



REGIONAL OFFICE FOR THE WESTERN PACIFIC  
BUREAU RÉGIONAL DU PACIFIQUE OCCIDENTAL  
P. O. Box 2932, MANILA

REGIONAL COMMITTEE

Twelfth Session  
Wellington  
31 August - 5 September 1961

TECHNICAL DISCUSSIONS

WP/RCL2/TD2  
12 May 1961

ORIGINAL: ENGLISH

THE PREVALENCE OF DENTAL DISEASE IN THE  
WESTERN PACIFIC AND ITS PUBLIC HEALTH IMPORTANCE

by

Associate-Professor G.N. Davies<sup>1</sup>

Summary

Complete physical health can only be achieved when each part of the body functions efficiently. As integral parts of the body the teeth and their supporting tissues enhance physical well-being when they are healthy and cause pain, discomfort, interference with growth, and economic loss when they are diseased.

Some countries already have extensive public dental health programmes, others have none. In either case comprehensive dental surveys are required as a basis for the evaluation of existing dental services and for the planning of future dental programmes. In developing countries economic, political, ethnic, professional and social factors will exert a powerful influence not only upon priorities accorded dental problems relative to other health problems but also upon the emphasis which is placed upon health education, research, prevention and treatment within the dental health programme itself. These factors can be viewed in perspective only when facts on the prevalence of dental diseases are known.

In the Western Pacific Region dental caries, periodontal disease, osteomyelitis of the jaws, oral cancer and malocclusion are sufficiently prevalent to warrant immediate attention from public health authorities. The recommendations of the Dental Health Seminars, held in Wellington in 1954 and Adelaide in 1959, should be implemented at the earliest opportunity.

---

<sup>1</sup>Head of the Department of Preventive, Public Health and Children's Dentistry, University of Otago Dental School, Dunedin, New Zealand.

CONTENTS

	<u>Page</u>
1. THE PREVALENCE OF DENTAL DISEASES IN THE WESTERN PACIFIC REGION .....	1
1.1 Dental caries .....	1
1.2 Periodontal diseases .....	2
1.3 Malocclusion .....	3
1.4 Other oral conditions of public health importance ....	3
2. THE IMPORTANCE OF DENTAL SURVEYS IN A PUBLIC HEALTH PROGRAMME .....	4
3. RECOMMENDATIONS .....	4

WHO defines health as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity." The physical well-being of an individual depends upon the health and functional efficiency of the entire body. Complete mental and social well-being can only be attained when the individual is free of pain, disability and discomfort. The teeth and their supporting and investing tissues are an integral part of the body. In a positive sense healthy teeth are essential to efficient mastication which helps to ensure full growth and development of the body. Healthy teeth also help an individual to attain complete social well-being by giving form and character to the face and by promoting clear speech. In a negative sense dental ill-health causes pain and discomfort, lowers the resistance of the body to general disease, may cause systemic disease and results in loss of time from school and industry.

Dental disorders of public health importance in the Western Pacific Region are dental caries, periodontal disease, malocclusion, osteomyelitis of the jaws and oral cancer.

## 1 THE PREVALENCE OF DENTAL DISEASES IN THE WESTERN PACIFIC REGION

### 1.1 Dental caries

Dental caries occurs in every country in the Western Pacific Region. Its prevalence varies between countries and regional variations have been detected within each country in which surveys have been made. Conclusions derived from the results of surveys conducted by different examiners must, however, be tentative because criteria for the diagnosis of caries and methods of examination have not been standardized. In many ethnic groups there are pronounced differences between the prevalence of caries in deciduous and permanent teeth. It would appear that when the intensity of the forces attacking the teeth is low as in New Guinea (Report, 1950) and remote atolls of the Cook Islands (Davies, 1956) the prevalence of caries is determined by the structural integrity and chemical composition of the enamel surface. Conversely, when the intensity of the forces attacking the teeth is very high, as it is in Australia (Barnard, 1956) and New Zealand (Hewat and Eastcott, 1953) structural integrity alone is insufficient to resist attack. No obvious racial differences are apparent so far as caries of deciduous teeth are concerned but in permanent teeth Caucasians exhibit consistently high prevalence rates.

Among all races the prevalence of caries is directly related to the frequent consumption of sticky refined carbohydrate (Takeuchi, 1960; WHO 1954, 1959). The prevalence of dental caries is increasing in those countries in which the consumption of sugar and flour is increasing. Some countries in the Western Pacific Region provide striking examples of the effect of refined carbohydrates on the prevalence of dental caries. In Fiji, and the Cook Islands (Davies, 1956) for example, the prevalence of caries is low in villages where there is no trade store and high in areas where the trade store sells flour, biscuits and sugar. In some Asian

countries the use of sweetened condensed milk increases the prevalence of caries (WHO, 1954).

The public health importance of dental caries obviously varies from country to country depending on its prevalence. In countries with a high prevalence rate the consequences of the disease are especially serious in young children and adolescents. Some form of treatment service is, therefore, essential. It must be recognized, however, that the prevalence of the disease will not be reduced by treatment alone. Known preventive measures must be applied. From a public health point of view there are two main approaches to the prevention of dental caries. The first is to increase the resistance of teeth to the disease through the use of fluorides. The most efficient way of doing this is fluoridation of public water supplies. (Commission of Inquiry, 1957). Fluoride tablets are recommended when fluoridation is neither possible nor practicable (Arnold, McClure and White, 1960). The second approach is to establish a continuous and co-ordinated health education programme which aims to encourage individuals to take an active personal responsibility in the maintenance of their own dental health by:

- (a) reducing the frequency with which sweet sticky foods are eaten,
- (b) ending meals with firm, fibrous foods, and
- (c) toothbrushing and/or mouth rinsing immediately after eating.

## 1.2 Periodontal diseases

Except for Australia, New Zealand and possibly Japan, periodontal disease is probably more prevalent in the Western Pacific Region than is dental caries (Shourie, 1960; WHO, 1954, 1959). But even in Australia and New Zealand periodontal disease is becoming a problem of increasing importance as the existing dental services are able to cope with the effects of dental caries. Until recently there has been no reliable and reproducible method of reporting periodontal disease. Data which report prevalence rates in terms of persons affected are of limited value since they give no estimate of the degree of involvement. From a public health point of view the immediate need is to reassess the prevalence of the disease throughout the region. Until this is done public health solutions to the problem will be mainly confined to a health education campaign with the objects of promoting a high standard of oral hygiene. In high prevalence countries where a dental service is established, a routine of regular and thorough scaling should be instituted for all patients with deposits of calculus. Auxiliary personnel can be usefully employed for this purpose. According to Shourie "calculus induces the more common forms of periodontal disease and is responsible for 80 per cent or more of periodontal lesions in both children and adults." (Shourie, 1960).

Since most periodontal diseases are chronic, and progressive, successful treatment depends upon early diagnosis. For this reason auxiliary dental and medical personnel working in high prevalence areas

should be trained to recognize the early signs of diseases of the tissues supporting the teeth.

### 1.3 Malocclusion

Surveys which have been made in Pukapuka, Fiji, New Guinea, United States of America, New Zealand and Malaya show that malocclusion is prevalent in all countries and varies from as low as 37 per cent of children affected in Fiji to as high as 50 to 70 per cent of children affected in New Zealand and the United States (Davies, 1956). The majority of malocclusions are caused by inherited or other factors which directly or indirectly interfere with the growth of the jaws. There are only two main preventable causes of malocclusion. These are extraction of deciduous teeth prior to the eruption of permanent teeth and abnormal pressure habits such as thumb-sucking and tongue thrusting. Caries is virtually the sole cause of early extraction of deciduous teeth. In countries with a school dental service staffed by auxiliaries, the auxiliaries should be trained to recognize early signs of malocclusion and to ensure that children with deciduous molars extracted prematurely are referred to a dentist for interceptive treatment. Simple space retaining devices can be made quickly and cheaply and will often either prevent a malocclusion from developing or at least reduce the complexity of an existing malocclusion. In most countries, however, malocclusion would receive a low priority during the initial stages in the development of a public dental health programme.

### 1.4 Other oral conditions of public health importance.

Osteomyelitis of the jaws is prevalent in many countries in the Western Pacific Region. "It seems likely that a combination of avitaminosis and neglect is the main cause of so-called 'tropical osteomyelitis' (Allwright, Tickle and Matsumiya, 1960). In some countries osteomyelitis is a relatively common sequel to the extraction of teeth by untrained or semi-trained "dentists" using infected instruments and poor technique. Early treatment is, of course, essential for this condition. From a public health point of view, the long-term solution to the latter problem is to ensure that the training of dentists and auxiliaries is accelerated. A short term but only partial solution is to train existing public health workers to recognize the early signs of osteomyelitis so that the existing dental services can be used to the best advantage.

"According to statistics in countries where comprehensive data are available, oral cancer comprises about 8 per cent of all reported cases of cancer." (WHO, 1955). However, it is higher than this in some countries such as Ceylon, Malaya, Thailand and Singapore (Allwright et al, 1960) and Papua-New Guinea (Barnes, 1960). From a public health point of view, the important factor with regard to oral cancer is its early detection and referral for diagnosis and treatment to the proper authorities. This is partly a problem of public health education and partly a problem of educating dental and medical personnel to recognize the earliest signs of cancer.

## 2. THE IMPORTANCE OF DENTAL SURVEYS IN A PUBLIC HEALTH PROGRAMME

Throughout the world there is general agreement on the essential functions of a public dental health programme. These are: the widespread application of measures for the prevention of dental disease; a programme of dental health education; a programme of research; and the provision of a remedial or corrective treatment service. The function upon which the greatest emphasis is placed will depend on the nature and severity of the dental problems as well as the social, political, professional and economic conditions of the country concerned. A properly conducted survey will provide data which will serve as a basis for planning a public dental health programme and for estimating the personnel, facilities, and finance required. A dental survey will also provide objective data which can be used to evaluate the effectiveness of existing dental programmes. Priorities within a health service cannot be laid down until an assessment has been made of the prevalence and extent of dental diseases relative to other health problems.

Regional variations in the prevalence of dental diseases can be detected. If these are sufficiently marked the data from the dental survey can be used as a basis for planning an epidemiological study to determine the reasons for the differences detected. Such research can have important practical results as exemplified by the discovery of fluoride as a caries-preventive agent. In New Zealand regional variations in the prevalence of dental caries are being studied to determine whether or not they are associated with the trace elements in soils (Ludwig, Healy and Losee, 1960). Since the dental and oral tissues are an integral part of the body such research must necessarily provide additional information which will not only add to our knowledge of man's reaction to his environment but might also facilitate the solution of other health problems.

Special problems of general as well as dental interest can be detected. In several countries in the Western Pacific Region such as parts of Hawaii, (Jones et al. 1930, 1934), New Guinea (Kirkpatrick, 1935), parts of Fiji and some of the atolls in the Cook Islands (Davies, 1956) defects in the structure of the enamel of deciduous teeth (Odontoclasia) are common. Histological examinations have shown that the factors responsible for this condition operate during the last few months in utero and the first few months post-partum. During its formation the enamel is sensitive to any nutritional or metabolic disturbances. Since enamel is unable to repair itself defects in its structure are permanent and, therefore, readily detectable. The metabolic disturbances of pregnancy and infancy which cause the defects must also affect the general health of infants. It is interesting to note that odontoclasia only occurs in areas where infant mortality rates are high. It is possible that the factors which cause odontoclasia also affect infant mortality rates. Certainly an attempt should be made to find the cause of odontoclasia.

## 3. RECOMMENDATIONS

- 3.1 Comprehensive dental surveys should be undertaken in most countries in the Western Pacific Region. An Expert Committee on the

*Standardization of Reporting of Dental Diseases* is to meet at WHO Headquarters in Geneva in November 1961. The recommendations of this committee should be followed to ensure that criteria and methods are uniform.

- 3.2 The data obtained from surveys in each country should be made available to health administrations in all countries in the Region.
- 3.3 Within each country data on the prevalence of dental diseases should be used as a basis for planning a public dental health programme where none exists, and for evaluating the effectiveness of existing programmes; for assessing priorities within the health services; and for assessing priorities that should be accorded research, prevention, health education and treatment within the dental health programme itself.
- 3.4 Existing data reveal that the prevalence of dental diseases is sufficiently high throughout the Region to justify the appointment of an experienced dental health officer to the Western Pacific Regional Office, the establishment of autonomous divisions of dental health within existing public health departments, and generally to justify the early implementation of the recommendations of the two dental health seminars sponsored by the Western Pacific Regional Office.

BIBLIOGRAPHY

- Allwright, W. C., Tickle, R. J. S., and Matsumiya, S. (1960) Dentistry in Asian countries, Int. dent. J., 3:327-349
- Arnold, F. A., McClure, F. J. and White, C. L. (1960) Sodium fluoride tablets for children, Dent. Progress, 1:12-16
- Barnes, D. E. Personal communication.
- Barnard, P. D. (1956) Dental survey of State school children in New South Wales. National Health and Medical Research Council Special Report Series No. 8. Canberra
- Baume, L. J. (1960) Joint Subcommittee of the F. D. I. on Standardization of Caries Recording Methods, Geneva
- Cadel, P. B. (1960) Dental health in South Pacific Territories. South Pacific Commission Tech. paper No. 131. Noumea, New Caledonia
- Davies, G. N. (1956) Dental conditions among the Polynesians of Pukapuka (Danger Island)  
1. General background and the prevalence of malocclusion, J. dent. Res., 35:115-131  
2. The prevalence of periodontal disease, J. dent. Res., 35:734-741
- Davies, G. N. (1956) A comparative epidemiological study of the diet and dental caries in three isolated communities. Proc. Conference on Diet and Oral Health. University of Alabama.
- Hewat, R. E. T. and Eastcott, D. F. (1953) Dental caries in New Zealand, Med. Res. Council of New Zealand.
- Jones, M. R., Larsen, N. P. and Pritchard, G. P. (1930) Dental disease in Hawaii, (1) Odontoclasia : a clinically unrecognized form of tooth decay in the pre-school child of Honolulu, Dent. Cosm., 72:439-450
- Jones, M. R., Larsen, N. P. and Pritchard, G. P. (1934) Taro and sweet potatoes versus grain food in relation to health and dental decay in Hawaii, Dent. Cosm., 76:395-409
- Kirkpatrick, R. M. (1935) Dental caries and odontoclasia in New Guinea, Dent. J. Aust., 7:707-714
- Kridakara, O., Boozayaangool, R., Yuktananda, I., and Volker, J. F. (1956) Dental survey of selected Thai children, Amer. J. clin. Nutr., 4:280-284



- Ludwig, T. G. Healy, W. B. and Losee, F. L. (1960) An association between dental caries and certain soil conditions in New Zealand, Nature (Lond.), 186:695-696
- McCombie, F., and Chua, S. C. (1957) A survey of Chinese, Malay and Indian young adult males in Singapore, J. Canad. dent. Ass., 23:687-698
- New Zealand Commission of Inquiry (1957) Report on the fluoridation of public water supplies. Government printer, Wellington.
- Report of New Guinea Nutrition Survey Expedition, 1947. (1950)  
Department of External Affairs, Canberra.
- Shourie, K. L. (1960) The importance of early dental care programmes in the prevention of periodontal disease, Geneva, (Unpublished working document WHO/DH/46 issued by WHO Headquarters)
- Takeuchi, M. (1960) Epidemiological study on relation between dental caries incidence and sugar consumption, Bull. Tokyo dent. Coll., 1:58-70
- Williams, J. F. (1953) Report on dental services in Niue Island, Unpublished report.
- World Health Organization (1954) Report on the Dental Health Seminar, Wellington, New Zealand, 4-21 May 1954 (Unpublished document issued by the WHO Regional Office for the Western Pacific)
- World Health Organization (1959) Report on the Second Seminar on Dental Health, Adelaide, Australia, 10-20 February 1959 (Unpublished document issued by the WHO Regional Office for the Western Pacific)
- World Health Organization (1955) Dental Health. Meeting of a WHO Consultant Group. Chron. Wld Hlth Org., 9,10-15