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Dental hygiene education in Nepal

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Abstract: *Aim:* This article provides information about the history, recent curriculum changes and the legal status of the dental hygiene education in Nepal. It also intends to show, how, even in a poor developing nation, the personal drive of a native Nepalese citizen with a vision and the proper connections can lead to the establishment of a new profession, until then unknown. *Method:* Data were obtained from the founder of the first dental hygiene school in Nepal through qualitative interviews, and through personal visits to two Nepalese dental hygiene schools in Kathmandu and in Pokhara. Since 2006, the first author serves as curricular advisor, allowing him access and input to drafts of the development of current curricular changes. *Results:* In 2000, the first dental hygiene course started in Kathmandu. Since then, dental hygiene education has been going through different stages of development and professionalization. In 2005, the programme was changed to 3 years in length in order for students to obtain an academic Certificate in Dental Hygiene. In 2006, the Nepalese Dental Hygienists Association was founded, resulting in greater recognition of the profession, especially by the powerful Nepalese Dental Association. Obscure rules and legislation results in eclectic specifications governing dental hygiene practice. Future challenges for the schools and the dental hygienists association are issues of quality insurance and scope of practice suitable for a developing country. Currently, Nepal is the only country worldwide with an almost equal gender distribution in the dental hygiene profession.

Key words: curricular development; dental hygiene education; dental hygiene profession; developing countries; Nepal; oral health promotion

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Introduction

Globally, public dental health delivery systems are affected by political, cultural and socio-economic factors, resulting in significant variations in access to care and in clinical outcomes. These differences can be observed in local oral health policies, costs, health beliefs, and in the attitudes of dental professionals and the public. In poor developing nations, addressing the unmet oral health needs of the majority of the population poses a nearly insurmountable challenge. It has been shown that there is a significant burden of untreated dental diseases in economically less developed countries (1). A study of 2006, which investigated the oral health of Nepalese school children, confirmed these findings (2). In developing countries such as Nepal, an economical barrier exists, which makes it impossible to treat all the dental problems. The costs will be disproportionately expensive in relation to other priorities faced by the population. Thus, in order to plan the provision of oral health care for a given society, it is important to gather reliable evidence-based information on treatment needs as well as on oral healthcare systems, costs, workforce numbers and on the provision of education for the dental team (3).

Nepal is among the poorest, least developed nations in the world. In 2007, it was ranked 142nd out of 177 countries on the global Human Development Index (HDI). The HDI is a summary measure for monitoring long-term progress in the average level of human development in three basic dimensions: a long and healthy life, access to knowledge and a decent standard of living (4). Nepal has an estimated population of 29 million people, with an expected explosive growth leading to the population being doubled in 2025.

The country is very fragmented because of the Himalayan mountains and rivers which make physical access to infrastructure nearly impossible in many rural areas. Its landlocked location and technological backwardness as well as a long civil war have prevented Nepal from fully developing its economy. In 2000, the ratio of population to physician was 1 to 21 000. The ratio of population to dentist was 1 to 220 000 (5). The same year, only 100 dentists were working in Nepal. Today, this workforce has increased to approximately 590 dental professionals in which 240 are dentists. At present, there are four dental schools and four dental hygiene schools in Nepal. After graduation, most of these professionals remain working in urban areas, where they have a limited impact on national oral healthcare services. Most of them are not willing to work in remote rural areas of the country, where more than 50% of the people live.

Given the dental workforce distribution mentioned above, one might wonder how dental emergencies are dealt with on a daily basis. In 2006, a survey conducted amongst Nepalese schoolchildren showed that 40% seek care either from physicians, traditional healers, health post workers or medicine shopkeepers when experiencing dental pain. Thirty per cent visit a doctor and only 21% seek help from a dentist (2). The factors that affect the access to dental care or dental hygiene care.

There is no specific oral healthcare system that entitles children or adults to free or subsidized dental care. All services were exclusively provided within the private sector. However, dental camps organized by national and international NGOs provide basic emergency care in some districts and rural areas. These dental programmes are run by volunteers, and although they have a semi-structural character, they provide a limited (although essential) contribution to oral health care in Nepal.

There is no fluoridation of drinking water. Generally, water distribution is a problem. In 2004, 80% of the population had access to drinking water. In light of these data, Nepal is likely to be the poorest nation in the world to have introduced the dental hygiene profession.

Method

Qualitative data were obtained from the founder of the first dental hygiene school in Nepal, Dr B. M. Shrestha, by means of structured interviews. In addition, the first author made several personal visits to two Nepalese dental hygiene schools in Kathmandu and in Pokhara and to seven satellite oral health centres throughout the country, which are run by Kantipur School of Dentistry and Dental Hospital (KSDH). Since 2006, he has been serving as curricular advisor for the above-mentioned dental hygiene schools, allowing him to collaborate closely with Dr Shrestha in developing higher educational standards and a wider scope of practice. In this function, he has firsthand knowledge about the development of current curricular changes and the professional profile.

Quantitative epidemiological data referred to in this article have been generated during the Buddhi Bangara Project (BBP) (2, 6). The first author was also involved in the establishment of the first dental hygiene association in Nepal [Nepal Dental hygienists' Association (NDHA)] and is thus aware of the challenges faced by this new profession in this country. Nepalese data were integrated and comparatively analysed with current global trends in dental hygiene education and practice.

Successful pioneer work to establish dental hygiene

Oral health promotion seems to be the only economically realistic option to improve the oral health situation in Nepal on a

larger scale (7). For this reason, introducing the dental hygiene profession and making dental hygiene care accessible for all socio-economic groups requires a culturally sensitive work profile specified to the Nepalese oral healthcare needs. In this context, a native Nepalese citizen, Dr B. M. Shrestha had a specific vision when he began to pioneer the profession in his country. He found that, in addition to limited access, the oral healthcare system in Nepal was based exclusively on curative aspects and that preventive dentistry was neglected. He recognized the importance of strengthening people's awareness about self-care and of helping them understand that oral health is in part their own responsibility. His personal interest in dental hygiene combined with his dental background convinced him that there was a need in Nepal to educate dental hygienists to promote preventive dentistry throughout the country.

In 1997, with the support of a Japanese NGO (Buddhi Bangara Japan), Shrestha established the Kantipur School of Dentistry (KSDH), where he envisioned to establish the first course in dental hygiene (6). However, the political climate at the time prevented the recognition of this new profession, which he felt was needed in order to proceed with the introduction of an educational course. His compromise was to educate dental chair side assistants in oral health promotion. He did this to bridge the gap between the service providers and the need of the population to receive information about preventive oral health. This newly established dental hospital also hired dentists to provide dental care for the area in which it was located. Shrestha's international outreach began when he got into contact with a Dutch dentist (T. Holt), who supported his stay in the Netherlands, where he visited the dental hygiene school in Amsterdam. His visits to the Netherlands and Japan gave him access to the curricular organization of the dental hygiene education. Thus, the first course in Nepal was based on a combined Dutch and Japanese educational model, but modified to fit the educational system of Nepal. A key factor for Shrestha's eventual success in establishing dental hygiene is that even though he was born in a rural village, his hard and dedicated work resulted in him becoming a highly respected, well-connected member of Nepalese society. Thus, he was able to convince influential people to support his vision.

Dental hygiene education in Nepal

In 2000, Shrestha succeeded in starting the first 2-year dental hygiene course at KSDH. It was preceded by the recognition of the curriculum by the Council for Technical Education and Vocational Training (CTEVT). Therefore, it became a professional course of education on a vocational level. This means that it was a non-academic course which resulted in a Technical School Leaving Certificate in Dental Hygiene (6, 8).

This 2-year course offered 18 months of theoretical training at the main school and 6 months 'on the job training' in the school and its satellite facilities. The programme description was prepared by several commissions, including the Nepalese Dental Association.

In 2005, the course was extended to 3 years, leading to a Certificate in Dental Hygiene. This certificate is academic and enables students to continue to study any Bachelor programme in Nepal, thus providing an equivalent to college or university entry qualifications (8, 9).

Currently, there are two types of dental hygiene courses offered in Nepal: one non-academic 2-year course providing a Technical School Leaving Certificate (as described above) and three 3-year (academic) courses resulting in the Certificate in Dental Hygiene (8). Only KSDH is still offering the 2-year programme (along side to the 3-year programme). The 2-year programme makes it possible for students with lower results in the School Leaving Certificate (SLC) examinations to enter the vocational dental hygiene course (9).

Each year of the 3-year Certificate in Dental Hygiene Programmes consists of 39 weeks, with one academic week consisting of 40 h (see Table 1). To enter dental hygiene education, students need a SLC with a certain minimal passing score (45%) and English, Science and Mathematics as compulsory subjects. In addition, they need to pass the entrance examination conducted by the CTEVT (8).

To graduate, students must pass the practical and theoretical final examination organized by the CTEVT. A minimum attendance rate of 90% is required to qualify for this examination. Upon successful completion, graduates are able to work as a dental hygienist in the hospital and in clinical settings under the supervision of dentists, as well as in the community, where different supervision requirements apply. Graduates are eligible for registration with the Nepal Health Professional Council through provincial healthcare legislation as Dental Hygienist (grade-B) (8).

Rules, legislation and scope of practice

The CTEVT laid out the legal and ethical requirements for dental hygiene practice. It is specified that the 'dental hygienist is considered to be a dental auxiliary, not being a dentist or a medical practitioner, who does oral prophylactics, gives instructions in oral hygiene and preventive dental

Table 1. **Course structure of Certificate in Dental Hygiene Curriculum**

Subject	Theory	Practical	Hours week
First year			
English	3	–	3
Nepali	3	–	3
Social studies	2	–	2
Anatomy and physiology	3	2	5
Physics	3	2	5
Chemistry	3	2	5
Zoology	3	2	5
Botany	3	2	5
Mathematics, statistics and computer application	3	2	5
Total	26	12	38
Second year			
Dental anatomy and physiology	3	1	
Basic periodontology I	6	6	12
Dental materials, instruments and assisting	1	2	3
Health education	2	1	3
Epidemiology and community diagnosis	2	1	3
Environmental health	3	1	4
Basic medical procedures and first aid	3	1	4
Oral pathology and microbiology	3	2	5
Total	23	15	38
Third year			
Food and nutrition	3	2	5
Dental pharmacology	3	3	6
Health management	3	1	4
Dental radiography and photography	2	4	6
Basic periodontology II	6	8	14
Dental public health and jurisprudence	3	–	3
Total	20	18	38
Comprehensive professional field practice			
Clinical		48	48
Community		48	48

health' (8). The scope of practice of the Nepalese dental hygienist involves clinical therapy, health promotion and education, comparable to the scope of practice in most countries (10).

It is further specified that the dental hygienist is to work under the supervision of the dentist and is not permitted to practice independently in areas where dentists are available. However, in areas which lack dentists, the dental hygienist may perform oral prophylactics (oral hygiene instruction, oral health promotion, scaling and root planing) without the supervision of a dentist. This provision shows that the regulations are rather eclectic and not dependent on ability. On one hand, this rule protects dentists from competition in areas where they themselves may provide care. On the other hand, it allows access to dental hygiene care in regions which are under served – in Nepal this means the majority of the country. This is an example how legislation may respond to workforce requirements. These flexible, need-specific regulations are in contrast to practices known in some developed countries, such as the USA (Alaska) and Australia, where there is evidence that rural or low-income populations have limited access to oral health care but legal restrictions prevent cost-effective independent dental hygiene care (11, 12). In Nepal, it was recognized that, if supervision requirements are lessened in certain remote areas, dental hygienist may be more willing to locate there to provide oral health care. This flexible rule will hopefully encourage dental hygienists to work in rural areas, where dentists are less willing to set up a practice.

Future challenges for dental hygiene education

Until 2006, the educational path to become a dental hygienist consisted of 18 months of theoretical training followed by 6 months on the job training. However, the addition of a third year did not result in more practical education. Basic sciences were added to the first year to fulfil the legal requirements to obtain an academic course level. In the past, teaching was mainly done by dentists. Practical education consisted largely of assisting dentists during restorative procedures, root canal treatments and extractions. After 18 months, the inexperienced dental hygiene students were put to work in the branches of the school throughout the country. Patients coming to these satellite branches could either afford restorative treatment or were in desperate pain. Both categories of patients were not interested in prevention. Under these circumstances, it is extremely difficult for a dental hygiene student to present her/himself as a preventive oral healthcare professional. Students encountered the social and cultural lack of awareness of Nepali people regarding the benefits of prevention. This circumstance led them to provide only basic supra-gingival scaling procedures, without oral health instruction. Supervision was mainly conducted by dentists, who usually lack specific knowledge about scaling and instrumentation techniques. Therefore, their learning experience was limited during the on the job training phase of their education.

During the past 2 years, the Buddhi Bangara Foundation Japan and the Buddhi Bangara Foundation Netherlands (BBFN) have been collaborating in educating dental hygiene students to become dental hygiene educators.

The first author led several practical and basic didactical training sessions for six graduated dental hygienists, in order to

prepare them for a job as dental hygiene instructor. The basic training, which has been completed so far, consisted of three blocks of 4 days (a total of 96 h). The course subjects were basic didactics, how to give lectures, how to coach students and support them in a practical training, instrumentation techniques, oral health promotion, case studies, how to read and interpret English books and literature, and how to improve student involvement in the learning process. The practical training consisted of practical exercises on the phantom head and guidance during patient treatment. From 2005 onwards the practical training for the potential dental hygiene instructors was given twice a year.

A schedule is developed within the basic legal framework of the curriculum described by the CTEVT which added case studies, lectures about dental hygiene topics, instrumentation techniques, and practical training sessions on phantom heads and study casts. Patient treatment under supervision of diplomated dental hygienists and a dentist was introduced in the second and third year of both programmes, allowing students to practice their skills at an earlier stage of their education. To motivate patients to come to KSDH for dental hygiene treatment, the school offers free scaling and oral hygiene instruction, making prevention affordable for all socio-economic classes in the surroundings of the school and its satellite branches.

On a structural basis, dental hygiene students now have to develop oral health promotion programmes for schools. This initiative is expected to increase oral health awareness among the children attending the schools these dental hygiene students must visit. The students are aware of the oral health situation in Nepal and of the importance of changing the perception of the Nepali people on oral health and prevention.

Nepali students are actively involved in oral health promotion and research activities within the BBP, allowing them to develop skills to study the specific needs of different populations. Dental hygienists being involved in epidemiological studies may in the future also play a more significant role in workforce capacity partnerships between health practitioners and academics in conducting evaluations of national and community health programmes (6).

Surveys among the dental hygiene students show that the changes in the schedule and curriculum had a positive affect on the attitude of the students and their satisfaction with their education.

The first author is also involved in the detailed curriculum content development of the dental hygiene programme. In cooperation with three newly employed dental hygiene educators and the dentist coordinator of the programme, specific topics, practical training units and assignments were now structured in specific schedules and timetables. This gives the new dental hygiene educators structure to prepare and teach specific topics. However, a major problem is the frequent change of staff members and teaching staff. At present, two dental hygiene educators are employed at the college and the dentist coordinator already left the education. It is a major challenge for the school to find well-trained and motivated educators, especially in a situation where there is a lack of dental professionals. In an effort to further professionalize the position of the employees of the dental hygiene school, Shrestha and the first author discussed the introduction of contracts for the employees at KSDH. A dental hygiene instructors profile was created and salary scales were introduced, as well as benefits for employees (i.e. paid leave, free visits to dental conferences).

The training for the dental hygiene educators will continue, as it is part of the 5-year collaborative programme to support the dental hygiene education in Nepal as part of the BBP.

In 2007, KSDH opened a new building in Kathmandu. Since 2007, a Bachelor in Dental Science is being offered. Education of different dental professionals now is taking place in one school building. This process and mutual exposure will hopefully succeed in introducing a team concept to oral health care in order to offer patients the best care available. For the future plans exist to develop a Bachelor Degree in Dental Hygiene. The Nepal Dental Association (NDA) seems to support this idea.

Professional issues

Today, there are approximately 350 diplomated dental hygienists in Nepal. In 2006, the gender distribution of the profession was almost equal. Nepal may thus be the country with the highest distribution of males in the dental hygiene profession (13).

The background and skills of these dental hygienists vary because of the continuous change of the curriculum and the gradual professionalization of the profession. The NDHA, established in 2006, with the support of the BBFN, is the professional representative organization for dental hygienists in Nepal. The geographical structure of the country, the infrastructure, the remoteness of certain areas and the fact that it is not compulsory for dental hygienists to register with the health council, makes it difficult for the NDHA to keep track of graduated dental hygienists.

The focus of NDHA is an increased recognition of the profession in Nepal and the promotion of oral health for all Nepali people. Both issues are proceeding slowly. The NDHA

faces similar issues as every other dental hygiene association in industrialized countries. While the NDA supports the establishment of the profession. At the same time, dentists try to regulate and limit the scope of practice and the responsibilities of dental hygienists. It is the case that, because of the lack of supervision and control of the dental workforce, dental hygienists sometimes perform tasks which are beyond their scope of practice. But this is also true for 'unidentified dental professionals' in which 26% of the Nepalese schoolchildren will visit in case of pain (2). This legal grey zone, which is not clearly specified, might polarize the relationship between the two professions. Data compiled by the FDI suggest a trend in which the highest numbers of dental hygienists are found in the countries with the highest dentist to population ratios and the greatest reduction of dental diseases (14). This shows that there is no need to fear that dental hygienists will replace dentists, but rather that a greater workforce is needed to treat and maintain the oral health of a growing and an ageing population that cares for and retains its natural teeth. As Nepal is facing major oral health issues and a lack of dental professionals (it has one of the lowest dentists to population ratio worldwide) concerns about how to share the pie should not be an issue (15).

Future challenges

In order to plan the provision of oral health care for Nepal, it is important to gather reliable evidence-based information on treatment needs as well as on the oral healthcare system, costs, workforce numbers and on the provision of education for the dental team (3). It is estimated that, in developing countries, nearly 90% of the population are unable to receive standardized caries treatment (1). So there is a dire need to promote oral health on a large scale.

In many other developing countries one finds no change or a deterioration in oral health. The same applies to Nepal. The ratio of dental hygienists and dentists per capita is too small to plan and implement programmes. A large workforce would be needed to promote oral health and to educate the public about home care, provide treatment or to educate millions of people about the consequences of increased consumption of sugar and processed foods, carbonated drinks, and about the positive effects of fluoride toothpaste and prophylactic care. Developing countries have programmes for oral health educators who dispense information in a culturally sensitive manner in order to begin to raise the awareness of large poor populations, frequently living in poor areas. Little can be gained by training a highly skilled professional to undertake costly and complex clinical tasks when the population requires simple oral hygiene education and oral health promotion programmes. However, a formally trained and registered professional is more likely to receive public confidence. The rural women trained in oral health promotion within the BBP reported that it was difficult to motivate the men in the villages, because they did not want to listen to illiterate women. KSDH and the BBFN are working on the establishment of an oral health promotion and training centre in the Western region of Nepal (Dhangadi) to train rural women and teachers for oral health promotion activities and the recognition of basic oral health problems. In the mean time the BBFN, together with the dental hygiene students from KSDH and INHolland University of Applied Sciences, will continue the training of rural women from the Navanjoti centres in Nepal in oral health promotion activities.

In Nepal, dental hygienists skilled in preventive health modalities and in behaviour modification would be in an excellent position to provide services as principal oral healthcare providers. This is especially true because of the lack of dentists, and of the lack of their interest in providing care to poorer people in the remote areas. A major future challenge lies ahead for the NDHA to insure the quality of care in urban and remote areas.

Nepal needs a large workforce to promote preventive oral health and to treat children's teeth. The longer the educational process, the higher the cost of care. Therefore, it is recommended that KSDH maintains the 2-year programme for dental hygienists with a focus on oral health promotion. A multilevel approach is needed in which rural health workers and indigenous members of certain areas are trained in oral health promotion activities.

For the 3-year programme envisaged for the future, it could be recommended that extended functions be included in the curriculum, so that dental hygienists can begin to collaborate with dentists to address the tremendous amount of unmet restorative needs of Nepalese children. Extended function dental hygienists (such as in the Netherlands or dental nurses in Australia and the UK) could meet some of the need for care through their minimal intervention approach. This includes the assessment of the risk of disease, with a focus on early detection and prevention, techniques for remineralization and the treatment of primary coronary or root caries, erosion, abrasion, demineralization, compensation for salivary dysfunction and management of high plaque levels (16).

Autonomous dental hygiene care has the potential to significantly impact the quality of dental care in remote areas where dentists are not available. Some treatment needs could be met via mobile care which transports oral healthcare facilities to a

non-mobile population (17). This approach has been successful in the Dominican Republic, where thousands of poor children have received preventive and restorative treatments or on the Phelophepa health train in South Africa, on which dental hygiene students undertake dental screenings and provide oral health education to thousands of children in rural South Africa (18, 19).

Kantipur School of Dentistry and Dental Hospital is very active in organizing dental camps with or without the support of sponsors (i.e. local Rotary clubs or local toothpaste manufacturers). From 2000 onwards 7483 patients were treated in free dental camps. The dental camps of KSDH are characterized by oral health promotion activities and quality dental hygiene instruction to individual patients, together with pain-relieving treatment, if indicated. Since 2000, 13 298 children had been checked in school dental health check-up programmes. In 2005, KSDH started with mobile dental camps by using a mobile dental van, to make dental services more accessible and affordable for the more remote communities. From 2005 to 2007, 3411 patients from different districts received treatment in this van.

Conclusion

The developments in Nepal show what the personal drive of a native Nepalese citizen with a vision and the proper connections can lead to in a small and poor country. Given the low workforce distribution in this country, at present, the focus of the dental hygiene education of KSDH is on oral health promotion activities, on individualized prevention, and on basic dental hygiene treatment ('hand scaling' or 'ultrasonic scaling'). The standard of treatment is not yet comparable with that of industrialized countries, but in some areas, it is tailored to the needs of the Nepalese population. The dental hygiene education in Nepal is developing and professionalizing rapidly.

In the future, Nepal might benefit from autonomous dental hygienists with expanded functions who are not only capable of initiating preventive oral health programmes, but may also begin to tend to the primary, minimal invasive restorative needs of a large segment of the population.

The training of rural women in oral health promotion activities and recognizing the basic oral health problems are a means to achieving oral health awareness even in the more remote areas of Nepal.

In Nepal, at this point and time, the dental hygiene workforce is too small and the scope of practice too restricted to have a significant impact on access to care, but there is potential for the future.

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