

Interaction between salt fluoridation and comprehensive oral health promotion

Summary

Health or disease status is the result of biological, behavioural, and social determinants. The components of health promotion focus specifically on these determinants. How the dissemination of fluoridated salt – a biological component of oral health promotion – interacts with both the determinants of health and the non-biological components of oral health promotion is discussed with respect to individual health behaviour, socio-economic health disparities, the physical and social environment, and the health education curriculum.

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Introduction

The biological determinants of oral health are well known, and it is clear how oral health can be kept at a satisfactorily high level. Use of fluorides, plaque removal, and diet control (a few rules regarding eating habits) are the “technical” components of oral health promotion (OHP) that serves to control the biological determinants. Whether or not a person makes use of these components depends on many non-biological determinants belonging to other areas of human life, as depicted in Figure 1.

Health education, teaching oral health self care, information, (social) marketing, and health policy are the components of OHP that shall enable people to apply the techniques of oral self care in order to maintain or improve their oral health. Therefore,

developing of clinical methods and oral hygiene products is part of OHP, but essentially OHP has to deal with: modifying human behaviour, shaping adequate communication, information and teaching, taking into account social conditions, creating a supportive environment, planning and executing health policy and social policy (SCHOU & BLINKHORN 1993).

Specific interactions among some single elements of these items lead to a person's oral health status (HORNUNG 1997). Example: High sugar consumption principally favours dental caries. If it is combined with low perceived susceptibility (to caries), lack of knowledge and low oral health consciousness in the social environment, an increase in dental caries is much more likely to happen than if high sugar consumption is combined with high perceived susceptibility, good knowledge, and well established oral health consciousness. On the other hand, if good knowledge is inactivated by a high stress level or low self-confidence, knowledge loses its positive effect. Because of the significance of such processes, contemporary models of oral health promotion take into account all these elements and the interdependencies among them (SOEGAARD 1993, INGLEHART & TEDESCO 2000).

This paper discusses some aspects of how salt fluoridation interacts with determinants of dental health status and components of oral health promotion.

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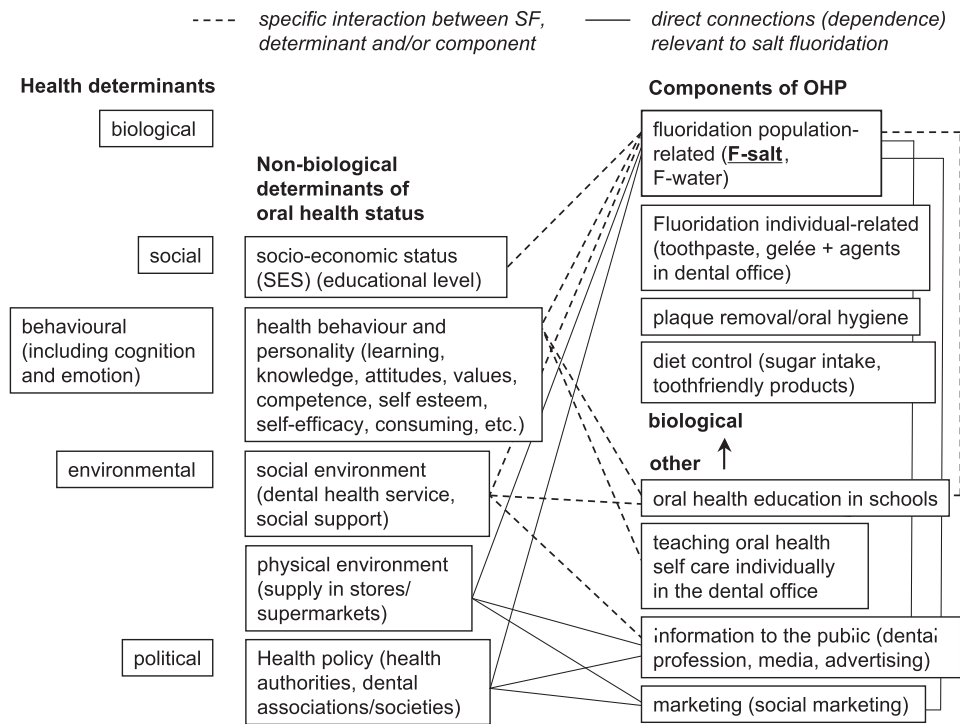


Figure 1: Interactions between FS, non-biological determinants of oral health status and components of OHP.

Some of the indicated connections are interactions in the proper meaning of the term (point out by broken lines), others are just dependences (point out by solid lines).

Interaction between salt fluoridation and oral health promotion (OHP) as a whole

First, "interaction" between salt fluoridation and OHP as a whole has to be considered. For those people consuming F-salt the effectiveness of F-salt when adequately implemented is of the same order as that of F-water (WHO 1994, MARTHALER 2005a). In Switzerland where 87% of the population consume domestic F-salt, MARTHALER (2005a) estimates a 20–25% caries reduction due to SF. In combination with other oral hygiene activities, FS contributes to the relatively high level of dental health in young people. This fact calls for re-adjustment of the objectives of OHP: Instead of fighting against large amounts of dental caries, the objective is now to help people keep the level of health already reached. Methods and objectives of OHP will be modified accordingly to the findings of modern health psychology as well as current learning models that are used as resources (e.g. self activity, curiosity, need for acceptance in a group, appeal to self esteem). In addition, more attention may be paid to close gaps still existing, as for example with a view to some disadvantaged social groups.

Interaction between SF and individual behaviour

Health behaviour depends on a person's behaviour in general. When, for instance, plaque should be removed, individual behaviour patterns are crucial. Behaviour is shaped by a bundle of factors from the inside and the outside world of the individual: learning capability, self responsibility, self care skills, personal values, acquired habits, self-esteem, socio-economic situation, educational level, general health, social environment, and health care system. Because of these manifold influences on individual behaviour we can observe that the variance of health parameters, which largely depend on individual behaviour, is wide. When public health objectives can be reached by appropriate environmental conditions or political decisions, respectively, the various factors of individual behaviour have little or no influence.

Prominent example: provision of safe drinking water. A second example of minimizing the influence of individual behaviour are the strategies used to reduce smoking: Success in reducing individual smoking habits is limited. In order to reduce the outside factor "occasion" (and to protect non-smokers) general regulations for public places have been introduced in some countries. Use of FS benefits from comparable advantages even though it still depends to a certain extent on the acceptance by the public. In fact, as far as buying FS requires an individual decision, individual behaviour is included. Yet, as we will see in a section below, there is a reciprocal relationship between diffusion and acceptance of a product. As far as FS dominates the "physical" environment (i.e. the shelves in the stores) and as far as it is already accepted in the social environment, the likelihood that individual choice occurs will be diminished, even though it is just such free choice of the consumer, which enhances the acceptance in the broad public. In Switzerland, we can consider three reasons (maybe in combination) for the 87% FS proportion of the salt sold: 1) possibly the individual choice has been positively influenced, 2) the individual choice could have been minimized, 3) the interaction between political decisions, supportive environment, (social) marketing and individual behaviour has worked out in a successful way.

Looking at individual behaviour itself, we would expect at first glance that persons or populations in unpleasant health conditions would make particularly strong efforts to improve these conditions. However, the opposite happens: it is well known that the higher the health level of a person or a population, the more likely health promotion activities are adopted.

The salutogenetic concept by Antonovsky postulates promoting health protecting factors and resources rather than trying to diminish the determinants for disease (cited in WYDLER et al. 2000). Such factors are for example high education, high self-confidence, good social rapport, little fatalism, and so on. Such resources are rarely found in socially deprived persons. We know that, in consequence, such persons are likely to have less healthy

lifestyles whereas healthier persons care more for their health. If a health problem adds to an already existing burden of critical life situations, which also includes health deficits, it is easy to understand that resources for managing an additional problem are missing. Hence, health status itself may be considered as a relevant resource of health behaviour (and it is indeed a predictor for health behaviour). Therefore, measures like SF, which enhance oral health independent of the individual behaviour, might ameliorate the starting position for desired health behaviour. (This describes the effect of a very substantial interaction between individual behaviour and SES on health; see following section.)

In summary, it can be stated that SF diminishes the possible health threatening effects of (negative) individual behaviour. At the same time, it can be considered as an environmental resource that facilitates individual health behaviour. It offers a chance for better oral health for all those individuals who temporarily or permanently may not be able to behave sufficiently oral health-oriented for whatever reasons.

Interaction between salt fluoridation and SES

Strong evidence could be demonstrated worldwide for the association between oral health status and socio-economic status (BURT 2002, HOBDEL et al. 2003). Is there also a specific interaction between salt fluoridation and SES?

JONES & WORTHINGTON (2000) examined the association between dental caries and social deprivation in 12-year-old children as measured by a deprivation score based on census variables (Townsend score), using a population with water fluoridation (Newcastle) and another without water fluoridation (Liverpool). As expected, caries prevalence in Liverpool was higher (1.58) than in Newcastle (0.92). Yet, the regression line equations predicting the percentage reduction in levels of dental decay by the Townsend score in the fluoridated area show a 37% reduction in the mean DMFT at a Townsend score of zero (well-to-do stratum) and a predicted 52% reduction at a Townsend score of 10 (very deprived).

The quoted example supports the assumption that F-salt (when largely disseminated in a population) reduces the dental health divide associated with SES by providing greater benefit in population strata with high deprivation level or low SES, respectively. Even though the SES effect does not disappear, fluoridation has at least the effect of reducing the dental caries disparities between the different SES strata. In his paper "Fluoridation and social equity", BURT (2000) postulates that for this important reason (water- or salt-)fluoridation should be established or be kept as a public health priority.

Interaction between salt fluoridation, social environment, and (social) marketing

STEPHEN et al. (1999) compared the prevalence of anterior dental fluorosis of 14-years-old Hungarian schoolchildren exposed to 350 ppm F/kg domestic salt from birth to 2.3–4.8 years (test) to the fluorosis of subjects without this exposition (control). With respect to caries prevalence, the authors did not expect a favourable effect of the earlier exposition to fluoride (up to the age of 4.8 years) to have persisted in the permanent teeth. After 1985, when the supply of fluoridated salt ended, children of both groups had comparable fluoride exposition (fluoride tablet distribution at kindergarten and school in both the test and control areas from 1985 to 1991, thereafter increasing use of fluoridated

toothpaste beginning to be available in Hungary in the early nineties). However, they were somewhat surprised to find a lower caries prevalence in the control group (DMFT=2.97; SD=3.60) than in the test group (DMFT=5.37; SD=4.93); in view of the similar fluoride exposure (the supply of fluoridated salt during the first three years of life is irrelevant as stated above), one would expect similar DMF averages.

The authors concluded that the difference in caries prevalence between the groups over such a short time span may well be explained by a socio-economic factor, given – as they assume – the rural life conditions of the test subjects. It is known that in the eastern European countries the diffusion of fluoridated dentifrices (as part of western lifestyle) into urban areas happened faster than the diffusion into rural areas. So, the children in the city of Szeged may have benefitted earlier and more, respectively, from the fluoride in the toothpaste than their rural-dwelling peers.

It is true that socio-economic factors may have played a role; e.g. it can be assumed that the educational level in the urban area was more advanced than in the rural area. Nevertheless, for the reason of the earlier access to F-dentifrice in the urban area as compared to rural circumstances, the rural origin, seen by the authors as a socio-economic factor, should rather be interpreted as an environmental factor that was in fact responsible for the higher caries prevalence there.

"Environment" can refer to the "physical" surrounding or to social groups to which the individual belong. When FS is brought into stores and into kitchens it becomes part of the "physical" environment. Dissemination and availability of FS by clever marketing as described by MARTHALER (2005b) forms an enabling factor pushing forward the process of diffusion.

The steady increase of the effect of preventive efforts during the last decades is to a large extent due to the use of fluoride containing products, above all toothpastes. Following the theory of diffusion of innovations by ROGERS (2003), this may have convinced a growing number of people that SF is also useful and does not present any health risk. (The preceding positive experience with iodized salt may have contributed, too.) At the point in time when a product is used by a growing part of the population, the users form a social environment, which reinforces users and challenges non-users.

Significant members of the social environment such as family members, friends or peers serve a function in shaping a person's attitudes and behaviour. If those people already behave in a certain way and/or show a positive attitude towards a new invention, other members are likely to adopt both the behaviour and the attitude. This social psychological concept of "social support" has shown to be a very crucial determinant concerning health behaviour when examined in health psychology research (INGLEHART & TEDESCO 1995). This may have happened concerning acceptance and use of FS.

Looking at these concepts, the use of different products containing fluorides may not only be founded in the very understanding of how it works but also because it is accepted in the social environment. People may do it because they want to "belong to the right side", because it is seen as part of a (healthy) lifestyle or just because "What everybody does, I can do, too".

These findings of social psychology are to be considered when looking at the disadvantage of salt fluoridation in contrast to water fluoridation. The higher the number of FS users can be pushed by clever marketing, the more the factor "social support" will help to establish the use of FS (and diminish the chances of the opponents to fluoridation).

Interaction between salt fluoridation and oral health education in school

(Oral) health education primarily aims to foster individual competencies needed for health behaviour. Nevertheless, the incorporation of oral health education in the regular school setting is a public health measure based on health policy administration (in Switzerland organized at the community level). This creates an element of the social environment. As such, it is a resource to oral health for all children. The curriculum of the programmes also offers opportunities to inform the pupils about fluorides, fluoridation, and salt fluoridation in particular. In addition, it opens a valuable information channel to the children's families that can be utilized for messages about the use of F-salt.

As mentioned above, an already high level of dental health requires adjustments of OHP objectives. If disease is no longer a serious plague, the "perceived vulnerability" may fade away. Then, for instance, young parents with little caries experience may not be aware of the susceptibility of their children to caries. Therefore, it is a "new" objective of OHP in schools to help the children 1) to understand that caries can still arise and 2) to establish a sufficient level of "perceived susceptibility". Additionally, one has to consider enlarging the programme towards preschool children and their parents.

Even though empirical evidence is not available, the well-known mechanism of social learning justifies the assumption that oral health education in school classes may have contributed to set standards, values and social norms. Therefore, it may be assumed that teaching oral health four to six times a year during the last four decades in the school setting has contributed to the current interest in oral health and oral aesthetics of large population segments. Fostering positive attitudes by education may additionally have contributed to set the use of F-salt as a standard, to consciously choose this health-supporting product, and to accept F-salt as part of everyday nutrition.

It should be pointed out that in view of the currently increasing number of schools where children stay all day and have lunch, F-salt should be used to prepare the food.

Conclusions

FS has not only a direct impact on dental health but it also interacts with health determinants as well as with OHP components. From this point of view, FS has to be considered as an integral part of the ensemble of OHP that influences individual health behaviour, SES-related health disparities, the physical and social environment, and health education objectives. It may be useful to take these aspects into consideration in countries which have introduced FS or are considering this very cheap measure of caries prevention (GILLESPIE & MARTHALER 2005).

Zusammenfassung

Gesundheit oder Krankheit ist das Resultat von biologischen, verhaltensbezogenen und sozialen Determinanten. Die verschiedenen Elemente der Gesundheitsförderung sind spezifisch auf diese Determinanten ausgerichtet. Es wird diskutiert, wie die Verbreitung von fluoridiertem Salz, einer biologischen Komponente der Förderung von Mundgesundheit, mit den Determinanten der oralen Gesundheit wie auch mit nicht biologischen

Komponenten der Gesundheitsförderung interagiert. Einbezogen sind das individuelle Verhalten, mit dem Sozialstatus verbundene Unterschiede der gesundheitlichen Lage, die physische Umgebung, das soziale Umfeld sowie Zielsetzungen in der Gesundheitsförderung.

Résumé

L'état de bonne santé ou de maladie est le résultat de déterminants biologiques, comportementaux et sociaux. Les différents éléments de la promotion de la santé visent à agir spécifiquement sur ces déterminants. La discussion porte, entre autres, sur la question de savoir comment la propagation du sel fluoré – l'une des composantes de la promotion de la santé bucco-dentaire – est susceptible d'interagir avec les autres déterminants de la santé bucco-dentaire, de même qu'avec les composants non biologiques de la promotion de la santé. Sont inclus dans cette évaluation: le comportement individuel, les différences associées au statut social au plan de la santé, l'environnement social, ainsi que les objectifs de l'éducation en matière de santé.

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