

***An investigation into the effects of socioeconomic position  
and ethnicity on oral health***

**Research Question:**

**To what extent does socioeconomic position and ethnicity affect levels of oral  
health in the UK?**

**SUBJECT AREA:** Geography

**CURRENT WORD COUNT:** 3998

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## Introduction

The UK is one of the most disparate Nations, both when it comes to ethnicity and socioeconomic position (SEP); for socioeconomic groups ‘the average diversity scores for LSOAs [spatial unit meaning Lower Super Output Areas] in both 2001 and 2011 were high (11.4 and 11.2 respectively)’.<sup>1</sup> Oral health is both an important indicator of these disparities and shows the social impact of low SEP and ethnic minorities on health.

In the UK, there is a standard level of healthcare which should be met. Oral health especially illustrates whether these standards are being upheld. However, oral health is singular in the sense that it is affected primarily by the individual: the level of hygiene, the education someone is given, the attitudes of the family, diet, smoking etc. all influence someone’s teeth and gums. The NHS spends £3.4 billion annually on dental care, with an added £2.3 billion for private dentistry.<sup>2</sup> Despite this, there is still large variation among the population. That is why I have chosen to examine **to what extent does socioeconomic position and ethnicity affect levels of oral health in the UK?**

The topic explores many aspects of life in the UK. Intersectionality, described as ‘the mutually constitutive relations among social identities’,<sup>3</sup> is a theory which I will use to consider differences between individuals in a population. It deals with social inequalities and in the case of oral health, inequalities have severe consequences.

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<sup>1</sup> ‘Mixed and Balanced Communities’, *Census Information Scheme*, CIS2014-05, 2014, p.20/21 [Accessed 6 March 2019]

<sup>2</sup> Jenny Godson, Julia Csikar, Sandra White, ‘Oral health of children in England: a call to action!’, *BMJ Journals, Archives of disease in childhood*, volume 103 No1 (2018), p.5 [Accessed 5 February 2019]

<sup>3</sup> Stephanie A. Shields, ‘Gender, An Intersectionality Perspective’, *Springer Link*, 2008, 59: 301, [Accessed 18 February 2019]

In the UK, the oral diseases most frequently experienced are periodontal disease and dental caries (decay and crumbling of teeth).<sup>4</sup> Experience with these diseases start from a young age, with dental caries causing the most visits to hospital for 5-9-year olds,<sup>5</sup> this has been shown to have detrimental effects on future health, as 'often their first introduction to dental care can lead to fear and anxiety with lifetime consequences'.<sup>6</sup> With children, the attitudes of parents or guardians is one important factor when considering dental care. The dental-hygiene habits instilled in children by parents affects not only their current oral health but their future health as well. This is why I chose to consider SEP, as less wealthy care givers tend to have less time to consider their child's dental care, often have reduced education on health or can't afford food which positively impacts oral health.

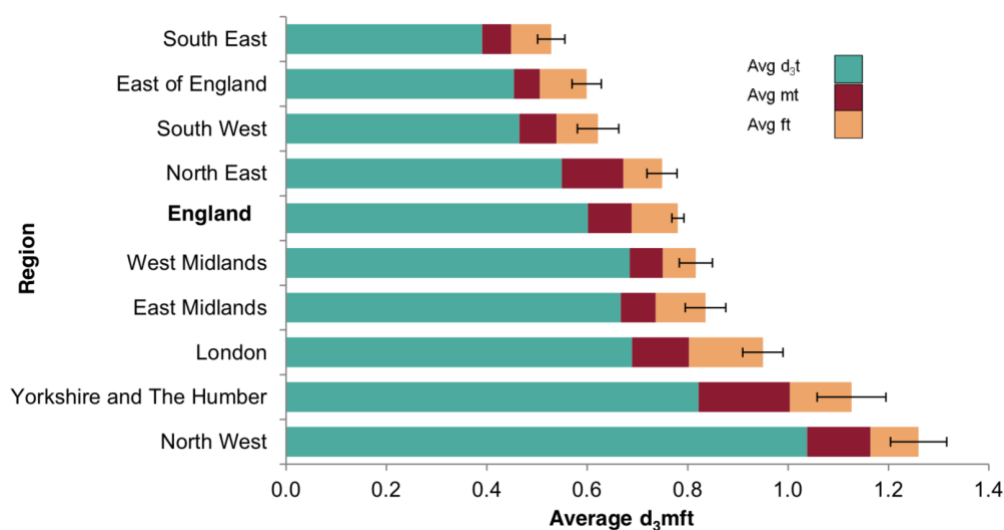
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<sup>4</sup> Patrick Rouxel and Tarani Chandola, 'Socioeconomic and ethnic inequalities in oral health among children and adolescents living in England, Wales and Northern Ireland', *Community Dentistry and Oral Epidemiology*, 46, 5, p.427, (2018) [Accessed 5 February 2019]

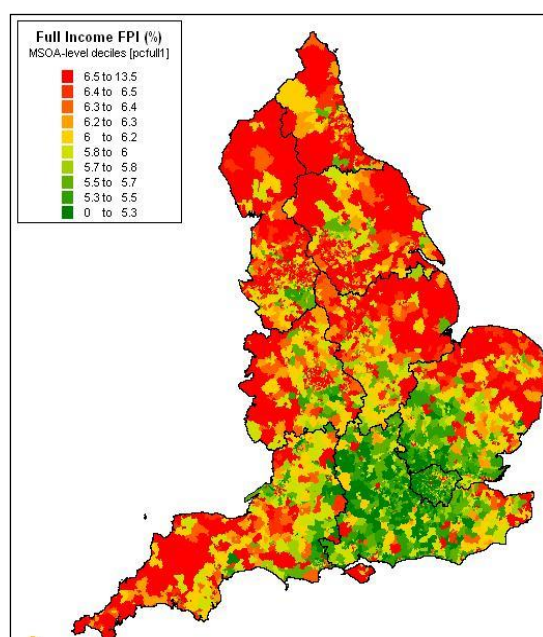
<sup>5</sup> *Ibid* 2 p.5

<sup>6</sup> *Ibid* 2 p.5

**Figure 1. Average number of dentinally decayed, missing and filled teeth (d3mft) among five-year-old children in England by region, 2017.<sup>7</sup>**



**Figure 2. Full Income FPI at 2001 Middle Super Output Area Level (%).<sup>8</sup>**



**Figure 1** shows that the area with the worst oral health is the North West, whilst the best in the South East. Looking at **Figure 2**, which examines income, we can clearly see that there is a correlation between oral health (particularly of children) and

<sup>7</sup> 'National Dental Epidemiology Programme for England: oral health survey of five-year-old children 2017', *Public Health England* (2018), gateway number: 2018081, p.9 [accessed 6 March 2019]

<sup>8</sup> Eldin Fahmy, David Gordon, 'Updating the fuel poverty indicator for England', *University of Bristol* (2007), p.18 [accessed 6 March 2019].

income, as the smallest income is in the North, the largest in the South East.

Income is a large part of someone's SEP.

There is vast disparity in quality of oral health for different ethnicities. In the 2011 census the highest ratio of people with 'not good' general health, with '50 hours or more of care per week relative to those providing no unpaid care' were Asian/Asian British people. With the highest ratio being the Chinese population in the UK with 3.2 (0.8 higher than that of white British).<sup>9</sup> This is mirrored by results found when looking at decay, dental caries and periodontal disease. 51% of Chinese 5-year olds have 'obvious decay'.<sup>10</sup>

There are many factors which can be attributed to this disparity. Although there may be a genetic difference, the main component is that of lifestyle; diet, education, hygiene habits. Yet, unlike the variety in SEP's impact on oral health, we need to consider migration status, length of time in the UK and age at arrival, for those not born in the UK. There are also aspects of intersectionality which can affect the ways in which different ethnicities seek treatment and are dealt with, such as attitudes towards races and immigration status. It is important to not only look for cultural explanations as there is concern that 'such explanations obscure the impact of structural factors on immigrant health disparities.'<sup>11</sup>

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<sup>9</sup> 'Trends in general health and unpaid care provision between ethnic groups, 2011', *Office for national statistics* (2013) [accessed 10 March 2019]

<sup>10</sup> *Ibid* 2 p.6

<sup>11</sup> Edna A. Viruell-Fuentes, Patricia Y. Miranda, Sawsan Abdulrahim, 'More than culture: Structural racism, intersectionality theory, and immigrant health', *Social Science and Medicine*, Volume 75, Issue 12, (2012) p.2099-2106 [accessed 10 March 2019]

Disparities in the UK have narrowed in the last few decades, yet looking at the increasing pressure on the NHS, the worsening of oral health in children and the increasing recognition of both socioeconomic and ethnic disparities (as shown by the rise in theories such as intersectionality), this essay is both critical and relevant. The purpose is to act as a baseline for further research leading towards better ways of understanding and dealing with oral health issues, as well as educate on ethnic and socioeconomic disparities to reduce discrimination.

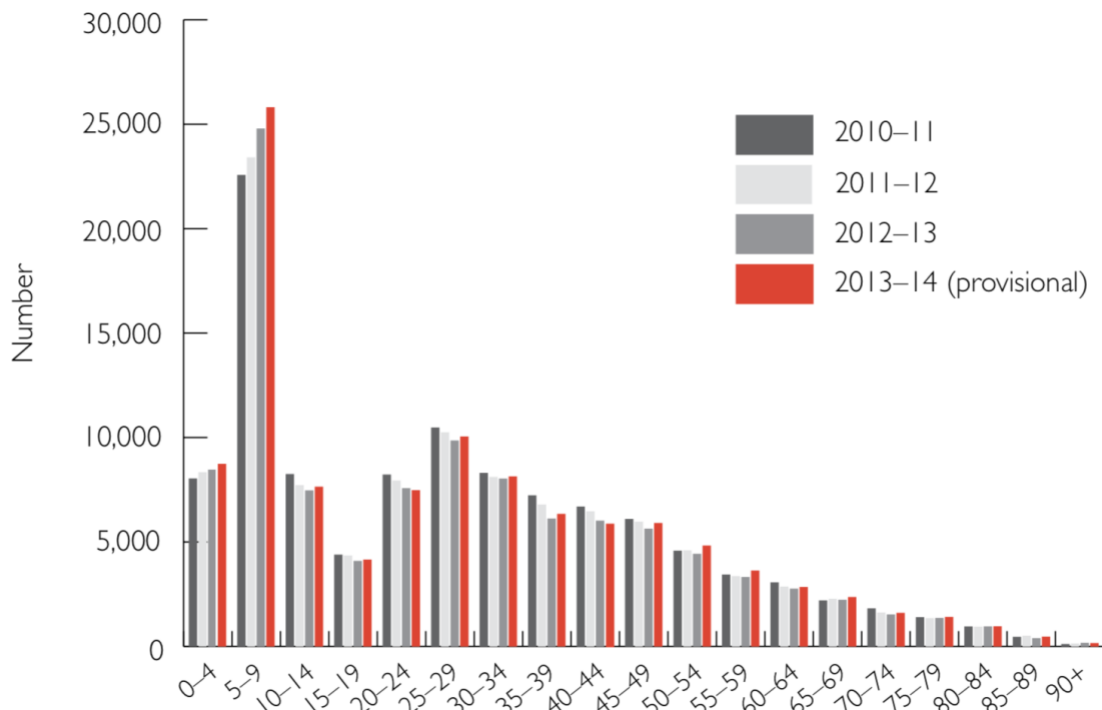
### **Social Deprivation**

We have already seen direct correlations between low oral health and low income for children aged 5. There are statistics that suggest a hypothesis known as 'socioeconomic equalisation'. The theory claims that as children age 'the influences of family and home and home environment diminish, with school, peers and youth culture playing a larger role in children's lives.'<sup>12</sup>

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<sup>12</sup> IBID 4 p.427

**Figure 3. Number of people admitted to hospital for a primary diagnosis of dental caries by age group<sup>13</sup>**



There is an obvious trend between age and dental caries, with those between the ages of 5-9 experiencing the most dental caries. This is usually the age at which parents stop helping children with brushing their teeth, allowing them to do it themselves. The ages 10-19 is when number of caries drops. This is the time in which children are in secondary school in the UK and so diet and education improves. However, it is also important to remember that children this age have recently developed permanent teeth. This means that less time has been allowed for them to become decayed and develop caries through bad hygiene and diet. This could explain why at 20-years-old, there is an increase of dental caries.

<sup>13</sup> 'The state of children's oral health in England', *Faculty of Dental Surgery* (2015) p.6 [accessed 10 March 2019]



Nevertheless, I believe that this decrease is somewhat due to a convergence in habits and lifestyle.

The equalisation hypothesis is complex and doesn't account for the different types of variation in lifestyle, whether they be ethnic, socioeconomic, residential, education etc. Data collected in 2013 suggests that 'There was some evidence of equalization in terms of ethnic and family-based SEP differences, particularly in terms of dental decay, but differences by residential deprivation remained throughout childhood and adolescence for dental decay and increased during adolescence for filled teeth and poor periodontal health'<sup>14</sup>. This underlines my inclusion of the equalisation hypothesis, as it does appear to change ethnic and SEP differences.

## **Diet**

Diet is merely one factor which is attributed to the numbers of people with dental carries, gingivitis and periodontal disease; yet it's considered one of the most influential.

An experiment, published in 2017, which took a group of people with gingivitis and periodontal disease, only changed the diet of those involved (unless they were the control), for 8 weeks. The new diet given was 'based on the current literature with regard to diet and general inflammation and gingival / periodontal inflammation.'<sup>15</sup>

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<sup>14</sup> IBID 4 p.432

<sup>15</sup> J. P. Woelber, K. Bremer, K. Vach, D. König, E. Hellwig, P. Ratka-Krüger, A. Al-Ahmad and C. Tennert 'An oral health optimized diet can reduce gingival and periodontal inflammation in humans - a randomized controlled pilot study', *BMC Oral Health*, p.2 (2016 16:109) [accessed 10 March 2019]

The significant differences of the controls and those with the new diet showed how big a factor diet is: between week 2 and week 8, 'pocket depths' of cavities were reduced by 0.8mm, whilst the controls grew in depth by an average of 0.21mm. Percentage of those 'bleeding on probing' dropped by 29.4%, whilst the percentage of the control's increased by 17.6%. These trends were consistent throughout all assessment criteria: 'PI Clinical results regarding plaque index, GI gingival index, PD pocket depth, CAL clinical attachment level, BOP bleeding on probing, and PISA periodontal inflamed surface areas.'<sup>16</sup>

These results give us an insight into the sorts of effects diet can have on oral health. Disparities amongst diets of those of different ethnicities and SEP plays a key role in whether someone has good oral health.

Type 2 diabetes is widely considered to be mainly due to bad diet and exercise. This dietary factor is unifying amongst diabetes and periodontal disease. Having diabetes even increases chances for periodontal disease by 2-3 times<sup>17</sup>. This correlation is clearly linked by the common thread of worse diet. Therefore, whilst having diabetes won't give someone cavities and periodontal disease, they are both partly by-products of the same issue.

Looking at people on an individual level can help grasp how much diet is impacted by ethnic and SEP. A study known as 'Families and Food in Hard Times', looked into more detail at the personal reasons why teenagers in London have substandard

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<sup>16</sup> IBID 15 p.4

<sup>17</sup> L. Casanova, F. J. Hughes and P. M. Preshaw, 'Diabetes and periodontal disease: a two-way relationship', *BDJ* 217 (2014), p.434 [accessed 10 March 2019]

eating habits. There are a multitude of impacts of lack of nutritious food both physiologically, such as worse oral health, but also socially and psychologically.<sup>18</sup>

The three teenagers in the study all described extended periods of time relying on eating cheap cereal, food banks or one or both parents skipping meals to provide for their children. Eating canned food, often found in food banks, or highly processed and sugary cereal such as 'coco pops', has severe impacts on the rates of periodontal disease. These hard times were almost always caused by an unexpected reduction in income: an unexpected bill, delay in housing benefits or loss of employment. As Michael, one of the teenagers said, 'when my mum's been paid, there's food in the house, when she hasn't been paid there's no food in the house'. The quality and quantity of food coming into the house is directly correlated to the income, both by parents and governmental benefits. Simple things such as having a vegetable garden shared with neighbours impacted the quality of the food these children were eating.<sup>19</sup>

One of the children was Kwame, born in West Africa and migrated to the UK at nine years old. Unlike the other two children in the study, whose parents relied on 'Job Seekers Allowance, Child Tax Credit and Child Benefit' Kwame's mother had no access to such services due to her legal status in the UK being reviewed by the UK Home Office. His mother lost her financially stable job and all welfare benefits. This has led to a hunger that Kwame described as feeling 'like I got stabbed with a knife'. Benefits such as free school meals for Kwame were removed and like the others, he describes extended periods relying on cereal or food banks to prevent starvation.

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<sup>18</sup> Abigail Knight, Rebecca O'Connell and Julia Brannen 'Eating with Friends, Family or Not at All: Young People's Experiences of Food Poverty in the UK' *Children & society volume 32*, p.185-194 [accessed February 7 2019]

<sup>19</sup> IBID 18

Situations such as these, are the main reason focussing on ethnicity is so important. Unlike the other two children in the study, who were White British, Kwame's diet was dictated due to their migratory status. All aspects of discrimination, as covered by intersectionality theory, have massive impacts. That is why similar events permeate throughout the UK, leading to decreased visits to the dentist (due to lack of income) and unsatisfactory levels of oral health (due to the quality of the food)<sup>20</sup>

Diet is not only impacted by income but also habit or tradition. Ethnicity and culture lead to differing impacts on oral health, not only because of discrimination, but due to the content of each country's daily food intake. Diets on a global scale have massive variety and each have different impacts on a person's oral health. The amount of sugar or oil in an average daily diet changes for people in different countries, meaning where a person is from and the habits they grew up with will impact their oral health. Ethnicity alone doesn't dictate someone's level of oral health, as factors such as time spent living in the UK can also be seen as an important dietary factor, as for many, those who have spent a larger proportion of their life in the UK will have mitigated cultural diets and adapted a more British diet. Whether the diet they have adapted from is better or worse for their oral health will vary for each country.

A study into daily diets in Denmark, Czech Republic, France and Italy, compared the nutritional values for an average person living in each country. Looking at sugar content, those from Denmark tend to have the highest intake, with a mean intake of 224ml a day of sugary drinks. That is over 100ml more than the country with the

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<sup>20</sup> IBID 18

second highest intake, France, with 121ml.<sup>21</sup> Factors such as time spent in the UK and country of origin for migrants, is important as those migrants with expendable income will be able to afford a diet which they enjoy; whether they grew up in a country like Denmark or Czech Republic will impact their choice in diet.

## **Social Behaviours**

A key aspect of someone's health is their attitude towards diet, exercise, smoking etc. Cultural differences of ethnicities in the UK have impacts on their behaviours and subsequent oral health issues.

This can be seen when looking at intentions to smoke. Smoking has correlations with clear oral health negatives as shown by 'smokers [having] 2.7 times and former smokers 2.3 times greater probabilities to have established periodontal disease than non-smokers'<sup>22</sup>. Intention to smoke is directly correlated to whether smoking is a social norm, is accepted and education on the consequential health negatives.

However, in many cases those who have more intention to become smokers at a young age are white and so having a different ethnicity may positively affect your oral health. White females were shown to have the most intention to become smokers between the ages of 12-13, with the lowest average of 1.7 (with 3 being

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<sup>21</sup> Mertens, E., Kuijsten, A., Dofková, M. et al. *Eauropean Journal of Nutrition* (2019) 58: 1475. P.1480 [accessed 11 August 2019]

<sup>22</sup> Aws S. ArRejaie, Khulud Abdulrahman Al-Aali, Mohammed Alrabiah, Fahim Vohra, Sameer A. Mokeem, Ghadeer Basunbul, Ali Alrahlah and Tariq Abduljabbar, Proinflammatory cytokine levels and peri-implant parameters among cigarette smokers, individuals vaping electronic cigarettes, and non-smokers, *Journal of Periodontology*, 90, 4, p.367-374 (2018) [accessed 20 May 2019]

strongly against). The group of children were African-Caribbean, Indian, Pakistani and White, in the UK. To contrast, those most strongly against smoking were Pakistani females with 2.4, closely followed by Indian males and females with 2.3.<sup>23</sup>

As we can see there are clear contrasts between intention to smoke and ethnicity in the UK. This will be down to the individual's culture and therefore, their perceived pressure and self-efficacy. The resistance to smoking by the Indian participants of both genders and the Pakistani girls, is not certain, yet there is evidence that it is to do with the idea of 'modelling': the number of people in their lives who smoke (mothers, fathers, sisters, brothers etc.), this mediates the desire to smoke through social influences. Those with the smallest number of people smoking are the least likely to smoke and there is a racial correlation to whether or not someone may smoke.<sup>24</sup>

Smoking is just one of the social behaviours dictated by upbringing and race, which impacts health. Having the largest number of smokers be white, goes against the overall pattern of levels of oral health, however, smoking is an expensive habit, meaning that many people of minority groups may not be able to smoke due to their SEP, whilst white people are able to afford this habit, so there are other factors which need to be taken into account.

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<sup>23</sup> Wolfgang A. Markham, Paul Aveyard, Hywel Thomas, Anne Charlton, Maria Luisa Lopez, Hein De Vries, What determines future smoking intentions of 12- to 13-year-old UK African-Caribbean, Indian, Pakistani and white young people?, *Health Education Research, Volume 19, Issue 1* (2004), p.15–28 [accessed 20 May 2019]

<sup>24</sup> IBID 23

## Methodology

My primary data collection focussed on the differences in oral health of two areas, one with young adults from low socioeconomic backgrounds and the other high. The areas were Ryde, Isle of Wight and the other Bradfield, Berkshire. The students in Bradfield were attending a public boarding school, whilst the young adults from Ryde were all working in the local fast food restaurant, McDonalds.

I chose to look at these specific young adults due to their contrast in lifestyle – specifically education and eating habits; which differ due to their contrast in social deprivation. The standards of education, housing and eating are all clear markers for the distinction between the groups.

I created a questionnaire which I could use to measure their lifestyle and oral health. I discounted anyone who wasn't White British, so that it could be a controlled variable, as well as narrowed down the age range from 16-22.

The Social-Ecological model is a scientific model which observes impacts of 'Social and Cultural Norms and Values', 'Sectors', 'Settings' and 'Individual Factors' on diet and physical activity. The model is used to predict health outcomes and I believed that focussing on one of the levels in the model, would be a worthy way of understanding how just a few factors can drastically change the observable oral health of young adults. I chose to look at 'Setting', which incorporates 'home', 'early care and education', 'school' and 'food service and retail establishments'. This became the basis to the questions posed by the questionnaire.<sup>25</sup>

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<sup>25</sup> Richard Olson, MD, MPH; Kellie Casavale, PhD, RD; Colette Rihane, MS, RD; Eve Essery Stoodly, PhD; Patricia Britten, PhD; Jill Reedy, PhD, MPH, RD; Elizabeth Rahavi, RD; Janet de Jesus, MS, RD; Katrina Piercy, PhD, RD; Amber Mosher, MPH, RD; Stephenie Fu; Jessica Larson, MS, RD; Anne Brown Rodgers (Editor) *2015-2020 Dietary Guidelines, Chapter 3, The Social-Ecological model* 'Health.Gov' [accessed 10 August 2019]

The questions asked were:

Age, Ethnicity, Residence, Occupation, Year of leaving school, Last time visiting the dentist (options were given for them to tick), Number of Cavities/Periodontal disease, Number of times eating fast food (options were given for them to tick).

26 forms were obtained from the Ryde sampling and 30 from Bradfield.

My hypothesis was that there would be an obvious distinction between the numbers of those with cavities/periodontal disease for each group; those with less education/low socioeconomic backgrounds having more and those with more education/high socioeconomic backgrounds having less.

### Data Analysis

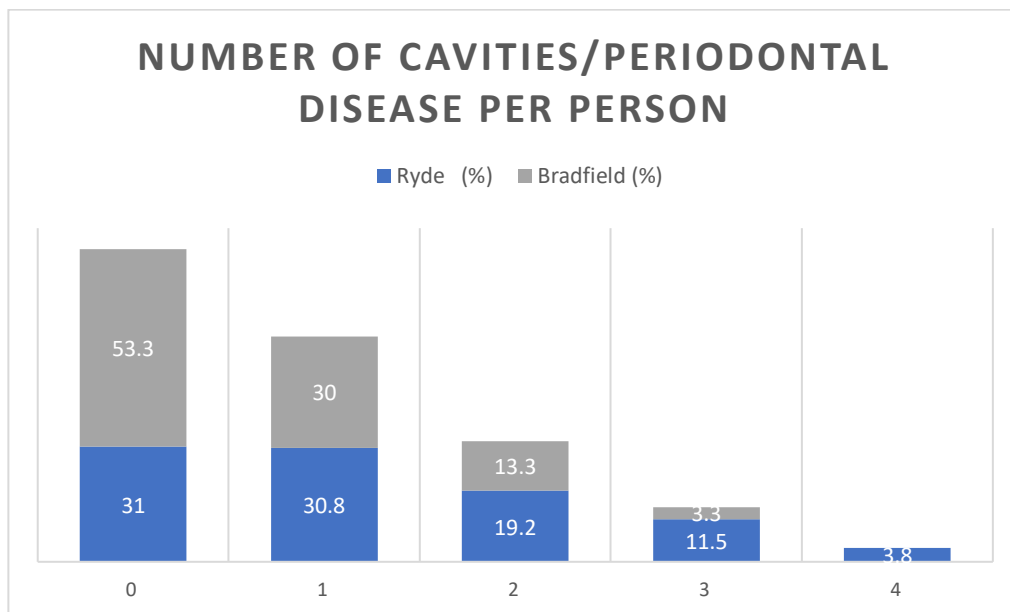
Looking at the initial data, there was a clear disparity between those in Bradfield and Ryde. 17 of the 26 people who completed the questionnaire in Ryde had cavities/periodontal disease, which is 65% of the participants; whilst in Bradfield it was only 14 out of 30, which is 47%. Of those who had cavities/periodontal disease, those in Ryde had more cavities per person.

**Figure 4. Raw data of numbers collected by the questionnaire of cavities/periodontal disease in Ryde and Bradfield**

number of cavities/periodontal disease	Ryde (number)	Bradfield (number)
0	9	16
1	8	9
2	5	4
3	3	1
4	1	0



**Figure 5. Stacked column graph of percentage of each group with different numbers of cavities/periodontal disease per person**



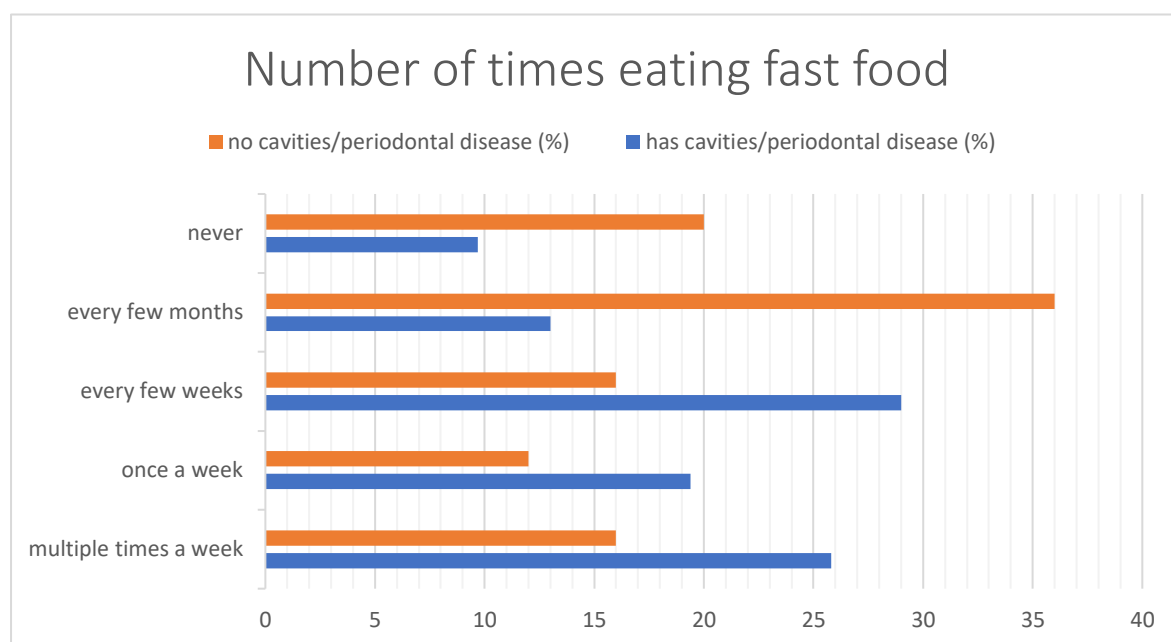
**Figure 5** shows the clear compound of those at Bradfield in the lower numbers of periodontal disease, as shown by the linear negative gradient. In Ryde, almost equal numbers had no cavities and one cavity. With a higher proportion having more cavities/periodontal disease per person than those in Bradfield.

This data only shows that there is a worse level of oral health for those in Ryde, however no reason can be deduced. Something I have already touched on, is the food that a person eats and how that affects their oral health. I used fast food as a marker to reflect a person's eating habits as a whole.

**Figure 6. Raw data of those who have or don't have cavities/periodontal disease and how many times they eat fast food**

number of times eating fast food	has cavities/periodontal disease	no cavities/periodontal disease
multiple times a week	8	4
once a week	6	3
every few weeks	9	4
every few months	4	9
never	3	5

**Figure 7. Bar graph showing the percentage of those who have/don't have cavities/periodontal disease and how many times they eat fast food**

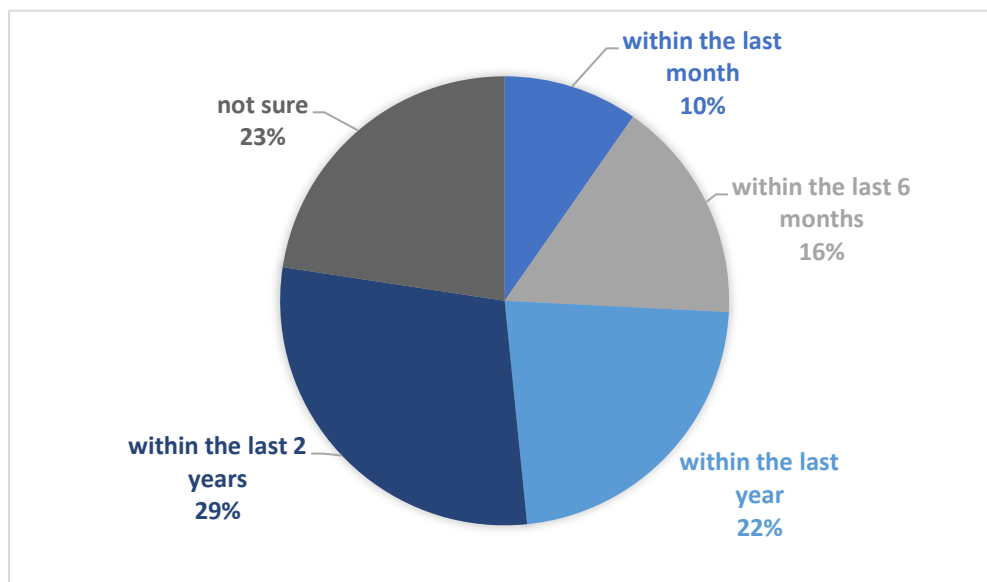


In **figure 7**, there is an association between the more times people eat fast food and their level of oral health; the largest proportion of those who have no cavities only eat fast food every few months, whilst those who do have cavities mainly eat it every few weeks. This shows us that the general trend is indeed those who eat fast food more often have worse oral health. The clearest contrast to me is the almost 10%

difference between those with and without cavities for those in the 'multiple times a week' category.

However, the issue with looking at this data alone, is that it doesn't take into account that the majority of those with cavities/periodontal disease work in a fast food restaurant. It can be assumed that those who work in fast food restaurants will eat it more often due to convenience, this means that they may not be entirely representative of the rest of those from a similar socioeconomic background. I was aware of this limitation before starting to collect the data and decided that it could be useful as an indicator more than confirmation of the hypothesis stated. However, a different, unexpected result helped to alleviate the contention around the fast food result:

**Figure 8. A pie chart showing the percentage of those who've had cavities/periodontal disease and when they last visited the dentist.**



**Figure 8** shows when those with cavities/periodontal disease last visited the dentist. The results show that the majority went 'within the last 2 years' or 'not sure'. It can

be assumed that 'not sure' means that it was a long time ago, as they do not remember. The reason that this is significant, is that those who have had cavities/periodontal disease lately will have visited the dentist more recently, meaning that the majority have not had issues with their teeth in recent years. The issues must have occurred earlier in life. This links back to **figure 3**, in which we could see evidence for 'socioeconomic equalisation theory'<sup>26</sup>, in which teenagers over the age of 15 have had a reduction in oral health issues due to mitigation of factors from earlier life. This could be one explanation for why most of the participants haven't had oral health issues in over a year.

If the majority of those with cavities/periodontal disease had them as children then that would mean that the impact of working in a fast food restaurant hasn't significantly increased their oral issues: they likely already had similar or worse eating habits before starting. Therefore, their problems are likely born through being from a low socioeconomic backgrounds with less education on diet, confirming the initial hypothesis.

## **Conclusion**

Overall, both **SEP and ethnicity have a large impact on oral health**. Neither encompass all the influences to oral health, yet I would consider them still large elements. SEP particularly effects diet and education given on oral health, both in school and at home. As seen in the primary evidence and **figure 1/2**. Influences

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<sup>26</sup> IBID 4, p.427

from home, which are consequences of SEP or ethnicity, tend to diminish in teenage years, as proposed by Socioeconomic equalisation theory. Ethnicity's impact on oral health is partly due to outside discrimination and other aspects of intersectionality for these individuals. However, cultural values also play a part when it comes to diet and health influences, such as smoking. Like for SEP, simplifying the reasons for bad oral health to 'ethnicity', doesn't take into consideration the multitude of factors, like time spent in the UK.

Both are important, nevertheless there are still far more levels to oral health and health in general, as we can see by looking at the **Social-Ecological model**. Oral health as an exemplar of disparities in our healthcare system reveals the issues ever present in the UK; SEP and socioeconomic position not only are important factors to consider when observing oral health disparities but the systematic discrimination throughout the UK.

## Bibliography

Aws S. ArRejaie, Khulud Abdulrahman Al-Aali, Mohammed Alrabiah, Fahim Vohra, Sameer A. Mokeem, Ghadeer Basunbul, Ali Alrahlah and Tariq Abduljabbar, Proinflammatory cytokine levels and peri-implant parameters among cigarette smokers, individuals vaping electronic cigarettes, and non-smokers, *Journal of Periodontology*, **90**, 4, (367-374), (2018). [accessed 20 May 2019]

<https://onlinelibrary.wiley.com/doi/abs/10.1034/j.1600-051X.2002.290815.x>

L. Casanova,<sup>1</sup> F. J. Hughes<sup>1</sup> and P. M. Preshaw, 'Diabetes and periodontal disease: a two-way relationship', *BDJ* 217 (2014), p.434 [accessed 10 March 2019]

<https://www.nature.com/articles/sj.bdj.2014.907.pdf>

Census 2011, Published 22 August 2018, Survey data – 2011 to 2015 *National Statistics Office for National Statistics*

<https://www.ethnicity-facts-figures.service.gov.uk/british-population/demographics/socioeconomic-status/latest>

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/cdoe.12381>

Elsa K. Delgado-Angulo Wagner Marcenes Seeromanie Harding Eduardo Bernabé 'Ethnicity, migration status and dental caries experience among adults in East London' First published: 16 May 2018 [Accessed 7 February 2019]

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/cdoe.12381>

Eldin Fahmy, David Gordon, 'Updating the fuel poverty indicator for England', *University of Bristol* (Published 2007), p.18 [accessed 6 March 2019].

<http://www.bristol.ac.uk/poverty/fuelpoverty.html>

Jenny Godson, Julia Csikar, Sandra White, 'Oral health of children in England: a call to action!', *BMJ Journals, Archives of disease in childhood*, volume 103 No1 (Published 2018), p.5/6 [Accessed 5 February 2019]

<https://adc.bmj.com/content/103/1/5.abstract>

Abigail Knight, Rebecca O'Connell and Julia Brannen 'Eating with Friends, Family or Not at All: Young People's Experiences of Food Poverty in the UK' Published 6<sup>th</sup> April 2018 *Children & society volume 32*, p.185-194 [accessed February 7 2019]

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/chso.12264>

Wolfgang A. Markham, Paul Aveyard, Hywel Thomas, Anne Charlton, Maria Luisa Lopez, Hein De Vries, What determines future smoking intentions of 12- to 13-year-old UK African-Caribbean, Indian, Pakistani and white young people?, *Health Education Research, Volume 19, Issue 1* (2004), p.15–28 [accessed 20 May 2019]

<https://academic.oup.com/her/article/19/1/15/603155>

Mertens, E., Kuijsten, A., Dofková, M. et al. *European Journal of Nutrition* First online 28<sup>th</sup> March 2018 58: 1475. P.1480 [accessed 11 August 2019]

'Mixed and Balanced Communities', *Census Information Scheme*, CIS2014-05, published 09 October 2004, p.20/21 [Accessed 6 March 2019]

Richard Olson, MD, MPH; Kellie Casavale, PhD, RD; Colette Rihane, MS, RD; Eve Essery Stoody, PhD; Patricia Britten, PhD; Jill Reedy, PhD, MPH, RD; Elizabeth Rahavi, RD; Janet de Jesus, MS, RD; Katrina Piercy, PhD, RD; Amber Mosher, MPH, RD; Stephenie Fu; Jessica Larson, MS, RD; Anne Brown Rodgers (Editor)

*2015-2020 Dietary Guidelines, Chapter 3, The Social-Ecological model 'Health.Gov'*

[accessed 10 August 2019]

<https://health.gov/dietaryguidelines/2015/guidelines/table-of-contents/>

Public health England 'National Dental Epidemiology Programme for England: oral health survey of five-year-old children 2017', *Public Health England* (2018), gateway number: 2018081, p.9 [accessed 6 March 2019]

Patrick Rouxel and Tarani Chandola, 'Socioeconomic and ethnic inequalities in oral health among children and adolescents living in England, Wales and Northern Ireland', *Community Dentistry and Oral Epidemiology*, 46, 5, p.427/432, (Published 10<sup>th</sup> June 2018) [Accessed 5 February 2019]

<https://onlinelibrary.wiley.com/doi/full/10.1111/cdoe.12390>

Trends in general health and unpaid care provision between ethnic groups, 2011 (Published 17 July 2013)[accessed 10<sup>th</sup> march 2019] Publication: Office for national statistics

<https://webarchive.nationalarchives.gov.uk/20160105204901/http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/ethnic-variations-in-general-health-and-unpaid-care-provision/sty-trends-in-health.html>

Edna A.Viruell-Fuentes, Patricia Y.Miranda, SawsanAbdulrahim, 'More than culture: Structural racism, intersectionality theory, and immigrant health', *Social Science and Medicine*, Volume 75, Issue 12, (published December 2012) p.2099-2106 [accessed 10 March 2019]

<https://www.sciencedirect.com/science/article/abs/pii/S0277953612000822?via%3Dihub>



J. P. Woelber, K. Bremer, K. Vach, D. König, E. Hellwig, P. Ratka-Krüger, A. Al-Ahmad and C. Tennert 'An oral health optimized diet can reduce gingival and periodontal inflammation in humans - a randomized controlled pilot study', p.4 *BMC Oral Health*, (Published 26<sup>th</sup> July 2016 16:109) [accessed 10 March 2019]

<https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-016-0257-1>