of the students (96%) were active consumers of instant noodles. Convenience and cost-effectiveness remain the major drivers of high instant noodles consumption among these students. About 76% students had knowledge of *Amaranthus*, however only 71% were consumers or had at least consumed *Amaranthus* in the past. The majority (92%) of participants used *Amaranthus* fresh leaves when cooking the plant while 4% used it in a powdered form. *Amaranthus* was therefore a familiar traditional leafy vegetable. However, its regular consumption as a vegetable was low due to stigmatization. Indigenization of noodles using *Amaranthus* as a supplement can be used as an intervention to improve nutritional value and optimise consumption of the vegetable.

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### INTRODUCTION

About 96 billion portions per capita of instant noodles are eaten worldwide every year

(Sikander *et al.* 2017). According to a survey done in 2015, China lead the statistics with 38 520 million servings whilst South Africa held the number 29 position out of 54 countries with 200 million servings (WINA 2017). A significant increase in consumption is notable among young people especially students (Sikander *et al.* 2017; Zahrul-lail 2017). According to research, instant noodles were preferred because of their taste, extended shelf-life, cheapness as well as convenience, all of which suits the busy lifestyle of the student population (Cotti & Tefft 2013, Phakare *et al.* 2018; Sikander *et al.* 2017). However, it has been argued that instant noodles were not always a healthy food choice (Cotti & Tefft 2013). There was a concern in terms of the adequacy of nutrients obtained from instant noodles especially when consumed as a single food item meal. Their use can lead to malnutrition if consumed frequently and may be detrimental to the health of young women (Annigan 2018; Huh *et al.* 2017; Sikander *et al.* 2017). *Amaranthus* is one of the abundant traditional vegetables, which is a good source of nutrients such as proteins, vitamins and minerals in South Africa (DAFF 2010). However, its underutilization persists because of negative consumer perceptions (for example, as food for old people, poverty food, and old-fashioned food) (Alegbejo 2013; Ramdwar *et al.* 2017). These negative perceptions affect preferences of this vegetable, especially among young people. This study therefore was aimed at determining the patterns of instant noodles consumption and utilization of *Amaranthus* among university students. This was undertaken to gauge the potential of using *Amaranthus* leaf powder to improve the nutritional profile of instant noodles. Fortification of food products with ingredients such as flours/powders from root tubers, legumes and other unconventional sources is gaining popularity in the food industry. This can have a positive impact on the functional, physicochemical and nutritional properties of developed products (Noorfarahzilah *et al.* 2014). In the current case, this would contribute towards indigenizing instant noodles, which were originally from Asia (Zahrul-lail 2017). Such a study is necessary as studies done on improving instant noodles have cautioned that when replacing or introducing ingredients, the consumers should be familiar with it (Barcelon *et al.* 2015; Mnkeni *et al.* 2007; Phakare 2018).

## MATERIALS AND METHODS

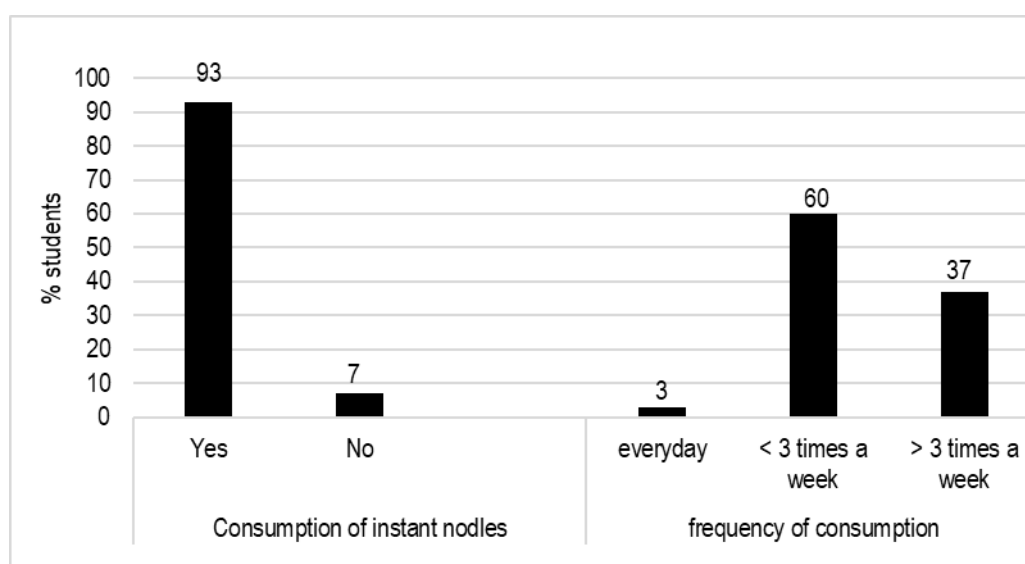
Students at the University of Zululand were surveyed to determine noodle consumption patterns. This rural University enrolls students mostly from the surrounding areas where there is access to *Amaranthus* vegetables but at the same time forms part of the student population consuming nutrient-deficient convenience foods (Unizulu Facts and Figures 2018/19). A quantitative research approach was followed when conducting the study. A total of 108 students were sampled and filled in the questionnaire using the Quota sampling method as defined in Welman *et al.* (2005). The students came from four faculty divisions and were categorized according to where they reside, i.e. selected from those living in on-campus residences and off-campus private or university residences. A self-administered questionnaire was designed and piloted with 10 students, after careful revision it was used to collect data on utilization of instant noodles and *Amaranthus*. The questionnaire was divided into 3 sections: demographics, consumption of noodles and utilization of *Amaranthus*. Of the 108 questionnaires that were used, only 100 were included in data analysis. Excluded questionnaires were incomplete.

### Participants' demographics

The sample was mainly comprised of individuals of ages between 19 and 30 years, which are considered the target market population for the product. Of the sampled population, there were more females (61%) than males (39%) participating in the study (Table 1). This ratio is a reasonable reflection of the student gender distribution of the University of Zululand, where women comprise 57.3% and men 42.7% of that population (Unizulu Facts and Figures 2018/19). Forty-one percent of the students sampled were final-year undergraduate students, while 26% were postgraduate students. This represents the group that had been at the university for quite some time and had the busiest academic schedule. Moreover, this particular group gives an insight into the food culture at the university. In terms of residence conditions, a bigger portion of the participants lived in off-campus residences. Students living both on-campus and off-campus had the primary responsibility to purchase their own groceries as the University

**TABLE 1: DEMOGRAPHICS OF PARTICIPANTS**

Variable	Attributes	Total of participants (n)	Percentage (%)
Gender	Male	39	39
	Female	61	61
Age	19-25 years	83	83
	26-30 years	10	10
	Above 30 years	7	7
<b>Education</b>			
Faculty	Arts	20	20
	CAL	8	8
	Education	30	30
	Science & Agriculture	42	42
Level of study	First year	9	9
	Second year	9	9
	Third year	15	15
	Final year	41	41
	Postgraduate	26	26
Residence	On campus	39	39
	Off-campus	61	61
Income	NSFAS	63	63
	Parents allowance	10	10
	Other	24	24
	Mixed	3	3

**FIGURE 1: CONSUMPTION FREQUENCY OF INSTANT NOODLES. N=100**

did not have any working system to provide students with meals for example, dining halls. A large portion of the participants (63%) depended on the National Student Financial Aid Scheme (NSFAS) allowance (R1500 per month) as a source of income in the year 2018. Only 3% received more than one income e.g. from parents as well as through part-time jobs. The rest of the participants, especially postgraduate students, were dependent on bursaries for both accommodation and subsistence.

#### **Ethical considerations**

An informed consent form with all the details of the research, and explaining the purpose, was administered. It was explained to the respondents and they signed as an indication of agreeing to participate in the study. Respondents were assured of privacy and anonymity when data are reported.

## RESULTS AND DISCUSSION

### Instant noodles consumption and frequency

A majority (93%) of the participants consumed instant noodles (Figure 1). About 37% of the students were consuming instant noodles more than three (3) times a week, but only 3% ate noodles every day and the remainder (60%) consumed noodles less than three times a week. An average of 8 packets per month, was being consumed by the total majority. By gender, females consumed an average 3 packets per month which was less than the average of 5 consumed by males. Although males were less than females in terms of participation, the fact that each male prepared at least 2 packets at once for a single meal justifies their high average in this instance against females who always consume 1 packet on each meal. These findings are similar to those of (Chung *et al.* 2010) indicating high noodle consumption amongst students. Students who resided in off-campus private residence consumed instant noodles more often, twice as much, as those residing on the campus. This may be due to limited time to prepare meals as students have to walk considerable distances to attend classes. University of Zululand is a rural based institution. Students who stay off campus are disadvantaged since they cannot go back to their residences between classes for meals like those residing on campus because of the distance, hence they must eat something in the morning, noodles being an easy to prepare and cheaper option available to them. The high consumption of noodles trend observed in this study confirms the findings reported by Nelson *et al.* (2009), Sikander *et al.* (2017) and Zahrul-lail (2017) who noted a similar trend among students at higher learning institutions.

### Noodle accompanying foods

As Figure 2 shows, 58% of the participants mainly ate noodles without any other nutritious food items and about 14% consumed noodles with ingredients such as chicken, fish, boerewors/sausage, mayonnaise, sauces, cheese and even bread; while 18% combined them with eggs and 10% combined them with vegetables. According to the World Health Organization (WHO) (2014), most consumers do not combine instant noodles with any vegetables

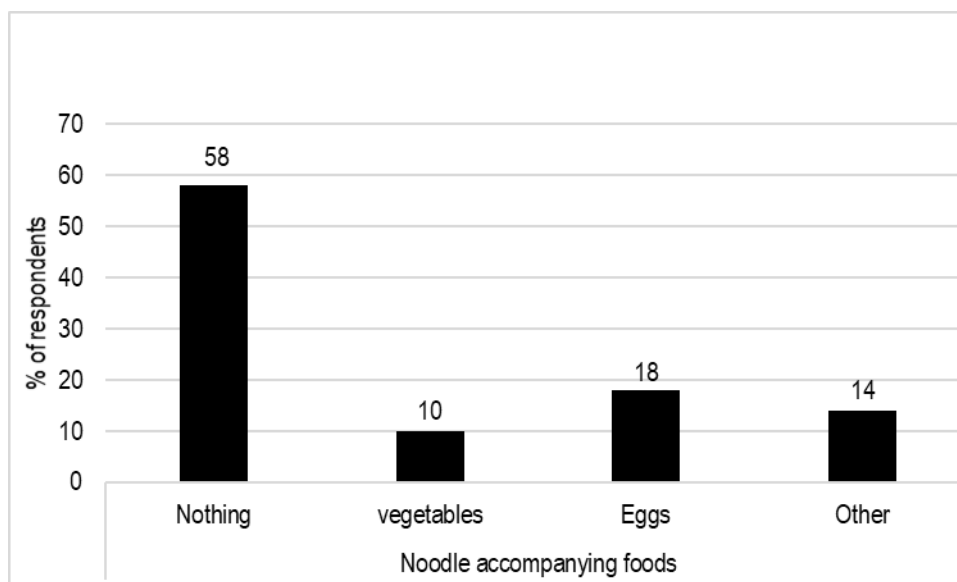
or protein sources to improve their nutritional value. This study suggests that protein source (mainly eggs) is more popular than vegetables in the South African context. A smaller portion of participants combined noodles with vegetables, as they found vegetables expensive. The study of Carlson *et al.* (2012) also found that consumers found vegetables expensive against other food groups. The short shelf life of vegetables also demands that students must constantly buy vegetables every now and then, which is expensive for them.

Literature has raised concerns about the nutritional value of instant noodles, as they are regarded as a 'hunger filling food' containing few nutrients. Noodles are notorious for being low in fibre and proteins, having high amounts of sodium, and exposing the consumer to risks of metabolic diseases and malnutrition (Shin *et al.* 2014). Pekcan (2013) argued that consumption of monotonous starch-based diets is related to a high prevalence of malnutrition among the youth. There is a need to take a closer look at the ingredients used in the production of *noodles and manage the food and nutrition security issues associated with noodle consumption* (Eddyono and Subroto 2014). *In themselves, noodles are not a balanced food. A diversified meal is required to provide nutrition security for consumers.*

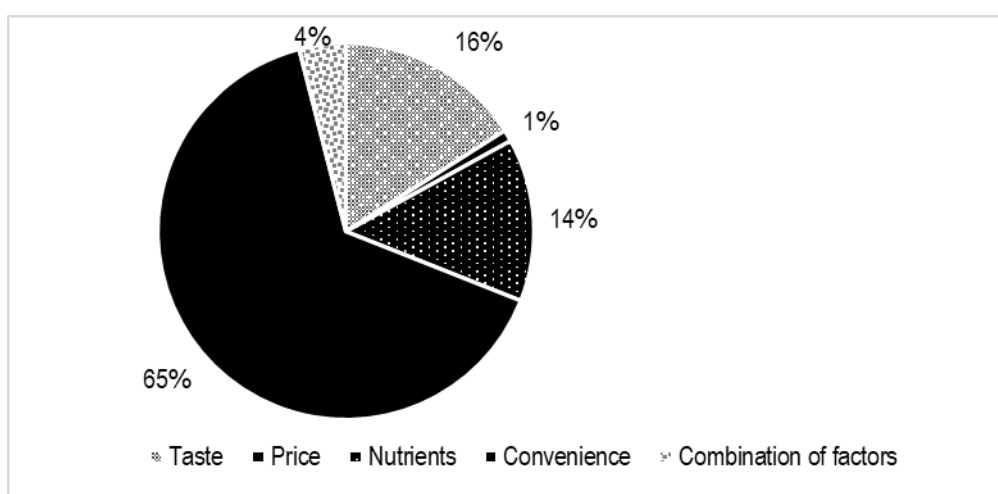
### Reasons for consuming instant noodles

There were various reasons influencing participants' consumption of instant noodles. Sixty-five percent of participants consuming them indicated that the main attribute that influenced their decision was the convenience of the food as noodles have a long shelf life and are quickly prepared (Figure 3). According to Tan *et al.* (2016), instant noodles saved students time to prepare foods due to their busy academic schedules. (Shin *et al.* 2014; Zahrul-lail 2017) reported similar findings.

About 16% and 14% students reported taste and the nutritional value respectively, of noodles as part of the important factors influencing consumption. Although nutrition was not a dominant factor, recent literature reports an increased demand for healthy instant foods among the health-conscious groups (RightChoice 2014). In the survey by Right



**FIGURE 2: INSTANT NOODLES FOOD ACCOMPANIMENT. N=100**



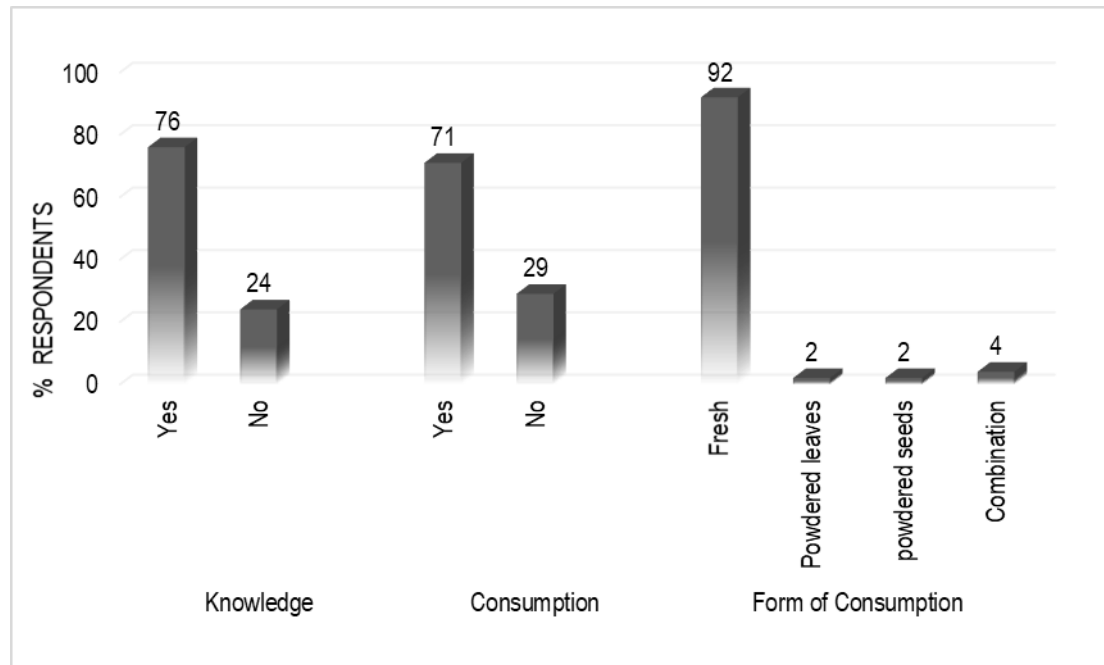
**FIGURE 3: REASONS FOR THE CONSUMPTION OF INSTANT NOODLES. N=93**

Choice (2014), flavour was identified as the major driver towards purchasing specific noodles. This is important to consumers as some have developed a loyalty to, and preference for, flavours of noodles. In this study, preferred flavours varied from beef to vegetable (such as spinach and mushroom) flavoured instant noodles. According to literature, it must be noted that the consumers often confuse flavour with the actual presence of the flavouring as the major ingredient. This is because the production processes for flavouring differ with each brand, of which with others, artificial flavouring ingredients in conjunction with lots of salt and fat are used over natural ingredients

(Bloom 2017). Price and brand of instant noodles were some of the least notable influential factors that were noted in this study. The price of noodles makes them a competitive carbohydrate food. Although the brand had a role in the preference for noodles, consumers really did not find much of a distinct difference between brands except in the fact some brands were considered as 'trusted brand'.

#### **Utilization of Amaranthus**

Due to the recent concerns of the increasing rise in noodle consumption, research has recommended supplementation or fortification of



**FIGURE 3: UTILIZATION OF AMARANTHUS. N=100**

noodles. Many countries including the Philippines have opted to fortify the noodle seasoning rather than the flour (Gulia *et al.* 2014). A study by Gulia *et al.* (2014) encouraged interventions that explore ways to fortify instant noodles with essential micronutrients like vitamins, minerals, fibre and other components that enhance the nutritional value. Wheat flour is the most prominent ingredient used in making instant noodles and this can be supplemented with a range of materials that can boost its nutritional contents. As shown in Figure 4, the majority of the students (76%) had knowledge and knew the *Amaranthus* vegetable. *Amaranthus* leaves were described as a traditional green leafy vegetable that grows in the wild, food that is usually cooked in rural homesteads, a healthy herb and isishebo (a relish) that is usually cooked by mothers.

Amongst the 76% that had knowledge on *Amaranthus*, 71% were consumers or have at least consumed *Amaranthus* once in their life. The majority (92%) of participants used *Amaranthus* fresh leaves when cooking the plant. There were a few (4 %) participants who mentioned using *Amaranthus* in the form of powdered dry leaves and grains. It was evident that although participants were familiar with *Amaranthus*, others going as far as acknowledging its nutritional benefits, very few were consuming the product as a staple food.

As reported in the literature, in South Africa there is a decline in the consumption of traditional leafy vegetables especially among young people (Nyembe 2015). This study confirmed that students had a similar reluctance in relation to *Amaranthus* consumption. Most of the participants mentioned that they preferred exotic vegetables such as spinach and lettuce over traditional vegetables. Although, there is a reported decline of *Amaranthus*, secondary consumption of the vegetable as a wheat supplement to prepare noodle composite food could improve the utilization of the vegetable and consequently improve the food and nutrition security for consumers.

#### Product innovation

As can be noted from the above results, majority of students consumed instant noodles as a single meal and did not pair it up with any vegetables or proteins. This put them at risk as it was noted that consumption of noodles as a single meal could lead to malnutrition if consumed regularly (Annigan 2018; Huh *et al.* 2017; Sikander *et al.* 2017). Noodles are among the most popular consumed starch food by young adults and children in SA, and have now surpassed the preference of maize in this particular population segment competing with bread that has been fortified (WINA 2017). Based on this study, there is a case for

indigenizing noodles by supplementing them with *Amaranthus* which is an available, highly nutritious & indigenous or traditional crop. The researcher has, therefore, developed *Amaranthus*-based noodles by using *Amaranthus* leaves to form a composite flour which was incorporated with the wheat flour to come up with a product that not only has improved nutritional value but can also be used as a strategy to re-introduce the leafy vegetable to the young people who have widely rejected the vegetable for various reasons. The product is to be taken through various tests including nutritional, physical and sensory analysis in order to investigate its acceptability - an important aspect of product development.

## CONCLUSION

It is concluded that about 93% of student sample at the University of Zululand were active consumers of instant noodles. The consumption ranged from 2 packets per week to 8 packets per month. Males were dominant in the average consumption as they prepared and consumed more than one packet of noodles at once for a single meal. Most students did not eat noodles with vegetable or proteins and considered convenience as the major driver towards the purchasing and consumption of noodles. Most students had knowledge of what *Amaranthus* was, however of those the majority consumed the vegetable when they are at home but not when they are at school. This showed that the consumption of *Amaranthus* amongst the young people remains low. So, there is a need to re-introduce the plant and encourage its consumption. In this regard, addition of Amaranth leaf powder on instant noodles during production is a potential strategy to address nutritional deficiencies in noodles as well as promoting the consumption of the vegetable among young people. Sensory evaluation is however necessary to determine the acceptability of the product.

## ETHICAL CLEARANCE

Ethical clearance for the study was attained from the Biomedical Research Ethics committee (BREC Ref no: BE453/19) at the University of KwaZulu-Natal. Permission to work with the

student population was obtained from the University of Zululand's Deputy Vice Chancellor of Research and Innovation and the Department of Consumer Sciences.

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