

Editorial**Improvement of global oral health - the leadership role of the World Health Organization**

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Progress towards a healthier world requires strong political action, broad participation and sustained advocacy. The World Health Organization Global Oral Health Programme (WHO GOHP) has worked hard over the years to put oral health high on the health agenda of policy and decision makers worldwide. In 2007, the WHO was given a unique mandate for strengthening the work for oral health by its two governing bodies, i.e. the Executive Board, and the World Health Assembly (WHA). A comprehensive report on global oral health was prepared by the Secretariat (WHO GOHP) for the governing bodies, and the World Health Assembly subsequently agreed on a Resolution (WHA.60.17) which reads: “Oral health: action plan for promotion and integrated disease prevention” (Petersen, 2008; Petersen, 2009). This statement is a wide-ranging policy that gives the direction to better oral health of people in the 193 Member States. The WHO statement is an impetus for countries to develop or adjust national oral health programmes, and the policy is a strong support to the global actions carried out by the WHO GOHP over the recent years. The action plan for oral health promotion and integrated disease prevention encompasses several elements.

The WHO 2007 Resolution urges Member States to:

1. adopt measures to ensure that oral health is incorporated into policies for the integrated prevention of chronic noncommunicable diseases.
2. take measures to ensure that evidence-based approaches are used.
3. consider mechanisms to provide essential oral health care and to incorporate oral health within the framework of primary health care.
4. consider the development and implementation of fluoridation programmes.
5. take steps to ensure that prevention of oral cancer is an integral part of national cancer-control programmes.
6. ensure the prevention of oral disease associated with HIV/AIDS and the promotion of oral health and quality of life for people living with HIV.
7. develop and implement oral health promotion for school children as part of activities in health-promoting schools.
8. scale up capacity to produce oral health personnel.
9. develop and implement, in countries affected by noma, national programmes to control the disease within national programmes for the integrated man-

agement of childhood illness and for the reduction of malnutrition and poverty.

10. incorporate an oral health information system into health surveillance plans.
11. strengthen oral health research.
12. address human resources and workforce planning for oral health as part of every plan for health.
13. consider increasing the budgetary provisions that are dedicated to the prevention and control of oral and craniofacial diseases and conditions

The Resolution requests the Director-General to:

- raise awareness of the global challenges to improving oral health, the specific needs of low-income countries and of poor and disadvantaged population groups
- ensure that WHO provides advice and technical support to Member States for the development and implementation of oral health programmes
- continually promote international cooperation and interaction with and among all actors concerned with the implementation of the oral health action plan, including WHO Collaborating Centres and Non-Governmental Organizations
- communicate to UNICEF and other organizations of the United Nation system that undertake health-related activities
- strengthen WHO’s technical leadership in oral health promotion.

The WHO approaches to promotion of oral health

The WHO GOHP has developed policies for the improvement of oral health in the 21st century (Petersen, 2003). Four strategic directions provide the framework for focusing WHO’s technical work for oral health: 1: Reducing the burden of oral disease and disability, especially in poor and disadvantaged populations; 2: Promoting healthy lifestyles and reducing risk factors to oral health that arise from environmental, economic, social and behavioural causes; 3: Developing oral health systems that equitably improve oral health outcomes, respond to needs and people’s legitimate demands, and are financially fair; and 4: Framing policies in oral health, based on integration of oral health into national and community health programmes, and promoting oral health as an effective dimension for development policy of society.

Ongoing WHO activities

WHO has published an account of its achievements in oral health during the years 2002-2007 (Petersen, 2008; Petersen, 2009). As an immediate consequence of the WHA60.17 Mandate, the WHO GPOH is currently involved with several important projects.

Policy and programmes

With the active contribution from the WHO GOHP, policies for oral health consistent to the WHA.60.17 resolution are now formulated by the WHO Regional Offices for Africa, and South-East Asia, and initiated for the Eastern Mediterranean and the Western Pacific Regions.

The Ottawa Global Conference on Health Promotion in 1986 was the first of its kind focusing on healthy environments, healthy lifestyles, and health systems oriented towards health promotion and disease prevention. In 2009, the 7th WHO Global Conference on Health Promotion took place in Nairobi, Kenya, and for the first time in history oral health was addressed through a special session organized by the WHO GOHP (Petersen and Kwan, 2010). The session focused on community empowerment, health literacy, and health behaviour, partnerships and intersectoral action, strengthening of health systems, including capacity building for oral health promotion. The oral health inputs for the Nairobi call for action include:

1. Oral health is a human right and essential to general health and quality of life.
2. Promotion of oral health and prevention of oral diseases must be provided through Primary Health Care and general health promotion. Integrated approaches are the most cost-effective and realistic way to implementation of sound interventions for oral health around the globe.
3. National and community capacity building for promoting oral health and integrated oral disease prevention requires policy and appropriate human and financial resources to reduce the gap between the poor and rich.

Recently, WHO initiated a global analysis of social determinants in health and an important report from the WHO Commission on Social Determinants in Health was issued (WHO, 2008). The WHO GOHP contributes to the work carried out under the Commission by focusing the social determinants in oral health. In a significant WHO publication (Blas & Kurup, 2010), equity and implications to public health programmes have been outlined with the focus on priority problems in public health. The oral health chapter of this publication suggests several entry points for public health action (Kwan and Petersen, 2010).

Fluoride and oral health

The WHO GOHP continuously strengthens the effective use of fluoride in countries through establishment of automatic fluoridation schemes. Water fluoridation is strong official policy of WHO as stated in several WHA resolutions. Salt fluoridation and milk fluoridation are highly relevant alternatives if water fluoridation is

not possible. Over recent years the WHO GOHP has been involved with organization of national fluoride programmes in China, Thailand, Vietnam, Laos, Madagascar, Bulgaria and Macedonia. At regional level, the WHO GPOH held a symposium on the importance of fluoride in prevention of dental caries; the meeting was hosted by the WHO Collaborating Centre for Research and Training in Preventive Dentistry, Beijing, PR China. At global level, guidelines and manuals are produced to assist public health administrators, for example, a WHO document on milk fluoridation has been published in 2009, a WHO document on chemicals- including fluoride- has been prepared in 2010, the WHO TRS846 on Fluorides and Oral Health is being updated, and the WHO GOHP provided input to the EU SCHER report on use of fluoride for prevention of dental caries.

Tobacco or oral health

Use of tobacco is a key risk factor in development of oral cavity cancer and periodontal disease. Based on the 2003 WHO Framework Convention on Tobacco Control, the WHO GOHP works by integrating its efforts for oral health in tobacco-free initiatives; recently the Programme took part in the global action on 31 May 2009 "Tobacco causes mouth diseases", with follow-up at country level. Fact sheets on the harmful oral health effects of tobacco use are produced to assist countries in raising the awareness of this key risk factor. In addition, several WHO GPOH publications about the burden of oral cavity cancer and periodontal disease have addressed the urgent need for incorporation of oral health concerns in related national public health intervention.

Diet-nutrition-oral health

The WHO Technical Report Series 916 emphasized the importance of diet in prevention of chronic disease, including oral disease. The role of sugars consumption in chronic disease, including dental caries, is currently being reviewed by WHO to provide update information on the strong evidence of the harmful health effects of sugars. The WHO GOHP contributes to the implementation of the Global Strategy on Diet, Physical Activity and Health, for example, in emphasizing control of sugars consumption and highlighting the importance of fruits and vegetables in oral cancer prevention, and the WHO GOHP collaborates with the WHO Nutrition Guidance Expert Advisory Group.

Oral health through schools

The school is a unique setting for health of children, parents, teachers and the community. The WHO GOHP is involved in the organization of demonstration school health projects in several countries worldwide. Such projects are particularly established in low and middle income countries and often linked to programmes on diet and nutrition and appropriate use of fluoride, for example, milk fluoridation or affordable fluoride toothpaste. Oral health components may be incorporated into general health projects implemented within the WHO framework of Health Promoting Schools. The school health work is supported by UNICEF, UNESCO, and the Education Development Centre.

Oral health-general health-older people

Oral health is essential component of general health and quality of life. In 2005, the WHO GOHP and the WHO Kobe Centre organized a workshop held in Kobe, Japan, on “Oral health-General Health in Aging Societies”. The outcome of this meeting forms an important source for the WHO advocacy work in strengthening of oral health promotion as well as primary health care for older people. Public health programmes for older people are high on the agenda of the WHO GOHP. Further, research on oral health-general health and oral health intervention was considered in 2010 at an international symposium in Niigata, Japan, organized by the WHO Collaborating Centre for Translation of Oral Health Science.

In particular, oral health – general health relationships manifest at old-age. The WHO GPOH has documented that the oral health of older people is widely neglected by policy makers, health authorities, dental professionals and researchers, and other health professionals. Based on a global survey of oral health status and an analysis of oral health programmes for older people, the WHO GOHP has called for public health action as older people are important target group worldwide. Strengthening of health promotion, integrated disease prevention, capacity of oral health systems, including age-friendly primary oral health care, is badly needed. This call for public health action is published in *Community Dental Health* (Petersen et al, 2010).

HIV/AIDS related oral disease

According to estimates by WHO and UNAIDS, 33.4 million people were living with HIV at the end of 2008. That same year, some 2.7 million people became newly infected, and 2.0 million died of AIDS, including 280 000 children. Two thirds of HIV infections are in sub-Saharan Africa. The burden of HIV AIDS is also high in South-East Asia and it is a growing public health problem in Eastern Europe. The WHO GPOH is actively involved with community research on oral lesions related to HIV AIDS in adults, children and orphans in selected countries of Africa. This project is undertaken by the WHO Collaborating Centre for Research and Community Oral Health Programmes, Copenhagen, Denmark. Moreover, the WHO GOHP adds significantly to the WHO/UNAIDS work for prevention of HIV/AIDS and the WHO Programme of Child Health and HIV, for example, in preparation of oral health training modules and manuals for primary health workers.

Strengthening of oral health systems

The WHO GOHP has developed guidelines for strengthening of oral health systems. In high income countries inequity and adjustment of services to match population needs are important issues. In low and middle income countries capacity building, universal coverage, and financially fair health care are key challenges, in addition to initiatives of solving the inequity problem. However, in the majority of countries around the globe there is a high need for establishing national oral health systems that are effectively oriented towards health promotion and integrated disease prevention. For countries with limited oral health manpower, WHO encourages the effective use

of Primary Health Care workers with special training in oral health. Such training programmes may include screening for oral disease, early detection, initial care of symptoms/problems and provision of essential oral health care. Positive experiences are available from developing countries in regard to oral cancer and HIV/AIDS. Working with countries, the WHO GOHP gives support to the development of primary oral health care based on the principles outlined in the World Health Report on Primary Health Care (2008) and agreed upon by the World Health Assembly Resolution WHA.62.12 (2009).

Protection of the environment and dental care

Dental caries is a major public health problem globally. Despite much effort in health promotion and disease prevention, dental restorations are still needed to re-establish tooth function. The recognition of the environmental implications of mercury has increased and alternatives to dental amalgam are desirable. WHO and the United Nations Environment Programme (UNEP) have strengthened the work for reduction of the mercury releases and usage. UNEP is mandated to elaborate a legally binding instrument on a ban of mercury; the work commenced in 2010 with the goal of completing it prior to the UNEP Governing Council/Global Ministerial Environment Forum in 2013. This treaty would have a significant impact on delivering oral health care worldwide. Due to the intervention by the WHO GOHP, it has been agreed to postpone the process for the dental health care sector in order to develop quality alternatives to amalgam for dental restoration. Late 2009, the WHO GOHP held a Consultation in Geneva on dental restorative materials. A report from this technical meeting provides information about the current evidence on use of dental restorative materials and some major challenges in relation to future use of materials alternative to dental amalgam are discussed.

WHO leadership in health information

The WHO Nomenclature Regulations is essential in health care practice and the International Classification of Diseases (ICD) is used for mortality and morbidity reporting in all Member States. ICD versions have shown to be useful for coding of mortality and morbidity, as well as recording specific diseases, injuries, signs, symptoms, complaints, social circumstances, reasons for presentation and external causes of both injury and disease. WHO has initiated an update of the current version ICD-10 into ICD-11. A series of Topic Advisory Groups (TAG) have been established in order to support the technical work, one of these groups is concerned with oral health. The WHO GOHP has invited a group of oral health experts from all Regions to assist in the preparation of this update version to be used in dentistry.

Oral health surveillance

The WHO GOHP has developed systems for oral health surveillance to be integrated in national health surveillance schemes. The WHO STEPS system contains an oral health module for data collection by questionnaires and such system is now in use in several countries. Oral health surveillance based on clinical data is also recommended for countries by use of the WHO manual *Oral*

Health Surveys-Basic Methods (WHO, 1997). The manual has been updated, including STEPS questionnaires for oral health risk assessment and quality of life measures. In addition, tools for collection of data on oral lesions related to HIV/AIDS are suggested. Over the past few years, the update WHO manual has been validated from surveys carried out in selected countries around the globe; the HIV/AIDS component is designed from experiences gained in African countries.

WHO GOHP continues its effort of maintaining the WHO Global Oral Health Data Bank, hosted by the WHO Collaborating Centres for Education, Training and Research in Oral Health, Malmo, Sweden, and Translation of Oral Health Science, Niigata, Japan. The bank is highly relevant to the on-going global oral health surveillance and currently the information from countries is vital to the future publication *Global Burden of Disease*. Surveillance of oral cancer is based on data provided by the WHO International Agency for Research on Cancer. The WHO GOHP is involved with surveillance of Noma in African countries, jointly with WHO AFRO. Recently WHO conducted a survey on the current epidemiological situation of Noma and the implementation of national programmes for prevention.

Oral health research

Research for oral health has high priority in the WHO GOHP policy. The World Health Assembly 2010 (WHA63.21) re-emphasizes WHO's role and responsibilities in health research. WHO recognizes the importance of research for improving health and health equity. In general, it is required to strengthen national health research systems, and to initiate or strengthen inter-country collaboration. Particular attention must be given to the research needs of low-income countries, notably in areas such as technology transfer, research workforce, and infrastructure development. WHO provides clear directions in public oral health research (Petersen, 2009). These imply strong emphasis on social determinants, quality of life, oral health systems research, evidence for public health intervention, operational research, and bridging the gap in oral health research between developed and developing countries. The 7th WHO Global Conference on Health Promotion (Petersen and Kwan, 2010) called upon implementation of oral health science for the benefit of the poor and disadvantaged population groups around the globe. In order to achieve this goal, the WHO GOHP interacts with its WHO Collaborating Centres in oral health, the International Association for Dental Research (IADR), and the World Dental Federation FDI. Recently, IADR initiated a promising project about developing a global agenda for research on social inequality in oral health. Strengthening of such research is intended to cover the major oral diseases and their social determinants, and the implications to public health research

WHO work with Non-Governmental Organizations (NGOs)

WHO organizes regular dialogue meetings with NGOs for the sharing of experiences in prevention of chronic disease. The WHO GOHP works effectively with two global NGOs in oral health, i.e. the World Dental Federation FDI, and the International Association for Dental Research (IADR). The two NGOs are in official relation

to WHO and activities are based on joint work plans of 3 years. On-going WHO-FDI-IADR activities are for instance the provision of sound evidence and practical experience relevant to development of future materials for dental restoration, and strengthening of oral health intervention in relation to older people. WHO also works with other NGOs, such as Aide Odontologique Internationale (AOI), in community based oral health projects in several low and middle income countries.

The leadership role of WHO

WHO's mandate for action in oral health and directions for the work to be carried out by the oral health technical programme are given by WHA.60.17. The WHO GOHP continues its effort for raising the awareness of the importance of oral health among policy makers and health authorities at global, regional and national levels. This essential task also includes advocacy for oral health in relation to other United Nations organizations such as UNICEF, UNESCO, UNEP and UNAIDS. Working effectively with NGOs in oral health is central as interaction may provide for exchange of experience and initiate oral health actions.

The WHO GOHP integrates its activities for oral health in the work carried out by other WHO departments or units, first of all departments for diet and nutrition, tobacco intervention, cancer, HIV/AIDS, child health, ageing and health, strengthening of health systems and Primary Health Care, surveillance, research and evidence in public health, water and sanitation, and healthy environments. The GPOH is a unit in the WHO Department for Chronic Disease and Health Promotion; the department has developed its Action Plan for Prevention of Non-Communicable Disease 2008-2013 which focuses on key risk factors also relevant to oral health, i.e. diet and nutrition, tobacco use, and excessive use of alcohol. This action plan offers a unique platform for integration of oral disease prevention into the prevention of other prominent chronic diseases, such as diabetes and cancer in general. The WHO GOHP works effectively with WHO Collaborating Centres in the area of oral health. Activities of centres are carried out under WHO leadership; the great commitment and the high-level technical assistance offered by the WHO Collaborating Centres are most valuable to the implementation of the WHO work plan for oral health. In parallel, the work undertaken by IADR, FDI and AOI, in support of WHO is highly appreciated.

Globally, WHO plays a leading role in the work for prevention and control of disease and promotion of health. The adoption of the basic principles in health promotion is still a high challenge to countries around the world. The 7th Global Conference on Health Promotion 2009 set the guidelines for translation of science into action and special efforts were done in relation to oral health. Currently, WHO is strengthening its work for mainstreaming health promotion; oral health promotion is a significant part of this project. Based on the evidence available, the aim of this work is to specify "What Works" and to identify barriers and opportunities for health promotion. Most important, WHO is highly committed to work for implementation health promotion and in closing the health gap between rich and poor at global, regional and country levels.

References

- Blas, E., Kurup, A.S. (2010): *Equity, social determinants and public health programmes*. Geneva: World Health Organization.
- Commission on Social Determinants of Health (2008): *Closing the gap in a generation. Health equity through action on the social determinants of health*. Final Report of the CSDH. Geneva: World Health Organization.
- Kwan, S., Petersen, P.E. (2010): Oral health: equity and social determinants. In: *Equity, social determinants and public health programmes*. Ed. Blas, E., Kurup, A.S., pp159-176. Geneva: World Health Organization.
- Petersen, P.E. (2003): The World Oral Health Report 2003: continuous improvement of oral health in the 21st century- the approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology* **31** (1), 3-24.
- Petersen, P.E. (2008): World Health Organization global policy for improvement of oral health - World Health Assembly 2007. *International Dental Journal* **58**, 115-121.
- Petersen, P.E. (2009): Global policy for improvement of oral health in the 21st century - implications to oral health research of World Health Assembly 2007, World Health Organization. *Community Dentistry and Oral Epidemiology* **37**, 1-8.
- Petersen, P.E., Kwan, S. (2010): The 7th WHO Global Conference on Health Promotion- towards integration of oral health (Nairobi, Kenya 2009). *Community Dental Health* **27** (Supplement 1), 1-9.
- Petersen, P.E., Kandelman, D., Arpin, S., Ogawa, H. (2010). Global oral health of older people - Call for public health action. *Community Dental Health* **27** (Supplement 2), 1-11.
- World Health Organization (1997). *Oral Health Surveys- Basic Methods* (4th Edition). Geneva: WHO.

Reflections from the outgoing Editor.

It has been an exciting privilege for me to serve as Editor of the journal *Community Dental Health* for the last eight years. Volume 1, number 1 of this journal was published in March 1984 under the editorship of the late Professor Peter James of Birmingham. The journal developed from the newsletter/proceedings of the British Association of the Study of Community Dentistry (BASCD) under the editorship of Dr Frank Stewart and later Dr. Alan French. Prof. James was succeeded as Editor by Professor Martin Downer in 1993 and I was very proud to be appointed Editor in 2003 (Anderson, 1984; Gelbier, 2003)

Over the last eight years a major development has been the introduction of the online journal as a result of which, a paper, on being accepted for publication, will be published online within a very short space of time. Also, at recent meetings of the Editorial Board and of BASCD and the European Association of Dental Public Health (EADPH) councils, a decision to proceed with an online reviewing system was taken. The exact system to be adopted for this exciting new development is currently being considered by the Editorial Board. The work of the Editor of a journal is hugely dependent upon the quality and willingness of colleagues to spend time and effort reviewing manuscripts. Dental public health being a multidisciplinary subject means that the range of topics falling within the Aims and Scope of our journal is very wide. As a result, the team of reviewers who have helped in assessing articles over the last eight years has expanded and now over 250 colleagues worldwide give of their time and expertise to this process. The availability of published work on Pub Med and other similar websites has greatly facilitated the identification of appropriate experts.

A feature of the changes that I have seen in my time as Editor has been the globalisation of contributors to the Journal. Authors from over 50 countries have had their work published in *Community Dental Health*. Perhaps more impressive is the expansion of the contribution of the EADPH membership to the scientific content of the

Journal. I would like to thank the committees and working groups in EADPH who have been mainly responsible for this important development. I am confident that innovative research in Dental Public Health from the European base will increase noticeably in future years. The emergence of new topics in the Journal has also been a feature. For example the increase in the number of top class research papers on oral health related quality of life is noteworthy. Similarly an increase in high class reports on qualitative research projects. The emergence of these and other new topics matches the growing interest in the scientific aspects of dental public health worldwide.

An important reason why my work as Editor of CDH has been so rewarding over the last eight years has been the help and support of the Associate Editors, Dominique Declerk and Eino Honkala, Deputy Editors, John Beal and Richard Watt, and the members of the Editorial Board – Gill Bradnock, Ivor Chestnutt, Gill Davies, Martin Downer, Mike Lennon, Cynthia Pine, Peter Robinson and Aubrey Sheiham. Our statistical advisor Professor Helen Worthington has been a longstanding colleague of mine, since co-supervising her Masters Degree in Statistics in the mid 1970s. The central role of statistics in the science of dental public health has been well marshalled under Helen's guidance. I want to pay special thanks to the previous Editor Martin Downer who was ever willing to offer advice and help which I frequently requested. My thanks to the 32 authors of the Editorials published during my time as Editor. I am pleased that the Editorial for this my last issue deals with the work of WHO, Geneva as an acknowledgment of the important roles of WHO generally and Poul Eric Petersen in particular in promoting Dental Public Health worldwide. I was fortunate to have as my Editorial Assistant, Ms. Colette Spicer, whose help and guidance throughout is greatly appreciated. It was interesting that on taking on the post of Editorial Assistant Colette decided to complete an honours BA Degree in English Language, no doubt aware of the limitations of the Editor in this regard!

Over the last few years the feature most frequently commented upon by readers of CDH has been the 'Grand Circle' historical photographs and brief narratives containing names of key figures in the development of dentistry and dental public health. The Editor of this feature has been my friend and colleague Professor Robin O'Sullivan, Professor of Anatomy in Bahrain Medical School and an enthusiastic anthropologist. It is indeed fitting that this final contribution from Prof. O'Sullivan should depict the earliest known dentist, Heshire, who lived about 4,600 years ago! I would like to take this opportunity to thank Robin for his help for this novel feature of our journal and readers will no doubt be glad to hear that the new editor, Professor Mike Lennon is making arrangements to continue this feature.

It is indeed a great pleasure for me to hand over the Editorship to Professor Mike Lennon. Mike has been associated with BASCD since the early 70s, acting as

Honorary Secretary, President and as a member of BASCD Council for many years and was founding member of the Journal. I am delighted that somebody of Mike's stature in the scientific world will be at the helm as Editor of our Journal. I wish Mike and his Editorial Assistant, Michael Smith, every success in the future. I have no doubt that the Journal will go from strength to strength under their stewardship.

Denis O'Mullane

References

- Anderson, R. J. (1984). A history of the British Association for the Study of Community Dentistry. *Community Dental Health* **1**, 5-10.
- Gelbier S. (2003). Community Dental Health: the road to excellence. *Community Dental Health* **22**, 4-10.

Book Review

“Oral Health Epidemiology: Principles and Practice” by Amit Chattopadhyay, published by Jones and Bartlett Publishers, 2009. ISBN: 9780763754099. Jones and Bartlett. £42.99

This is a book that everyone involved in undertaking research in oral health should have in their bookcase. As the author points out epidemiological concepts have major applications in basic science, general clinical research and public health as well as studying health states in populations, which is the definition of epidemiology. The text book is well crafted and can be read from cover to cover (392 pages) or it can be used as a good reference book with the important information clearly summarised in boxes. I personally found it extremely informative, easy to follow and interesting. Although the book generally has a USA focus (e.g. periodontal disease surveillance, oral cancer mortality, FDA, water fluoridation policy) there are other examples outside the US and there is frequently sufficient diversity in the US examples to be applicable to other parts of the world.

The book is written in three sections. The first and longest section gives an overview of epidemiological concepts in oral health. Apart for the usual descriptions and definitions of different study designs, sampling methods, measuring associations including diagnostic tests and meta-analysis, there are several excellent chapters on: error and bias, confounding and effect modification (this includes an interesting explanation of causal diagrams), pharmacoepidemiology. There are some interesting comments relating to the calculation and analysis of DMFT/S data. I did however find the chapter on molecular and genetic epidemiology quite challenging as I am unfamiliar with the terminology, but that is probably reflects my non-clinical (or biological) background.

The second section of the book titled 'Epidemiology of oral diseases and conditions'. This provides a good description of the measurement of caries and periodontal disease, and the epidemiology of oral cancer survival and screening tests for oral cancer. The section on risk factors for oral cancer is comprehensive and is followed by a section on the genetic and molecular epidemiology of oral cancer. Many other oral diseases and conditions are included, and this section also includes an excellent chapter on fluorides, which includes the mechanism of action, fluorosis indices and water fluoridation. Although this is generally about fluorides in the USA, there is a summary of recommendations by international health agencies.

The short third section "Oral Epidemiology in socio-biological context" comprising three chapters: social epidemiology, bioethics in oral health and systems thinking. All three chapters are informative and thought provoking. The final chapter on 'Systems thinking' certainly looks an interesting way forward which "attempts to answer questions about health determinants in a comprehensive quantitative and qualitative analysis of the manner in which all the components of a biological system interact functionally over time".

In conclusion, as I said in the introduction, this is a very comprehensive, well written book that I strongly recommend.

Helen Worthington