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“Will the Implementation of a Sugar Tax Reduce Obesity Levels? An Insight from Scotland”

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Abstract

Obesity places a strain on health services and leads to premature death due to its association with cardiovascular disease (Akabus et al. 2012). Sugar-Sweetened Beverages (SSBs) have been identified by public health experts as a major contributor to sugar consumption and a crucial factor in childhood obesity. The Soft Drinks Industry Levy (SDIL) is a key part of the UK Governments childhood obesity strategy and the main purpose of this study is to assess whether the introduction of the SDIL or sugar tax can be successful in reducing the obesity levels in Scotland. As it was identified that obesity levels were higher in low socio-economic areas, this research has focussed on a survey of residents from North Ayrshire, which is a low socio-economic area in rural Scotland. A questionnaire was developed and collected from 64 people (32 males and 32 females). The purpose of the questionnaire was primarily to identify the consumers who may be directly affected by a sugar tax, then question them on their attitudes, values and beliefs concerning the SDIL. Previous literature examined consisted of research undertaken in America, Mexico, and Hungary, with a focus on age (Briggs et al. 2013) and household income (Zhen et al. 2011). Prior sugar tax studies carried out assessed groups based on age and household income (Finkelstein et al. 2010; Powell and Chaloupka, 2009). However, there are few relevant studies based on gender. To evaluate if a sugar tax in Scotland would be successful in reducing obesity levels, it was identified that there was a significant gap in existing literature. This study has aimed to offer an insight into the current gap within academic literature by surveying consumers in Scotland by analysing gender, age and household income. This study also adds a contribution to this field of research as the survey presents a significant difference in consumer behaviour, knowledge, awareness and values concerning obesity and the differential rates of sugar tax between males and females in Scotland. The results of the survey provide an insight into the potential effects of the SDIL but it is unclear whether it will have any significant impact on obesity levels within Scotland. Whilst higher tax rates may have a better probability of decreasing demand for SSBs, it is considered essential that lower income groups access to healthy options are increased, making the healthy choice easier for consumers; better education about obesity and the associated risks to health are delivered to children from an earlier age to increase awareness; more robust campaigns are targeted at most unaware group, identified by this research as the males. This study has implications for policy makers, the soft drinks industry and the academic arena as it demonstrates that differing levels of awareness, different values and beliefs between different socio-demographic groups that have the potential to impact upon policies that are attempting to change consumer behaviour as with the UK SDIL. Limitations concerning the results of the study are the location, as North Ayrshire is only a small area within Scotland; the size of the sample surveyed; limited access to academic literature; and that consumer responses may not be an accurate portrayal of consumer behaviour. Future researchers could gain further insights from increasing the sample size of people surveyed within Scotland at the point when the UK SDIL commences as this may provide a more accurate response from the consumers pertaining to their actual behaviour as opposed to their potential behaviour.

Keywords:

Obesity, Scotland, Soft Drinks Industry Levy, Sugar Sweetened Beverages, Sugar Tax

1.0 Introduction

Obesity places a strain on health services and leads to premature death due to its association with cardiovascular disease and the two major lifestyle factors associated with the growth of obesity are physical inactivity and poor diet (Akabus et al. 2012). In the UK for the year 2015, 65 per cent of adults aged 16 and over were overweight, including 29 per cent who were obese. There has been an increase in the proportion who are overweight or obese among both sexes (aged 16-64) since 1995, from 52 per cent to 62 per cent. Most of this increase occurred between 1995 and 2008, with figures remaining broadly stable henceforth (Keenan, Grant and Ramsey, 2016). In 2015, 15 per cent of children aged 2 to 15 were at risk of obesity, with a further 13 per cent at risk of overweight. Since 1998, the proportion of children aged 2-15 at risk of being overweight (including obesity) has fluctuated between 29 per cent and 33 per cent, and was 28 per cent in 2015 (Keenan, Grant and Ramsey, 2016). Dobbs et al. (2014) suggest that the cost of obesity in the UK is approximately £16 billion per annum, which is the equivalent of three per cent of GDP.

Younger generations are becoming obese at earlier ages and staying obese for longer. The number of children admitted to hospital for obesity and related conditions has quadrupled in the last decade. However, there has been a 3 per cent reduction in 2-15 year olds at risk of overweight and obesity, between 2014 and 2015, and the Scottish Government argue this demonstrates that other obesity prevention measures are effective (Keenan, Grant and Ramsey, 2016). In addition, evidence has shown that children in Scotland are consuming too much sugar which causes increases in weight gain and obesity. Sugar consumption is also a leading cause of tooth decay in children, with tooth extractions now the main reason for hospital admissions for children aged 5 – 9 years (HM Revenue and Customs (HMRC), 2016).

Sugar-Sweetened Beverages (SSBs) have been identified by public health experts as a major contributor to sugar consumption and a crucial factor in childhood obesity. Consuming one ordinary 330 millilitres can of cola takes a child over their recommended daily intake of sugar for the day. A typical can of cola contains 35g of sugar, whereas HM Treasury (HMT), HMRC, and Department of Health (DH) (2016) believe a five-year-old should have no more than 19g of sugar in a day. Announced at the Budget in March 2016 was a new levy on soft drinks; the Soft Drink Industry Levy (SDIL). This introduction requires companies from April 2018 to reduce added sugar content in their products with the objective of encouraging companies to reformulate their product mix (HMT, HMRC, and DH, 2016).

The main purpose of this study is to assess whether the introduction of the SDIL or sugar tax can be successful in reducing the obesity levels in Scotland. Previous literature examined consists of research undertaken in America, Mexico, and Hungary, with a focus on age (Briggs et al. 2013) and household income (Zhen et al. 2011). Prior sugar tax studies carried out assessed groups based on age and household income (Finkelstein et al. 2010; Powell and Chaloupka, 2009). To evaluate if a sugar tax in Scotland would be successful in reducing obesity levels, it was identified that there was a significant gap in existing literature in terms of gender related studies. This study will try to cover this gap by surveying consumers in Scotland by analysing gender, age and household income. This study adds a contribution to this field of research as the survey presents a significant difference in consumer behaviour, knowledge, awareness and values concerning obesity and the differential rates of sugar tax between males and females in Scotland. The paper is structured to provide a section that gives an overview of the SDIL followed by the research methodology, results and commentary from a small sample survey conducted.

2.0 SDIL Overview

The SDIL is a key part of the UK Governments childhood obesity strategy. The media labelled the SDIL as the sugar tax and thus both terms are used interchangeably throughout this research. HMT, HMRC and DH (2016) explain the rationale and objectives of the levy. The SDIL is aimed at producers and importers of SSBs, encouraging them to remove or reduce sugar content and promote diet drinks. The UK Government has taken advice from the World Health Organisation (WHO), who suggested that taxes are required to combat rising global obesity levels. To explain the SDIL *strategy*, the Government highlight that it is not increasing the price of SSBs. Companies can absorb the tax, thus do not have to pass the charge onto the consumers. The UK Government maintains that if the companies start producing healthier drinks, they will pay less tax or even zero. If total sugar content of five grams or more per 100 ml, the company will be charged 5 per cent tax and if the total sugar content of eight grams or more per 100 ml the company will be charged 8 per cent tax. The tax generated revenue has been promised, by this terms UK Government, to be spent on programs to encourage physical activity, balanced diets and other obesity related prevention actions. It is worth mentioning that drinks that contain calcium and other nutrients, that are crucial for a healthy diet, will also be exempt from the levy. Pure fruit juices do not contain added sugar and as such they will not be taxed (HMRC, 2016).

The UK has one of the highest obesity rates among developed countries, and arguably this situation is getting worse. By 2050, over 35 per cent of boys and 20 per cent of girls aged 6-10 are expected to be obese (Keenan, Grant and Ramsey, 2016). The estimated obesity-related costs to the NHS are over £6 billion with indirect costs being circa £10 billion (Dobbs et al. 2014). The main rationale behind the SDIL is that nutritionists have identified that SSBs contain more than the recommended daily sugar intake of a child and that sugar intake is a major cause of obesity (HMRC, 2016). *This explains the UK Government rationale in respect of the SDIL.* The UK Government firmly believe that the reformulation of SSBs is possible, as companies like Tesco, Robinsons and The Co-Operative have already taken positive steps towards this agenda. Taber et al. (2012) observed that middle schools in the US which had banned SSBs may have reduced in-school access, however they did not reduce overall consumption.

Regulations could be incorporated to prevent beverage companies marketing to children (Federal Trade Commission, 2006). In addition to the above, price has been identified to be a key element of food choices. Reducing prices of more healthy beverages may also be an effective strategy for reducing consumption of SSBs (Neumark-Sztainer et al. 1999). The American Public Health Association (APHA) (2012) state that there are compelling reasons to implement a tax on SSBs; spiralling health care costs and the escalating problem of obesity related diseases; research evidence suggests that a reduction in the consumption of SSBs may be accomplished by introducing a SSB tax; considerable revenue may be generated from taxes to tackle obesity and invest in other prevention methods. Brownell et al. (2009) agreed that a tax on SSBs was warranted since there was clear scientific evidence linking the consumption of SSBs to the risk of chronic diseases. It was acknowledged that the UK Government were justified in recouping health care costs associated with obesity linked diseases.

To decrease SSB consumption and promote the consumption of healthier options, the availability and accessibility of SSBs could be limited. In-school access to SSBs could be limited or the increased use of fast food restaurants could be addressed (Bleich et al. 2008). Furthermore, to *explain the purpose of the UK Governments intervention*, the SDIL is aimed directly at producers and importers, not consumers, because the UK Government believe that producers need to act, rather than just passing higher prices onto consumers. The UK Government highlights that a similar approach was successful in Hungary, where companies have attempted to remove unhealthy ingredients (HMT, HMRC, and DH 2016). The UK Government exclude the smallest operators from the SDIL. The purpose of this exclusion is to balance the administrative costs to HMRC of collecting the levy against the revenue likely to accrue from enforcing the levy below the threshold. It is worth mentioning here that the UK Government *is offering consultation* on the details of the SDIL, giving manufacturers time to reformulate their products, so they won't have a tax liability (HMRC, 2016). However, it will introduce new penalties and sanctions for failure to comply with the scheme. The UK Government aims to tackle the risk of fragmentation (abuse of the small operator exemption) from UK based soft drinks producers. Fragmentation is where larger companies might break up, enabling them to qualify for the small operator exemption (HMRC, 2016).

Having presented the aims, rationale and purpose of the SDIL, it is noted there are potentially several issues with the SDIL. Contrary to most studies, Niebylski et al. (2015) determined that a tax on SSBs would be problematic because the consumption of SSBs only accounts for a small proportion of the consumers' diets; substitutes for SSBs may be rich in calories; governments may not re-invest the revenue in obesity prevention; the poor may unfairly suffer the brunt of the tax. However, they believe that a tax on SSBs should still be considered as a public health measure, as it is likely to reduce consumption, raise awareness, and encourage the consumption of more healthier options, such as water or milk.

3.0 Research Methodology

The primary objective of this research is to assess whether the introduction of the SDIL in the UK will be successful in reducing obesity levels in Scotland. Previous literature examined consists of research undertaken in America, Mexico, and Hungary, with a focus on age (Briggs et al. 2013) and household income (Zhen et al. 2011). To evaluate if a sugar tax in Scotland would be successful in reducing obesity levels, it was identified that there was a significant gap in existing literature. This study will try to cover this gap by surveying consumers in Scotland by analysing gender, age and household income.

As it was identified that obesity levels were higher in low socio-economic areas, this research has focussed on North Ayrshire, which is a low socio-economic area in rural Scotland. The research strategy adopted belongs to the functionalist paradigm, where the ontological position is positivism, as reality was viewed as being external and something that cannot be affected, merely observed (Saunders, Lewis and Thornhill, 2012: 113-121). This leads into the epistemological position as that of an observer, where only credible facts and data can be relied upon. The axiological position follows on from this as the research would be conducted in a value-free manner, thus opinions are ruled out as they cannot be relied upon, nor are they credible facts with the overall approach being deductive (Saunders, Lewis, and Thornhill, 2012: 113-121). A questionnaire was

developed and collected from 64 people (32 males and 32 females). The purpose of the questionnaire was primarily to identify the consumers who may be directly affected by a sugar tax, then question them on their attitudes, values and beliefs concerning the SDIL.

The survey data obtained would allow for assessment of the likelihood that an increase in the price of SSBs would have a positive effect on Scotland's consumer behaviour, which is believed to be crucial to reducing the levels of obesity. Inter-relationships between categories such as – gender, age, household income, obesity awareness, attitude to weight gain, and price responsiveness were analysed. The survey was conducted using Qualtrics. The participants were contacted face-to-face, by phone, through social networks or via e-mail. To provide a fair, proportionate sample which would present more accurate and reliable results, 32 men and 32 women with varying ages and income were surveyed. Participants were questioned on three themes – behaviour, knowledge/awareness and values. The survey was conducted in North Ayrshire, a rural community in Scotland, with high unemployment and low socio-economic status. The 64 completed surveys were obtained from Qualtrics, and then results were analysed in 3 categories – gender, age, and household income. Relationships based on obesity awareness, attitude to a sugar tax, and consumer behaviour were formed for each category. Tables were created, comparing the 3 categories with a view to identifying trends in consumer behaviour.

4.0 Results

4.1 Aware that 2/3 of Scotland's population are overweight and a 1/3 are obese

When the authors linked it to gender, the results show that 68.75 per cent of males and 90.62 per cent of females were aware of the obesity levels in Scotland. Relating the awareness of obesity levels to age, the results show that 66.67 per cent from age group of 16-29; 91.30 per cent of age group 30-49, and 80 per cent of age group over 49 were aware of the obesity levels in Scotland. In addition, linking this to the income levels, the results show that 79.31 per cent of those who earn less than £20,000, 82.61 per cent of those who earn (£20,000-£45,000), and 75 per cent of those who earn over £45,000 were aware that 2/3 of Scotland's population are overweight and 1/3 are obese. In summary, the above results show that females, those in the age group of 30-49, and the middle-income group were more aware that 2/3 of Scotland's population are overweight, and 1/3 are obese. The least aware groups were males, those from the age group 16-29 group, and the high-income group.

4.2 Aware of the effects of obesity

When the authors linked it to gender, the results show that 56.25 per cent of males and 78.12 per cent of females were aware of the effects of obesity. Relating the awareness of the effects of obesity to age, the results show that 61.90 per cent from age group of 16-29; 73.91 per cent of age group 30-49, and 65 per cent of age group over 49 were aware of the effects of obesity. In addition, linking this to the income levels, the results show that 75.86 per cent of those who earn less than £20,000, 65.22 per cent of those who earn (£20,000-£45,000), and 50 per cent of those who earn over £45,000 were aware of the effects of obesity. In summary, the above results show that females, those in the age group of 30-49,

and the low-income group were more aware of the effects of obesity. The least aware groups were males, those from the age group 16-29 group, and the high-income group.

4.3 Believe that the consumption of SSBs is linked to childhood obesity

When the authors linked it to gender, the results show that 81.25 per cent of males and 65.62 per cent of females believed that the consumption of SSBs were linked to childhood obesity. Relating the consumption of SSBs relationship with childhood obesity to age, the results show that 57.14 per cent from age group of 16-29; 69.56 per cent of age group 30-49, and 95 per cent of age group over 49 believe that the consumption of SSBs were linked to childhood obesity. In addition, linking this to the income levels, the results show that 62.07 per cent of those who earn less than £20,000, 82.61 per cent of those who earn (£20,000-£45,000), and 83.33 per cent of those who earn over £45,000 believe that the consumption of SSBs were linked to childhood obesity. In summary, the above results show that males, those in the age group of over 49, the middle and high-income groups were most likely to believe that the consumption of SSB`s were linked to childhood obesity. The groups which were less likely to believe that the consumption of SSBs were linked to childhood obesity were females, those from the age group 16-29 group, and the low-income group.

4.4 Agree with the UK Government implementing a tax on SSBs on the basis that it will combat the growing childhood obesity epidemic

When the authors linked it to gender, the results show that 50 per cent of males and 50 per cent of females agreed with the UK Government implementing a tax on SSBs. Relating those in agreement with the UK Government`s tax on SSBs to age, the results show that 42.86 per cent from age group of 16-29; 17.39 per cent of age group 30-49, and 75 per cent of age group over 49 agreed with the UK Government implementing a tax on SSBs. In addition, linking this to the income levels, the results show that 37.93 per cent of those who earn less than £20,000, 47.83 per cent of those who earn (£20,000-£45,000), and 50 per cent of those who earn over £45,000 agreed with the UK Government implementing a tax on SSBs. In summary, the above results show that those in the age group of over 49, were the only group who clearly agreed with the UK Government implementing a tax on SSBs. The groups who clearly disagreed were females, those from the age groups 16-29 and 30-49, and those from the low and middle-income groups.

4.5 Make a conscious effort to reduce their consumption of SSBs

When the authors linked it to gender, the results show that 68.75 per cent of males and 68.75 per cent of females make a conscious effort to reduce their consumption of SSB`s. Relating consumer`s effort to reduce consumption of SSBs to age, the results show that 71.43 per cent from age group of 16-29; 56.52 per cent of age group 30-49, and 80 per cent of age group over 49 make a conscious effort to reduce their consumption of SSBs. In addition, linking this to the income levels, the results show that 68.97 per cent of those who earn less than £20,000, 65.22 per cent of those who earn (£20,000-£45,000), and 75 per cent of those who earn over £45,000 make a conscious effort to reduce their consumption of SSBs. In summary, the above results show that those in the age group of over 49, and the high-income group were more likely to make a conscious effort to reduce their consumption of SSBs. The least likely group was from the age group 30-49.

4.6 Would a price increase of 5 per cent, 10 per cent or 20 per cent, encourage consumers to stop purchasing their regular SSB

When the authors linked it to gender, the results show that 25 per cent of males and 43.75 per cent of females would be encouraged to stop purchasing their regular SSB, if a price increase was implemented. Relating the probability of a price increase encouraging consumers to stop purchasing their regular SSB to age, the results show that 52.38 per cent from age group of 16-29; 13.04 per cent of age group 30-49, and 40 per cent of age group over 49 would stop. In addition, linking this to the income levels, the results show that 48.28 per cent of those who earn less than £20,000, 26.09 per cent of those who earn (£20,000-£45,000), and 16.67 per cent of those who earn over £45,000 would stop. In summary, the above results show that females, those in the age group of 16-29, and the low-income group were more likely to stop consuming their regular SSB. The least likely groups were males, those from the age group 30-49 group, and the high-income group.

4.7 If the consumer declared that a price increase would deter them from purchasing an SSB, would they make a healthier change, such as doing without or switching to a healthier option

When the authors linked it to gender, the results show that 21.88 per cent of males and 28.12 per cent of females would make a healthier change. Relating a healthier change in SSB consumption to age, the results show that 33.33 per cent from age group of 16-29; 8.70 per cent of age group 30-49, and 35 per cent of age group over 49 would make a healthier change. In addition, linking this to the income levels, the results show that 27.59 per cent of those who earn less than £20,000, 26.09 per cent of those who earn (£20,000-£45,000), and 16.67 per cent of those who earn over £45,000 would make a healthier change. In summary, the above results show that females, those in the age groups of 16-29, the over 49, and the low and middle-income groups were more likely to make a healthier change. The least likely groups were males, those from the age group 30-49 group, and the high-income group.

5.0 Discussion

Prior sugar tax studies carried out assessed groups based on age and household income (Finkelstein et al. 2010; Powell and Chaloupka, 2009). However, there are few relevant studies based on gender. This study adds a contribution to this field of research as the survey presents a significant difference in consumer behaviour, knowledge, awareness and values concerning obesity and the differential rates of sugar tax between males and females in Scotland.

5.1 Customer Awareness

Pettinger (2015) explains that an SSB is a demerit good as the public may be unaware of the personal costs involved in sugar consumption; may be unaware that sugar has negative health consequences; or struggle to reduce consumption due to its addictive qualities. The average Scottish resident consumes 238 teaspoons of sugar per week – but often without realising as much of this sugar is ‘hidden’ in SSBs and other processed foods. This lack of awareness about sugar is an example of information failure – consumers not having full information to make informed choices based on the amount of sugar in certain foods or drinks and the harmful effects of sugar. Leslie (2016) identified that throughout the decades’

nutritional scientists who simply provide more evidence; offer stronger arguments; or represent more prestigious establishments; can manipulate consumers eating or drinking behaviour. Moreover, it was observed that due to the general lower price of SSBs, they have partly replaced milk as a main source of fluid consumption in the home. Therefore, as a means of promoting milk consumption and discouraging the use of SSBs, it was suggested that the price of SSBs should be increased (Yen et al. 2004).

5.2 Gender

It was observed that females were more aware than males of the percentage of overweight and obese adults in the UK, and the effects of obesity. Thus, it was surprising to learn that more males in the same survey thought that the consumption of SSBs were linked to childhood obesity. It may be perceived that females have other ideas of the probable causes of childhood obesity. Furthermore, fewer females than males agreed with the UK Government implementing a tax on SSBs, which supports the notion that a greater number of females believed that the consumption of SSBs was not the only factor to be considered when tackling childhood obesity. Research conducted by Devaux et al. (2011) found a direct linear relationship between education and obesity, with a greater education gradient in obesity stronger in females. This might explain the surveyed females having other ideas on the causes of obesity, since they had a greater awareness of the effects of obesity.

As fewer females than males were found to have tried to reduce their consumption of SSBs, it may be the case that the females surveyed, have less disposable income, making it more convenient to stick to the same cheap and convenient product. Moreover, it was found that females were more price responsive than males, suggesting that females had less disposable income or more females oversaw the household grocery budget. It was also observed that of the males and females who said they would stop purchasing their regular SSB, a greater percentage of the females would switch to a cheaper SSB. This suggests that the female decision is perhaps purely a financial one, rather than a health choice. This is interesting because although females are more aware of the effects of obesity, the survey suggests that a financial reason is more likely to change their consumer behaviour. Findings from Devaux et al. (2011) contradict this theory, as they found the more educated/aware an individual is, the more likely they are of making positive health choices, thus less likely they are of becoming obese.

5.3 Education levels

Research undertaken by Devaux et al. (2011) in Australia, Canada, England and Korea, suggests that individuals who spent more years in full-time education were less likely to suffer from obesity. England's education gradient in obesity was found to be stronger in women than in men, thus women were less likely to be overweight or obese. The authors found that the positive effect of education on obesity is likely to be determined by greater access to health-related information; clearer perception of the risks associated with lifestyle choices; and improved self-control. It was observed that the higher the individual's education relative to his or her peers, the lower the probability of the individual being obese. Thus, the effectiveness of various health programs working in conjunction would be a key factor in tackling obesity (Franck, Grandi, and Eisenberg, 2013).

5.4 Age

The survey showed that the 16-29 group were least aware of the percentage of obese adults and their effects. It is a relatively safe assumption that younger people are less concerned about their long-term health, as time is on their side. This would possibly make them less willing to learn about overall health statistics (WHO, 2017).

The 16-29 group also had the least percentage of participants who thought the consumption of SSBs were linked to obesity, with the over 49's having the highest. A potential reason for this may be that the oldest group show more awareness and a greater discipline in their diet. Also, a fair assumption is that the oldest group's consumption of SSBs will be a lot less than the youngest group's. Since the 16-29 year olds are known to consume more SSBs than any other adult group, they may wish to believe that the consumption of SSBs are not linked to obesity or do not care (Ogden et al. 2011). It was also observed that a significant percentage of the 16-29 group answered that they didn't know, which could possibly mean that not enough information on obesity is provided to children. Pettinger (2015) commented on this lack of awareness about sugar was an example of "information failure" – consumers not having full information to make informed choices on. Quinn (2015) also identified that as consumers become more aware of the "hidden" ingredients in products, they become more discouraging.

A greater percentage of the over 49's believed that the UK Government should implement a sugar tax, with the 16-29 group having the lowest. Possible reasons for these findings may be that the over 49's will be less affected by the tax, as their consumption is lower; the 30-49 group may have more disposable income, thus could afford a price increase; or the 16-29 group have less disposable income, and are also the largest consumers of SSBs. It was noticeable that the 16-29 group had the largest percentage who didn't care. This could suggest that the youngest group are not interested or have not been properly educated on obesity at school (Devaux et al. 2011: 140).

When asked whether the respondents made a conscious effort to reduce their consumption of SSBs, a larger percentage of the over 49's answered 'yes'. Interestingly, more of the 16-29 group answered that they had tried, but they found the SSBs to be cheap and convenient. It was observed that healthier products being generally more expensive than SSBs, made it more difficult for consumers to switch to a healthier product. It was also noticed that nearly half of the 30-49 group stated that they have not made any effort to reduce their consumption of SSBs. This could suggest that the consumption of SSBs are convenient for the 30-49 group, and that they may be just below the trigger point, where their health becomes a priority.

When respondents were asked if a 5 per cent price increase would encourage them to stop purchasing their regular SSB, the 16-29 group had the biggest percentage who answered 'yes', although it was only 1 in 7. Thus, a 5 per cent price increase had minimal effect on consumer behaviour. This appears to be consistent with other findings as Powell, Chriqui, and Chaloupka (2009) concluded that a 5 per cent price increase was insufficient to change consumer behaviour, and recommended that a substantial increase was required.

The survey's findings concur with a study by Bahl, Bird, and Walker (2003) which determined that a 10 per cent price increase would result in an approximate 11 per cent decrease in consumption. The groups' responses to a 10 per cent price increase were slightly higher with the 16-29 group

still having the largest percentage answering ‘yes’. However, it was noticeable that the over 49’s had the greater increase, and nearly all who said they would stop, would switch to a healthier option rather than a cheaper SSB.

This survey found evidence that some participants would in fact switch to cheaper alternatives. The groups’ responses to a 20 per cent price increase showed a greater rise in participants who would stop purchasing their regular SSB. 1 in 2 of the 16-29 group, and 2 in 5 of the over 49’s answered that they would stop. Again, nearly all the over 49’s would switch to a healthier option. Only 1 in 8 of the 30-49 group would consider stopping. Briggs et al. (2013) also found that a tax on SSBs would have the greatest impact on young people.

5.5 Economic Perspective

As suggested by Deegan and Unerman (2006: 65) public interest theory posits that, due to the substantial expense of obesity, it is a rational response for the UK Government to intervene to “benefit society as a whole”. In addition, Pettinger (2015) argues that economics attempts to achieve the optimal allocation of resources, but the free market doesn’t always achieve this. If the production or use of a good has a greater social cost than social benefit, then governments are entitled to attribute a tax to the good, to ensure the consumer pays the full social cost, and not just the market price. Theoretically, a higher price reduces demand, achieves a more socially efficient level of consumption, and generates revenue for the UK Government. In practical terms, a tax on SSBs would help reduce obesity, diabetes, and tooth decay whilst generating revenue to deal with rising health costs in the UK. Furthermore, Lombroso et al. (2013) stated that since healthier products such as fruit and vegetables have risen sharply compared to SSBs, it is reasonable to increase the price of SSBs as an incentive for consumers to move to healthier options. Poor health not only imposes greater costs to the NHS, but also affects work and productivity, thus, the social cost of sugar consumption is greater than the private cost (Pettinger, 2015).

Other previous studies discuss the price elasticity in low and middle income as factor affecting SDIL. Andreyeva, Long, and Brownell (2009) determined that to constructively manipulate the consumption of SSBs, prior knowledge of the product’s price elasticity of demand must be obtained. By accumulating information on products’ price elasticities, policymakers can then easily identify the items which could have the greatest impact. Cabrera Escobar et al. (2013) expanded on this by suggesting that conducting further research on the price elasticities in low and middle income countries, the potential health gains, financial savings to the health sector and potential government revenue may be identified. Encouragingly, it was observed that low-income household’s consumption of SSBs in Mexico fell by 17 per cent in the first year of an imposed sugar tax, denoting they were more responsive to a price increase. Since the poor are hit hardest by diabetes and obesity, because they have less access to healthcare, the tax was regarded as beneficial (Snowden, 2015).

Additionally, it is worth noting here that the SDIL will have an impact on job security in the UK. Bradford (2016) revealed job concerns in the beverage industry that employs 34,000 people in Scotland – 19 per cent of all manufacturing jobs. It was considered that penalising the beverage industry, with no conclusive proof of the effectiveness of a tax on SSBs, could be construed as unfair. As plans for a tax on SSBs were officially announced, shares in Barr Soft Drinks immediately fell by 3 per cent. (Freeman, 2016).

5.6 Income

This survey's results conflicted with a study conducted by Sturm et al. (2010) which found that low-income groups would be more responsive to 5 per cent price increase. The low-income group had the lowest percentage who thought the consumption of SSBs was linked to childhood obesity. They may have answered 'no' to justify buying SSBs. Only 1 in 3 of the low-income group, compared to 3 in 5 of the middle-income group and 1 in 2 of the high-income group, agreed with the UK Government implementing a tax on SSBs. This would suggest that the low-income group may have concerns about the rising costs of groceries, which would eat into their already low disposable income. Conversely, Colchero et al. (2016) suggested that a larger reduction in consumption was often found in low socio-economic populations.

The survey showed that although the middle-income group was slightly more aware of the percentage of overweight and obese adults, the low-income group was more aware of the effects of obesity. The middle-income group had the largest proportion who would stop purchasing their regular SSB if a 5 per cent price increase was implemented, and would all change to a healthier option or do without. If a 10 per cent price increase was implemented, 1 in 4 of the middle-income group, 1 in 7 of the low-income group, and none of the high-income group would stop. Encouragingly, all the middle-income group who would stop, would switch to a healthier option or do without. However, Zhen et al. (2014) conducted research in which he found that although there may be a reduction in SSB consumption, this reduction would be substituted by an increase in sodium and fat intakes, thus negating the positive effects on obesity levels. Whereas Mytton, Clarke, and Rayner (2012) determined that to have a significant positive effect on health, a tax of at least 20 per cent would have to be imposed. Fitts (2016) agrees that the price of SSBs would have to change considerably in order for consumers to change their behaviour, however he questions the ultimate impact this will have on obesity.

The survey showed that if a 20 per cent price increase was implemented, 1 in 2 of the low-income group, 1 in 4 of the middle-income group, and 1 in 6 of the high-income group would stop purchasing their regular SSBs. Importantly, it was observed that more of the low-income group would switch to a cheaper SSB. Therefore, 1 in 4 of the low and middle-income groups would switch to a healthier option or do without – ultimately being the desired change in consumer behaviour (HMRC, 2016). These findings concur with Zhen et al. (2011), who also found that low and middle-income groups were more responsive to a price increase. Furthermore, Smith, Lin, and Lee (2012) deduced that a tax-induced 20 per cent price increase would result in adults losing 3.8lbs over a year, and children losing 4.5lbs. The authors acknowledge that the survey is only on probable consumer behaviour. The consumer has answered the questions hypothetically, thus might behave differently faced with the real scenario.

6.0 Conclusions

The primary objective of this research was to assess whether the introduction of the SDIL in the UK will be successful in reducing obesity levels in Scotland. Previous literature examined consisted of research undertaken in America, Mexico, and Hungary, with a focus on age (Briggs et al. 2013) and household income (Zhen et al. 2011). Prior sugar tax studies carried out assessed groups based on age and household income (Finkelstein et al. 2010; Powell and Chaloupka, 2009). However, there are few relevant studies based on gender. To evaluate if a sugar tax in Scotland would

be successful in reducing obesity levels, it was identified that there was a significant gap in existing literature. This study has aimed to offer an insight into the current gap within academic literature by surveying consumers in Scotland by analysing gender, age and household income. This study also adds a contribution to this field of research as the survey presents a significant difference in consumer behaviour, knowledge, awareness and values concerning obesity and the differential rates of sugar tax between males and females in Scotland.

In terms of gender, female participants in this survey had a higher awareness of obesity levels and the harmful effects of obesity. However, it was observed that of the males and females who said they would stop purchasing their regular SSB, a greater percentage of the females would switch to a cheaper SSB. Thus, negating any potential health benefits from the SDIL regardless of increased awareness concerning obesity females display.

In terms of age, it was determined that the 16-29 group would be most responsive at every rate of price increase. The over 49's were found to be more responsive than the 30-49 group at the 10 per cent and 20 per cent rate, but the reverse was true at the 5 per cent rate. Block et al. (2010) concluded that merging education with a price increase would result in a further reduction in consumption. Since the 16-29 group produced the lowest figures for awareness, this suggests that if the 16-29 group were better informed, an even greater response to price change may be obtained. This analysis concurs with Devaux et al. (2011), who determined that the better educated an individual is, the less likely they are of becoming obese.

In terms of income, it was determined that low-income consumers would be the most responsive to a tax on SSB's at the 20 per cent rate, but middle-income consumers would be more responsive at 5 per cent and 10 per cent rates. It must be noted that although the low-income group was more responsive at the 20 per cent rate, it was similar to the middle-income group in respect of how many switched to a healthier option or did without. It was observed that in response to any price increase, when consumers decided to move to an alternative, the low-income group was more likely to switch to a cheaper SSB compared to the other groups, who would change to a healthier option. This would suggest that because of the low-income group's limited funds, as much as they wish, it proves more difficult for them to change to a healthier option.

In conclusion, the main purpose of this research was to provide a tentative judgement on whether the SDIL will be successful in reducing obesity levels in Scotland. The results of the survey provide an insight into the potential effects of the SDIL but it is unclear whether it will have any significant impact on obesity levels within Scotland. Whilst higher tax rates may have a better probability of decreasing demand for SSBs, it is considered essential that lower income groups access to healthy options are increased, making the healthy choice easier for consumers; better education about obesity and the associated risks to health are delivered to children from an earlier age to increase awareness; more robust campaigns are targeted at most unaware group, identified by this research as the males. This study has implications for policy makers, the soft drinks industry and the academic arena as it demonstrates that differing levels of awareness, different values and beliefs between different socio-demographic groups that have the potential to impact upon policies that are attempting to change consumer behaviour as with the UK SDIL. Limitations concerning the results of the study are the location, as North Ayrshire is only a small area within Scotland; the size of the sample surveyed; limited access to academic literature; and that consumer responses may not be an accurate portrayal of consumer behaviour. Future researchers could gain

further insights from increasing the sample size of people surveyed within Scotland at the point when the UK SDIL commences as this may provide a more accurate response from the consumers pertaining to their actual behaviour as opposed to their potential behaviour.

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Research Table of Survey Data

items	Sex				Age						Income						Total
	Male		Female		16-29		30-49		Over 49		Less than £20,000		£20,000-£45,000		Over £45,000		
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Awareness	22 34.76%	10 15.62%	29 45.31%	3 4.69%	14 21.88%	7 10.94%	21 32.81%	2 3.12%	16 25%	4 6.25%	23 35.93%	6 9.38%	19 29.69%	4 6.25%	9 14.06%	3 4.69%	64
Effects of Obesity	18 28.16%	14 21.88%	25 39.06%	7 10.94%	13 20.31%	8 12.5%	17 26.56%	6 9.38%	13 20.31%	7 10.94%	22 34.38%	7 10.94%	15 23.44%	8 12.5%	6 9.37%	6 9.37%	64

Consumption of Sugar Sweetened Beverages (SSB) is linked to childhood obesity	26 40.62%	6 9.38%	21 32.81%	11 17.19%	12 18.75%	9 14.05 %	16 25%	7 10.94 %	19 29.70%	1 1.56 %	18 28.13%	11 17.19 %	19 29.69%	4 6.25%	10 15.62%	2 3.12%	64
Do you agree with the UK Government implementing a tax on Sugar Sweetened Beverages (SSB) to combat the growing childhood obesity epidemic	16 25%	16 25%	12 18.75%	20 31.25%	9 14.06%	12 18.75 %	4 6.25%	19 29.69 %	15 23.44%	5 7.81 %	11 17.19%	18 28.13 %	11 17.19%	12 18.75%	6 9.37%	6 9.37%	64
Make a conscious effort to reduce your consumption of SSB's?	22 34.38%	10 15.62%	22 34.38%	10 15.62%	15 23.44%	6 9.38 %	13 20.31 %	10 15.62 %	16 25%	4 6.25 %	20 31.25 %	9 14.06 %	15 23.44%	8 12.5%	9 14.06%	3 4.69%	64

Which price* *increase would encourage you to stop purchasing your regular sugar sweetened beverage (SSB)	Any 8 12.5%	None 24 37.5%	Any 14 21.88%	None 18 28.12%	Any 11 17.19%	None 10 15.62 %	Any 3 4.69%	None 20 31.25%	Any 8 12.5%	None 12 18.75 %	Any 14 21.88 %	None 15 23.44%	Any 6 9.38%	None 17 26.55%	Any 2 3.12%	None 10 15.63%	64
If you declared** that a price increase would deter you from purchasing an SSB, would you then	(+) Change 7 10.94%	No Change 25 39.06%	(+) Change 9 14.06%	No Change 23 35.94%	(+) Change 7 10.94%	No Chan ge 14 21.87 %	(+) Change 2 3.12%	No Change 21 32.82 %	(+) Change 7 10.94 %	No Chan ge 13 20.3 1%	(+) Change 8 12.5%	No Change 21 32.82 %	(+) Change 6 9.38%	No Change 17 26.56%	(+) Change 2 3.12%	No Change 10 15.62%	64