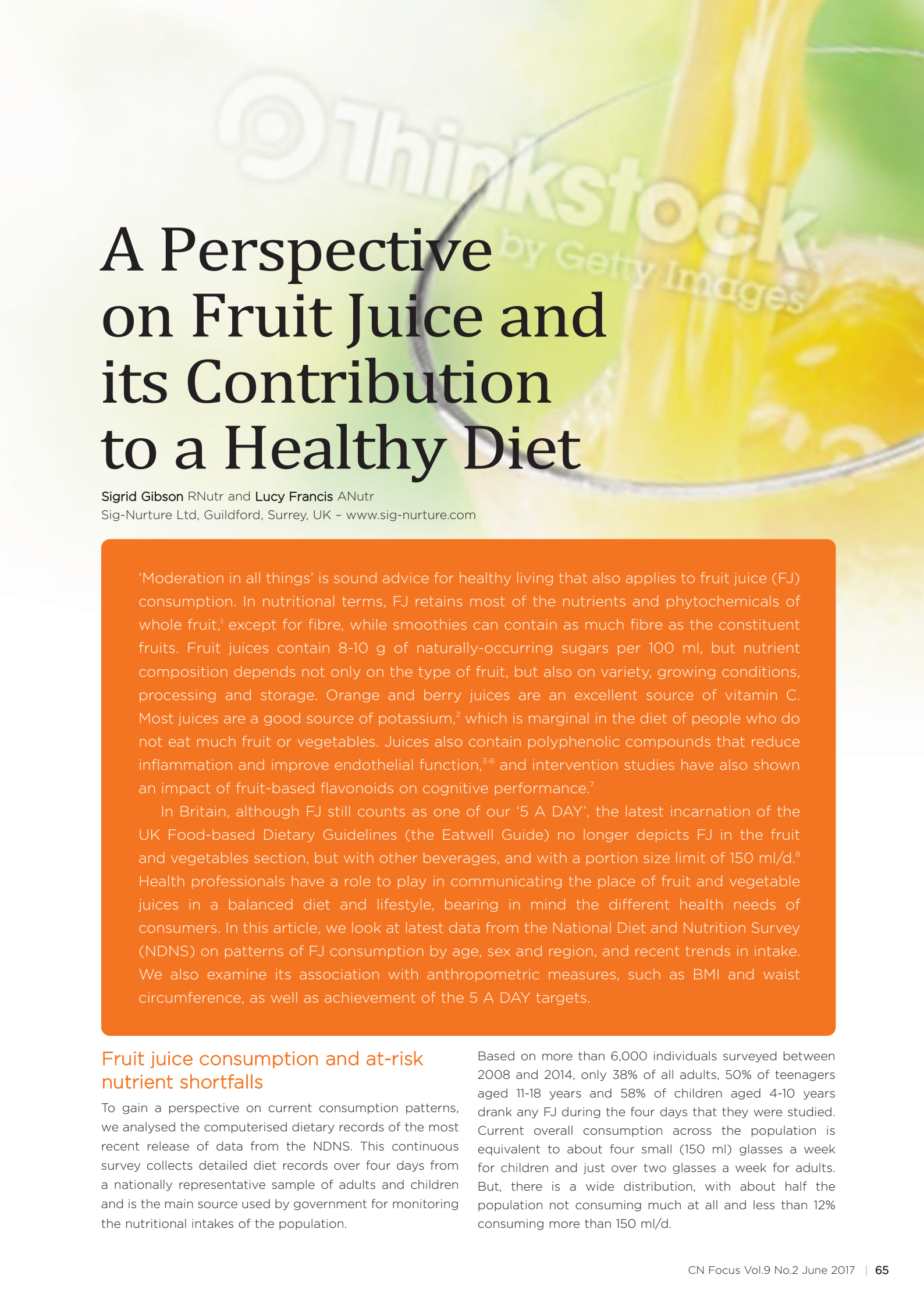




A Perspective on Fruit Juice and its Contribution to a Healthy Diet

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'Moderation in all things' is sound advice for healthy living that also applies to fruit juice (FJ) consumption. In nutritional terms, FJ retains most of the nutrients and phytochemicals of whole fruit,¹ except for fibre, while smoothies can contain as much fibre as the constituent fruits. Fruit juices contain 8-10 g of naturally-occurring sugars per 100 ml, but nutrient composition depends not only on the type of fruit, but also on variety, growing conditions, processing and storage. Orange and berry juices are an excellent source of vitamin C. Most juices are a good source of potassium,² which is marginal in the diet of people who do not eat much fruit or vegetables. Juices also contain polyphenolic compounds that reduce inflammation and improve endothelial function,³⁻⁶ and intervention studies have also shown an impact of fruit-based flavonoids on cognitive performance.⁷

In Britain, although FJ still counts as one of our '5 A DAY', the latest incarnation of the UK Food-based Dietary Guidelines (the Eatwell Guide) no longer depicts FJ in the fruit and vegetables section, but with other beverages, and with a portion size limit of 150 ml/d.⁸ Health professionals have a role to play in communicating the place of fruit and vegetable juices in a balanced diet and lifestyle, bearing in mind the different health needs of consumers. In this article, we look at latest data from the National Diet and Nutrition Survey (NDNS) on patterns of FJ consumption by age, sex and region, and recent trends in intake. We also examine its association with anthropometric measures, such as BMI and waist circumference, as well as achievement of the 5 A DAY targets.

Fruit juice consumption and at-risk nutrient shortfalls

To gain a perspective on current consumption patterns, we analysed the computerised dietary records of the most recent release of data from the NDNS. This continuous survey collects detailed diet records over four days from a nationally representative sample of adults and children and is the main source used by government for monitoring the nutritional intakes of the population.

Based on more than 6,000 individuals surveyed between 2008 and 2014, only 38% of all adults, 50% of teenagers aged 11-18 years and 58% of children aged 4-10 years drank any FJ during the four days that they were studied. Current overall consumption across the population is equivalent to about four small (150 ml) glasses a week for children and just over two glasses a week for adults. But, there is a wide distribution, with about half the population not consuming much at all and less than 12% consuming more than 150 ml/d.

Girls consume less FJ than boys, even from an early age. Since girls have higher levels of dietary inadequacy, especially in the teenage years, they might benefit most from the nutrients provided by FJ. For example, FJ provides more than half the recommended intake of vitamin C, which increases the bioavailability of non-haem iron from foods consumed in the same meal.⁹ Given that nearly half of all teenage girls have very low iron intakes (below Lower Reference Nutrient Intake [LRNI]), 22% have low iron stores and 5% have iron deficiency anaemia,¹⁰ one useful public health message could be suggesting that girls and young women consume a fortified cereal for breakfast with a small glass of juice, rather than tea, which can inhibit iron absorption. Other nutrients low in teenage diets (and those of young women) include folate, potassium and magnesium, and FJ can be a helpful source of these, especially where fruit and vegetable consumption is low. The potassium content of FJ also helps to counterbalance sodium, which continues to be a nutrient of excess in most diets.

With regard to dental health, responsible advice to reduce erosion would be to consume drinks with meals, rather than sipping throughout the day, and to use a straw if possible. However, according to an American study of more than 2,200 pre-school children taking part in the National Health and Nutrition Examination Survey (NHANES), FJ was not associated with early childhood caries, even after adjusting for confounding factors.¹¹

Regional differences in consumption of fruit and vegetables and fruit juice

Overall, only 29% of UK adults and a mere 8% of teenagers achieve five portions a day. Delving deeper, the average number of portions of fruit and vegetables consumed (with the accepted limits to amounts of FJ, pulses and dried fruit), was highest in London and lowest in Northern Ireland (Figure 1).

There are also geographical differences in juice consumption, with people in Northern Ireland and Wales having the lowest consumption of FJ in the UK (Figure 2). Fruit consumption also appears to be lowest in Northern Ireland and the North East of England, and highest in London and the South West. By age group, the results suggest that teenagers in West Midlands, younger adults in Yorkshire

and middle-aged adults in Wales and Northern Ireland had lowest intakes of juice; although, differences should not be interpreted too literally as samples were small at this level of stratification.

Thus, there is a clear need to improve consumption of fruit and vegetables of all types, especially for teenagers and children. Fruit Juice is proportionately more important as a source of fruit and vegetables for these groups and could boost nutrient intakes for reluctant consumers of fruit, especially if consumed in place of other caloric beverages of low nutritional value.

Furthermore, teenagers who consume FJ are twice as likely to achieve 5 A DAY as non-consumers (11% vs. 5%). Fruit juice is associated with higher, not lower consumption of fruit and vegetables, not including the contribution from FJ itself (Figure 3). Thus, consumption of FJ has a direct effect (via its contribution to up to one portion of 5 a day) as well as being a marker of better diet quality and compliance with recommendations. Other studies have also demonstrated that consumers of FJ tend to have diets significantly richer in micronutrients and to be at less risk of dietary inadequacy.¹²⁻¹⁶

Figure 1: Regional Differences in 5 A DAY Portions

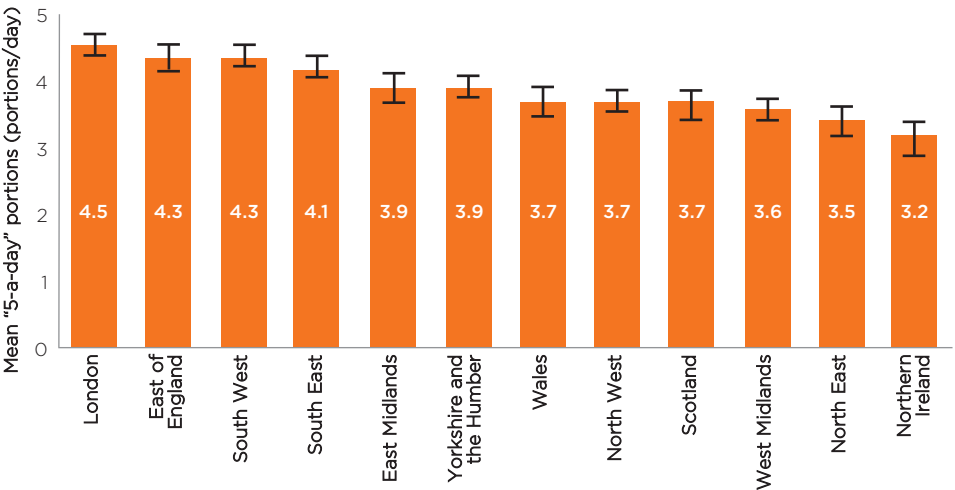


Figure 2: Fruit and Vegetable, and Fruit Juice Consumption by Region in the UK

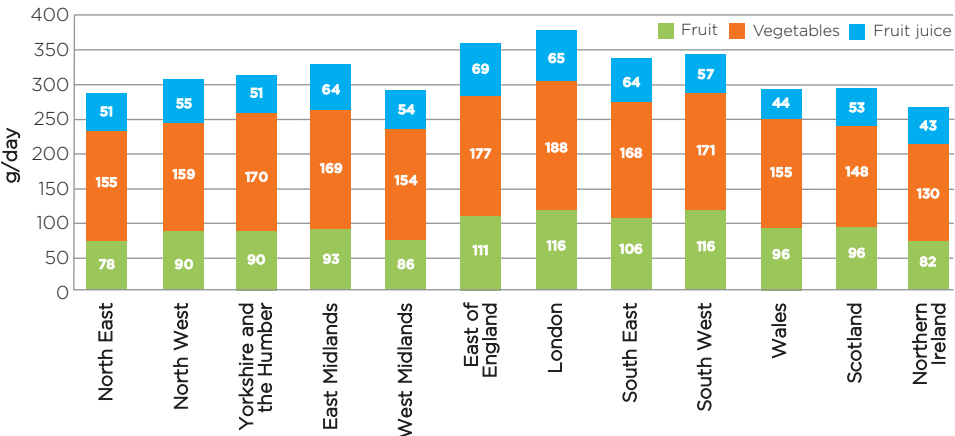
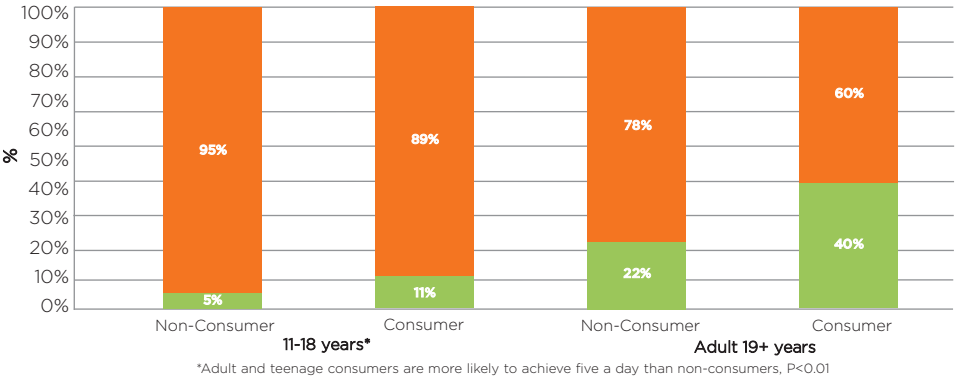


Figure 3: Achievement of 5 A DAY Target in Consumers and Non-Consumers of Fruit Juice



At the other end of the age spectrum, the over 60s consume the least FJ but also tend to have higher fruit and vegetable intakes than younger adults. For those of advanced age, poor dentition may have an adverse impact on consumption of whole fruit; hence, FJ could provide a more nutritious alternative to other beverages whilst also supporting hydration.

Trends in fruit juice consumption

Fruit juice consumption declined in the last two years of the NDNS (2012-14) in 4-10 year olds in particular (by 27%, from 92 g/d to 67 g/d). This may be of concern as it there is no evidence that children are eating more whole fruit instead. Among adults there was a smaller reduction in FJ consumption (by 12%, from 49 g to 43 g/d), also with no change in fruit and vegetable consumption. If these trends continue the proportion of people reaching the recommended minimum of 5 A DAY will be decreasing rather than increasing.

Health indicators and fruit juice

Adult FJ consumers had significantly lower body mass index (by >1.1 units) and waist circumference (by >2.7 cm) compared to non-consumers (see **Figures 4 & 5**). As this is a cross-sectional study, a direct impact of FJ cannot be proven, so the association could be due to reverse causality, with healthy food choices and more active lifestyles among FJ consumers. However, our results are consistent with other studies suggesting that normal consumption of FJ is not associated with being overweight. In the DONALD study, FJ consumption in pre-school children was inversely associated with other beverages and was uncorrelated with anthropometric indices.¹⁷ More recent and larger studies have reported no increased risk of obesity in children associated with consumption of

100% orange juice.¹²⁻¹⁸ One cohort study among adults found a minor association between change in FJ consumption and body weight, but the effect size was only 150 g over four years.¹⁹ More significantly, in clinical intervention studies, adding FJ to a habitual or study diet did not result in weight change, suggesting that individuals compensated with other dietary choices.² The recent review of 22 studies by Crowe-White *et al.* concluded that evidence did not support an association between 100% FJ consumption and weight/adiposity in children after controlling for energy intake.¹⁴

Conclusions

Fruit juice provides a significant boost to total fruit and vegetable consumption, especially for adolescents, who are the lowest consumers of fruit and vegetables. Even so, only 11% of teenage FJ consumers achieved the 5 A DAY target. Clearly,

other imaginative ways need to be found to encourage fruit and vegetable consumption in this age group via composite dishes and sensible swaps. Replacing toast, jam and a hot drink with (non-sugary) breakfast cereal and FJ would improve dietary quality and nutrient density. There may also be opportunities for the FJ industry to develop and promote juice varieties and blends with a lower natural sugar content. In our analysis of all six years of the NDNS, FJ did not appear to displace consumption of whole fruit and was associated with higher intakes of micronutrients and lower adiposity among adults. From current evidence, moderate consumption of FJ should be positively encouraged on nutritional grounds; especially as, currently, less than half the population consumes FJ regularly.

Figure 4: BMI in fruit juice consumers and non-consumers

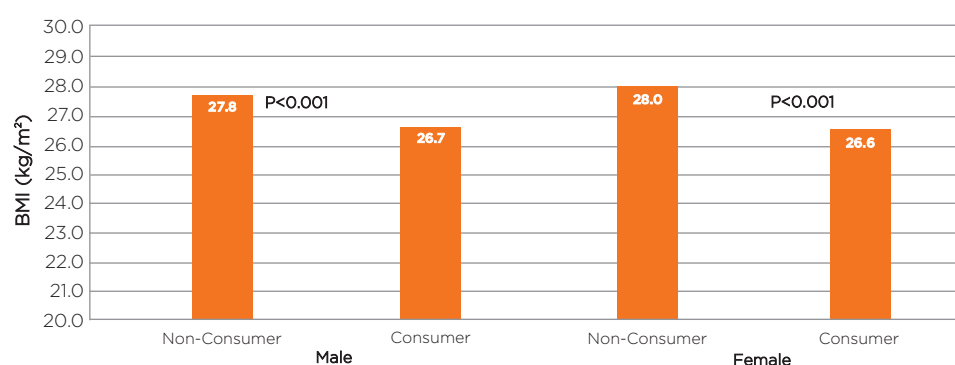
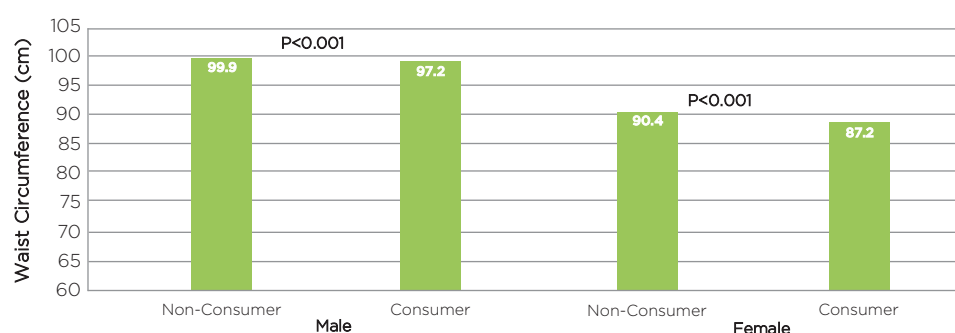


Figure 5: Waist Circumference in Fruit Juice Consumers and Non-consumers



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