Institution: University College London		
Unit of Assessment: 3 Allied Health Professions, Dentistry, Nursing and Primary Care		
Title of case study: National and international policy changes from research on reducing oral health inequalities		
Period when the underpinning research was undertaken: 2010 - present		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Richard Watt	Professor, Dental Public Health	1991-present
George Tsakos	Professor, Dental Public Health	2002-present
Period when the claimed impact occurred: 2015 - 2020		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

Oral diseases such as tooth decay, gum disease and oral cancers are significant public health concerns, disproportionally affecting socially disadvantaged and marginalised groups across the globe. The UCL Dental Public Health Group (DPHG) has led research on oral health inequalities, the underlying determinants of these inequalities, and the need for a complimentary range of individual, community and national policies to reduce the oral health gap that has influenced and driven international oral health policy changes. Their research has been pivotal with influencing national evidence-based policy decisions across organisations including Public Health England, and providing the basis of policy recommendations published by international organisations such as the World Dental Federation and the World Health Organisation.

2. Underpinning research

The UCL Dental Public Health Group's (DPHG) focus is world-leading research on global oral health indicators and inequalities. This research highlights stark socioeconomic inequalities in a range of different clinical and subjective outcomes and uncovers the underlying societal and economic determinants affecting quality of life in different populations. DPHG research has highlighted the shared common risk factors between oral and general health which has been instrumental in promoting the closer integration of oral health within the broader non-communicable disease (NCD) agenda. The findings have important applications as key oral health outcomes in a range of national epidemiological studies, in clinical practice, and in the evaluation of interventions to reduce oral health inequalities.

UK and Europe: Using secondary analysis of data from the Adult Dental Health Survey of England, Wales and Northern Ireland 2009 (a national study with large representative sample of adults across these three countries), DPHG reported stark socio-economic inequalities (poorer outcomes for less educated and economically deprived groups) in subjective oral health measures, including self-rated oral health and oral health related quality of life indicators, based on Oral Impacts and Daily Performance (OIDP, developed by DPHG) and Oral Health Impact Profile (OHIP-14) (**R1**). These core oral health indicators reflect the impact of oral conditions on the ability of people to undertake activities and behaviours in daily life, such as difficulties eating, speaking, cleaning teeth, relaxing, problems smiling, laughing and showing teeth without embarrassment, problems with emotional stability, and problems with enjoying the contact of other people etc. These inequalities were measured from socioeconomic position indicators including educational attainment, occupational social class and household income and were shown to reflect social gradients, with poorer oral health recognised for those at lower socioeconomic position **(R2).** These findings complemented those from an additional DPHG publication from the same data set that also showed oral health inequalities in clinical oral health indicators.

To expand the study, the DPHG team went on to explore inequalities across Europe, analysing data from Eurobarometer 72.3, a survey carried out in 2009 among adults across 20 countries. The team compared the extent of inequalities by different welfare state regimes, including Scandinavian, Anglo-Saxon, Eastern, Southern, and Bismarckian (**R3).** The results showed differences according to absolute educational inequalities but not for relative inequalities and concluded that welfare state regimes may influence the relationship between knowledge-related resources and oral impacts on daily life, thereby emphasising the importance of political factors and welfare regimes for addressing oral health inequalities.

Older adults and care homes: In examining the effects of oral health on vulnerable groups, DPHG research used English Longitudinal Study of Ageing data (**R4)** to assess oral health inequalities among a nationally representative population sample of older adults (50+ years), in the first study of its kind. Results showed clear and consistent social gradients in the oral health of older adults in England, where lower socioeconomic position (irrespective of which socioeconomic position marker was used) was associated with higher rates of tooth loss, as well as with worse self-rated oral health and higher prevalence of oral impacts among people with at least some of their own teeth (the dentate population). By providing strong evidence of inequalities at older ages across the socioeconomic position hierarchy, rather than differences between the most disadvantaged groups and the rest of society, this study highlighted that public health policy should focus not only on poverty but on reducing the steepness of the social gradient in the whole older adult population.

By including the OIDP measure, DHPG showed that oral conditions have a considerable impact on the quality of life of care home residents (**R5**). Clinically examining 325 residents from nine nursing homes, 180 residents were interviewed to assess their oral symptoms and their quality of life, along with carers and care home managers across nursing homes in Islington, London. The team found that 61.3 % of dentate (with some teeth) and 50.9 % of edentate (with no teeth) residents reported problems such as dry mouth, sore cracked lips, broken teeth and toothache and ill-fitting dentures, noting a higher prevalence of oral impacts even after adjusting for demographic and socio-economic factors, and for the number of teeth in dentate residents. The paper's conclusions made recommendations for health promotion programmes to maintain resident oral health, and therefore quality of life. Tsakos' NIHR project 'Improving the Oral Health of Older People in Care Homes: a Feasibility Study: TOPIC' (NIHR reference number: 17/03/11; 2018-2021) is continuing this work. Led by UCL, TOPIC is assessing the feasibility of the public health aspects of the NICE guideline NG48, as a multicentre cluster randomised controlled trial testing the feasibility of an NG48-based intervention to improve the oral health of older people living in care homes. The research is carried out by a multidisciplinary team also involving Queens University Belfast, University of Bangor, Newcastle University, University of Glasgow and Salford NHS Trust as project partners, with funding of GBP473,418.

***Lancet* oral health series:** DPHG has also led research to identify the underlying causes of inequalities by exploring the role of psychological, social and political factors on population oral health. This innovative research highlighted the important role of social factors on vulnerable groups including children living in poverty and socially marginalised groups. The recent Lancet paper (**R6)** developed this work by including the important role and influence of commercial determinants on global oral health. Such commercial dterminants include the global sugar industry sponsoring research, global marketing, government lobbying and corporate responsibility strategies that include sponsoring health initiatives. The analysis of data from the Global Burden of Disease (2015) study highlighted the extent and nature of oral health inequalities across the world which disproportionally affect poorer and marginalised groups. DHPG's research evidence is informing implementation of population-wide strategies to counteract the influence of commercial factors that are detrimental to oral health.

3. References to the research

R1. White DA, Tsakos G, Pitts NB, Fuller E, Douglas GV, Murray JJ, Steele JG. (2012) Adult Dental Health Survey 2009: common oral health conditions and their impact on the population. *British Dental Journal;* 213(11):567-72. doi: 10.1038/sj.bdj.2012.1088.

R2. Guarnizo-Herreño CC, Watt RG, Fuller E, Steele JG, Shen J, Morris S, Wildman J, Tsakos G. (2014) Socioeconomic position and subjective oral health: findings for the adult population in England, Wales and Northern Ireland. *BMC Public Health*.14:827. doi: 10.1186/1471-2458-14-827

R3. Guarnizo-Herreño CC, Watt RG, Pikhart H, Sheiham A, Tsakos G. (2014) Inequalities in oral impacts and welfare regimes: analysis of 21 European countries. *Community Dentistry and Oral Epidemiology* 42, 517-525. doi: 10.1111/cdoe.12119.

R4. Tsakos G, Demakakos P, Breeze E, Watt RG. (2011) Social gradients in oral health in older adults: findings from the English longitudinal survey of aging. *American Journal of Public Health*.;101(10):1892-9. doi: 10.2105/AJPH.2011.300215

R5. Porter J, Ntouva A, Read A, Murdoch M, Ola D, Tsakos G. (2015) The impact of oral health on the quality of life of nursing home residents. *Health Quality of Life Outcomes*; 13:102. doi: 10.1186/s12955-015-0300-y

R6. Peres M, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, Listl S, Celeste RK, Guarnizo-Herreño CC, Kearns C, Benzian H, Allison P, Watt RG. (2019) Oral diseases: a global public health challenge. *The Lancet* 394:249-259. doi: 10.1016/S0140-6736(19)31146-8.

4. Details of the impact

Influencing national health policy and guidelines for vulnerable groups

DPHG research focusing on the oral health needs of older people and oral health inequalities in later life has been pivotal in influencing national policy and guideline development in this neglected area. Tsakos is a senior academic member of Public Health England's Adult Oral Health Oversight Group and Oral Health in Care Homes Working Group and was involved in shaping the direction of PHE guidance through their report *Commissioning Better Oral Health for Vulnerable Older People* in 2018 (**S1**). Tsakos's work provided evidence (**R4, R5**) to support claims that poor oral health in older people contributed to a poorer quality of life, reporting eating difficulties, speech problems, and reduced ability to communicate freely. This research, with six additional papers from the DHPG body of work, were cited throughout the document which coincided with the publication of the Care Quality Commission's report *Smiling Matters: Oral Health Care in Care Homes*. This push by PHE to increase quality provision for older people and those in care homes, has materialised in the form of the *Oral Healthcare Toolkit for Adults in Care Homes*, launched in December 2020, developed by the Working Group including Tsakos (**S2**). This toolkit, for use by residents, families, carers and commissioners in care homes, includes baseline assessments, quality assurance check lists, policy templates and training materials and videos (based also on Tsakos' early findings and materials from the TOPIC project). These resources were also developed to help with the implementation of NICE Guideline *NG48: Oral Health of Adults in Care Homes*, which outlined key actions needed in all care homes to maintain and promote good oral health in a vulnerable population. Tsakos' research provided an original contribution to NG48, where the case study, *The Oral Health Needs of Older People Living in Islington Nursing Homes* (**R5**), was one of four key resources providing shared learning for carers and care home managers in support for the recommendations (**S3**).

Recently, the DPHG were commissioned by PHE to undertake a systematic review of oral health inequalities in the UK to inform policies and future commissioning decisions (**S4**). A comprehensive review of UK epidemiological studies of oral health interventions and outcomes (clinical, subjective, behavioural and service use) by a range of socioeconomic measures and for disadvantaged population groups (including prisoners and homeless people), served as the basis of two key recommendations: a need to include equity and action to reduce inequalities in all future policy and service developments; and that the most effective action to reduce oral health inequalities requires integrated legislation, regulation and fiscal policy change. The National Lead of Dental Public Health at PHE, stated Tsakos and Watt's work had been "particularly helpful in highlighting the UK evidence on oral health inequalities across a range of disadvantaged and vulnerable groups" in tackling this significant public health problem (**S4**). The report was completed in 2020 but only recently published in March 2021, delayed due to COVID 19. These reviews and

recommendations will inform policy and commissioning decisions about public health interventions and oral health care services and provide baseline data for future reform of NHS general dental services such as payment systems for dentists in England, referral policies and other health-related issues.

Influencing international policy to address global oral health inequalities

The DPHG's strong evidence highlighting the neglect in global policies on oral health (**R1**), convinced Dr Richard Horton (*Lancet* Editor-in-chief) to establish a new Lancet Commission on Oral Health, co-led by Watt at UCL. In recognition of their high-quality research on oral health inequalities, DPHG was designated as a WHO Collaborating Centre on Oral Health Inequalities and Public Health in 2019. No other university globally has received this specific recognition, which allows DPHG access to a WHO network of international oral health-related policy makers. Following publication of the *Lancet Oral Health Series* (including **R6**), Watt was invited in November 2019 by WHO HQ to give a presentation to the WHO Deputy Director General to stimulate policy support for recognising oral health inequalities by the WHO Executive.

Following their insight, WHO published in December 2020 *EB148/8 Oral Health: Achieving Better Oral Health as Part of the Universal Health Coverage an Noncommunicable Disease Agenda Towards 2030*, co-authored by Watt and the WHO Director General (**S5**)**.** Based on **R6**, the document reflected key oral health priorities, including the burden and impact of oral diseases (tooth decay, gum disease and mouth cancers) and how they disproportionately affect marginalised populations in lower income settings and the importance of integrated action linked to other non-communicable diseases (NCDs). Based on this evidence, the report outlined 20 detailed actions for the WHO to commit to as part of the its NCD agenda, including those based on DPHG research "reducing common risk factors and promoting health environments through an integrated approach focusing on key risks to oral health (tobacco, unhealthy diets and poor hygiene) and strengthening health promoting environments in key settings such as schools, workplaces and communities through multi-sectorial action and a Health in All Policies approach" (**S5**).

These actions reflect DPHG's call for population wide strategies in preventing and treatment of oral diseases. In addition to these policy actions, a new WHO Global Oral Health Report (2021) also co-authored by Watt, expands on the WHO *EB148/8 Oral Health* communication, and has been developed to deliver a strategic guidance to all countries around the globe on oral health policy. The report focuses on providing an overview of evidence on the public health importance of oral diseases globally (based on epidemiological data from Global Burden of Disease Study); and highlights the impact of oral diseases on individuals and communities across the globe, summarising problems and challenges in oral health services globally and outlining policy recommendations for future action (based on the 20 recommendations initially published in the *EB148/8*). The report, originally due to be published in Summer 2020, will now be published in 2021 due to delays caused by COVID-19 pandemic. The Oral Health lead at the WHO from the Department of Noncommunicable Diseases stated the group's research has "helped to initiate the subsequent preparation of a Resolution on oral health supported by 14 member states which was then endorsed at the WHO Executive Board Meeting in January 2021." The Chief Dental Officer said of the report: "This important WHO publication will provide an overview of the global burden of oral diseases and will outline a vision to inform future oral health policy developments linked to Universal Health Coverage and UN Sustainable Development Goals" (**S6**).

Research from DPHG has also had a major impact on the World Dental Federation (Federation Dentaire Internationale, FDI) – the international representative body for over 200 national dental organisations around the world. This work has helped shift FDI focus from a narrow treatment approach towards prevention/ health promotion, and provided FDI with a new definition of oral health which takes into consideration physical, psychological, emotional and social impacts. Watt and Tsakos' academic input also led to the development of a new set of core oral health indicators to be used as the main outcome set in dental practices worldwide (**S7**): The Adult Oral Health Outcomes Set (2020). This was developed jointly by the World Dental Federation (FDI) and the International Consortium for Health Outcomes Measurement (ICHOM) and co-authored by Watt and Tsakos within an international working group of clinicians, policymakers and public health experts, and includes "25 items directed towards patients (including demographics, the

impact of their oral health on oral function, a record of pain and oral hygiene practices, and financial implications of care) AND items for clinicians to complete, including medical history, a record of caries and periodontal disease activity, and types of dental treatment delivered." This patient-centred model was created to promote value-based health care and support areas where previous outcome models did not provide full insight to clinical practice, health services research, epidemiology and advocacy. It includes new measures such as financial burden of care, sugar consumption and alcohol/tobacco usage, whilst taking into consideration the patient's other NCDs (e.g. diabetes, cardiovascular disease) and the treatment recommendation. The Adult Oral Health Outcomes Set is currently undertaking a formal validation exercise (an FDI project led by Tsakos) while relevant measures have been applied in practices in more than 10 countries, including Australia, China, India and Japan. Finally, Watt and Tsakos have also influenced the FDI Global Oral Health Atlas (GOHA) (**S8**). The GOHA (2015) entitled "The Challenge for Oral Disease - A Call for Global Action" sought to map worldwide neglected oral health issues and create a tool for advocacy of global oral health as a fundamental right, supporting these issues by addressing recommendations and activism for change. Watt and Tsakos' contribution in co-authoring Chapter 4 (Oral Disease and Society), along with citations throughout the Atlas in chapters discussing tooth decay and inequalities, highlights the influence of societal factors upon health and the resultant burden upon oral and systematic wellbeing. The GOHA has been instrumental in raising the policy profile of oral health globally and the specific importance of addressing inequalities.

5. Sources to corroborate the impact

S1. PHE Commissioning better oral health for vulnerable older people (2018): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/738722/CBOH_VOP_V16_Final_WO_links.pdf

S2. PHE Toolkit: https://khub.net/web/phe-national/public-library/-/document_library/v2WsRK3ZlEig/view/387025297

S3. 2016 NICE guidelines on care homes (NG48): https://www.nice.org.uk/guidance/ng48 Shared Learning example: https://www.nice.org.uk/guidance/ng48/resources/shared-learning

S4. PHE Testmonial and Review of Oral Health Inequalities 2021: https://www.gov.uk/government/publications/inequalities-in-oral-health-in-england

S5. WHO EB148/8 23rd December 2020 Provisional Agenda Item 6: https://apps.who.int/gb/e/e_eb148.html.

S6. WHO (2020). Oral health – achieving better oral health as part of the universal health coverage and noncommunicable disease agendas towards 2030. Report by the Director General. WHO Executive Board, Geneva. Testimonial, Dental Officer WHO.

S7. FDI (2017). Accelerating action on oral health and NCDS – Achieving an integrated response. FDI World Dental Federation and NCD Alliance. FDI, Geneva.

S8. FDI (2015) Global Oral Health Atlas: https://www.fdiworlddental.org/resources/publications/oral-health-atlas/oral-health-atlas-2015