Towards an oral healthcare framework and policy analysis for Swaziland

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KEY CONCEPTS:
Dental caries; Oral health framework, oral health policy

ABSTRACT

Background and Rationale: A synopsis by the researcher suggested that caries was becoming a public health problem among the youth, hence there was a need for deeper investigations which would lead to possible oral health interventions.

Purpose: The purpose of the study was to assess dental care practices and experiences among teenagers in the Northern region of Swaziland. Based on the outcomes and views from health professionals; develop a framework for oral healthcare delivery and policy analysis.

Design: The study engaged a randomized-survey design. The subjects filled a total of 562 questionnaires, of which 508 were selected for data-analysis. Their ages ranged between 12-20years.

Essential Results: Regression-analysis results indicated that, taking soft-drinks increased the odds of having caries by 3.33 times compared with sugar-free drinks. What was strange among this group was that knowing causes of caries doubled the odds (e^{B}=1.918) compared to lack of knowledge. Living within 10kms radius from the dental-clinic significantly reduced the odds of being found with caries by a factor of 0.719 compared to living >10km away.

Conclusion: All the signs of the corresponding regression-coefficients seemed to be in the right direction except for "*knowledge on how tooth-decay occurs*" amongst this group. Based on these findings regarding caries experiences and practices amongst the youth, a framework for oral health care and policy analysis for Swaziland was developed.

INTRODUCTION

Some preliminary evidence to caries being regarded as an emerging public health problem resulted from a synopsis by the researcher at the Piggs Peak Government Hospital (Swaziland), hence there was a need for deeper investigations and possible interventions. The purpose was to assess the perception and experiences of teenagers about dental health care; and then develop a framework for oral health delivery as an intervention approach. Specifically, the objectives were to:

- Determine dental caries experiences among teenagers in Northern-Hhohho
- Develop a framework for oral health care delivery and policy analysis for Swaziland

Swaziland is one of the few countries in Southern Africa which still do not have a clear policy on oral health to direct and strategise all their oral health programs. This has however caused a challenge when it comes to oral health development in Swaziland. Under every aspect, WHO and other independent scholars have long concluded that both dental caries and periodontal diseases are very important because almost everybody has experienced one or more of these conditions in every country. Hence in developing countries like Swaziland, caries and periodontal disease continue to have an impact on the oral health status of the general population. There still exist a big gap in caries rates between the two worlds (developing countries and industrialized countries). For instance whilst in some developing countries the percentage of untreated caries is said to be as high as 70%; it has been noted that in Europe caries is declining and is occurring at later ages (Sheiham 2001). Sugar has remain the main causal factors in caries development. For instance there has been marked consistency in research findings and reviews regarding the association between amount and frequency of sugars in the development of caries (Moynihan and Petersen 2004; Rugg-Gunn and Nunn 1999; Sheiham 2001; WHO 2006; van der Hoeven and van Palenstein Helderman 1998).

It was in 1994 when the Swaziland government noted that there was no significant increase in the experience of dental caries in 12-year old children. However, there was a big difference in caries experiences in the same age cohort between rural and urban areas with a decayed-missing-filled-teeth (DMFT) of 0.64 for the rural and 1.23 for the urban areas (MOH&SW Report, 1994). Four years later the dental caries experience of 6yrs and 12yrs children was significantly higher in the urban areas than in rural areas. For the Shiselweni region, only the 12yr olds had a significant difference $p=0.0018$ in the urban-rural caries experience. There was no significant difference $p>0.05$ observed in the urban-rural dental caries experience of all the other age groups and the regions (Gugushe and du Plessis 1998:410). Since then, no significant studies had been conducted on caries especially among 12yr olds. It is now well documented that apart from oral hygiene practices, there are other factors such as dietary habits which also appear to occupy a central role in caries development. For instance it was noted that some social and geographical factors do put children at risk to dental caries. In a study whose purpose was to examine the structure of attitudes towards healthy food in a group of adolescents, and evaluate the impact of a health education programme on these attitudes; one researcher concluded that the change in attitudes can be explained by two mechanisms: (i) dissonance arousal and discrepancy between personal attitudes and group norms; (ii) and that future programmes should emphasise affection rather than cognition (Höllund 1990).

MATERIALS & METHODS

A randomised survey design was used in this study. The age cohort of the target population was between the ages 13 – 18 years old. The sample comprised a total of 508 teenage children in the northern Hhohho region of Swaziland. A pre-testing exercise was conducted on nine (9) secondary school pupils. These were randomly picked within the Piggs Peak hospital complex. A self-administered questionnaire was used in data collection. All data were captured using the MS Excel spreadsheet and converted to SPSS format for further analysis. The first stage of analysis was the descriptive analysis. The second stage involved statistical analysis to determine the level of significance in testing the hypothesis. This kind of data analysis involved testing the significance of the association between key variables to determine the p-value, and how it compares with the standard value.

The third and last stage of statistical analysis involved regression analysis. Logistic regression attempts to model a dichotomous response variable on a number of explanatory variables. In this study the data-gathering instrument was designed so that it would capture many possible explanatory variables. These included: the sex of the pupil; the age; whether they were boarders or day scholars; whether they lived with at least one of their parents; whether they had a tooth brush or not; whether the pupil's gums bled when brushing teeth or not; whether the pupil brushed teeth two times or more per day; whether they knew of other (traditional) methods of cleaning teeth, whether the pupil could list all carbohydrates foods found in the community and could tell which ones were known for causing tooth decay; whether the pupil was in the habit of eating sweetened food during spare time after lunch; whether their daily snack consisted of sweets or not; whether their daily drink consisted of soft drinks or not; whether the pupil sometimes went to bed chewing a sweet or a "*chappies*"; whether it was easy to buy sweets from the school tuck-shop or not; whether their lunch box normally consisted of cookies and juice; whether the pupil could tell the difference between tooth decay and gum disease; whether the distance to the nearest dental clinic was more than 10 kilometres or not; and whether the pupil ever visited the dental clinic to check their teeth at least once a year.

The logistic regression equation is of the form:

$$\log_e(P/(1-P)) = \text{Const} + B_1X_1 + B_2X_2 + ... + B_kX_k + u$$

Where:
P is the probability that a pupil will be found with at least one of the following: a missing tooth, a decayed tooth or a filled tooth;

P/(1-P) is the odds of having a missing or decayed or filled tooth; (in general the odds of an event it is the ratio of the probability that it will occur to the probability that it will not occur);

$\log_e(P/(1-P))$ or $\ln(P/(1-P))$ is the natural logarithm of the odds ratio;

k is the number of explanatory variables $X_1, X_2, ..., X_k$;

$B_1, B_2, ..., B_k$ are the associated regression coefficients; and
u is the random error term.

The protocol for this study was approved by the university ethics body. The basic ethical principles such as: respect for person, beneficence, and justice can be universally applied in any research involving human subjects. Hence the following principles such as: confidentiality, anonymity, permission, right to termination, informed consent, and beneficence were adhered to during the course of the study.

RESULTS

Briefly, the study was centered on caries experiences as the main problem; hence dental caries remains the dependent variable in this presentation. A proportion of about 43.3% of the respondents had one or more decayed teeth (caries). About 28.1% had one or more missing teeth (Missing); 9.6% had one or more filled-teeth (Filled); whilst 71.9% knew how a tooth starts to decay (K/caries) (Figure 1)

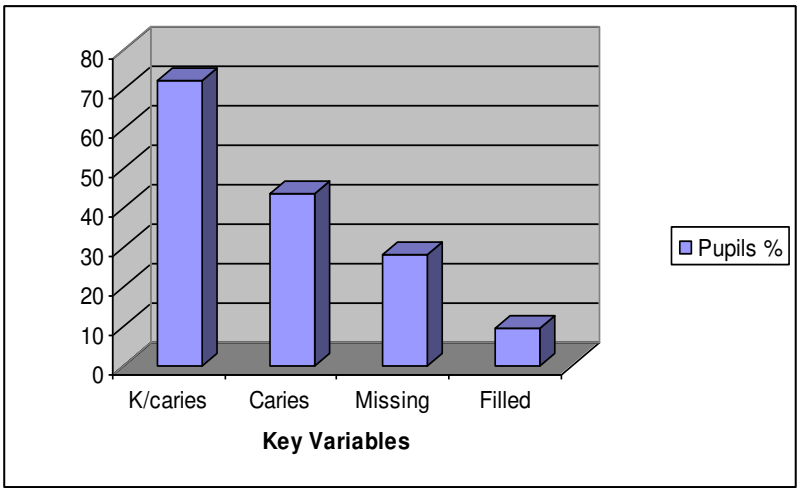

Figure 1: Respondents' Caries Experiences

On the overall, about 23.3% of the respondents do regular dental checkups at least once a year. 28.3% reported bleeding gums during tooth brushing. 63.8% claimed to know the difference between gum diseases and caries; whilst about 23.6% had no access at all to oral health facilities.

Model Diagnostics

The examination of each of the nineteen independent variables gave an indication of how it is likely to be associated with the response variable (the presence or absence of dental caries) in a binary regression model. The results from this preliminary analysis (see Table-2) seemed to suggest the following:

Table-2: Relationships between 19 explanatory variables and having a decayed-tooth

Explanatory Variable	Values of the Explanatory Variable	Dental Caries? (dependent Variable)		Total	Percent "Yes"	z-statistic and p-value for testing equality in % "yes"
		No	Yes			
1.Sex	**Female =0**	95	129	224	57.6	z=1.118
	Male=1	131	146	277	52.7	p=0.264 ns
2.Type of scholar	**Day scholar = 0**	202	257	459	56.0	z=1.633
	Border = 1	24	18	42	42.9	p=0.102 ns
3.Living with whom	No parents=0	78	110	188	58.5	z=1.263
	With at least one parent=1	148	165	313	52.7	p=0.207 ns
4.Having tooth brush	No=0	14	15	29	51.7	z=-0.368
	Yes=1	211	260	471	55.2	p=0.713 ns
5.Bleed in gums when brushing	No=0	161	195	356	54.8	z=-0.242
	Yes=1	62	79	141	56.0	p=0.809 ns
6.Know traditional methods	No=0	49	64	113	56.6	z=0.414
	Yes=1	177	211	388	54.4	p=0.679 ns
7.Can list carbohydrates	No=0	65	71	136	52.2	z=-0.74
	Yes=1	160	203	363	55.9	p=0.459 ns
8.Know decay-causing foods	No=0	26	37	63	58.7	z=0.656
	Yes=1	200	238	438	54.3	p=0.512 ns
9.Take sweet food > lunch	No=0	44	43	87	49.4	z=-1.107
	Yes=1	182	231	413	55.9	p=0.268 ns
10.My daily snacks=sweets	No=0	201	243	444	54.7	z=-0.099
	Yes=1	25	31	56	55.4	p=0.921 ns
11.Cookies or cakes daily	No=0	183	208	391	53.2	z=-1.434
	Yes=1	43	67	110	60.9	p=0.152 ns
12.My daily drink is soft drinks	No=0	219	251	470	53.4	z=-2.601
	Yes=1	7	24	31	77.4	p=0.0093****
13.Gone to bed chewing sweets?	Never=0	151	198	349	56.7	z=1.241
	Sometimes=1	75	77	152	50.7	p=0.215 ns
14.Tuckshop is easiest source of sweets	No=0	143	185	328	56.5	z=0.941
	Yes=1	83	90	173	52.0	p=0.347 ns
15. Cookies/ juice lunch box	No=0	212	256	468	54.7	z=-0.324
	Yes=1	14	19	33	57.6	p=0.746 ns
16.Know how t-decay starts?	No=0	77	63	140	45.0	z=-2.744
	Yes=1	149	211	360	58.6	p=0.006***
17.Can tell t-decay from gum disease?	No=0	83	95	178	53.4	z=-0.581
	Yes=1	141	180	321	56.1	p=0.561 ns
18.Nearest dental clinic	>10k (= 0)	128	172	300	57.3	z=1.345
	≤10k (=1)	98	103	201	51.2	p=0.179 ns
19.Visit to dental clinic	Never=0	174	209	383	54.6	z=-0.190
	At least once=1	52	65	117	55.6	p=0.849

(i) More than a half of respondents had at least one tooth missing or decayed or filled (54.9% as against 45.1%).

(ii) Most of the 19 independent variables were not significantly associated with the absence or presence of dental carries, and this was shown by the test z-statistics.

(iii) The only variables that showed statistical significance were: taking soft drinks (p-value = 0.009) and having knowledge of traditional methods of cleaning teeth (p-value = 0.006).

The results of the three variable-selection procedures are shown in Table-3. Method 1, where all 19 explanatory variables were included, produced three significant variables associated with dental carries: (i) Taking soft drinks to school on a daily basis – which increased the odds of having dental caries 3.3 times.

(ii) Going to bed with sweets – this had a negative regression coefficient which seemed to be in the wrong direction as it reduced the odds of getting dental caries to 60%.

(iii) Knowing what causes tooth decay – which seemed to double the odds of getting dental carries (e^B = 1.918)

Table-3: Results of the three variable-selection procedures

Method 1: All 19 variables included	B	p-value[1]	e^B
Const…….	1.452	0.234	4.272
Sex…….	-0.188	0.349	0.828
Type of scholar (day or boarding)…….	-0.479	0.185	0.619
Whether pupil was staying with parents…	-0.181	0.360	0.834
Ownership of toothbrush…….	0.121	0.771	1.128
Bleeding of gums when brushing teeth…	0.166	0.451	1.181
Knowledge of other traditional methods.	-0.220	0.341	0.802
Knowing all carbohydrate foods……	0.133	0.556	1.142
Knowing which foods cause tooth decay.	-0.490	0.111	0.613
Taking sweetened food after lunch……	0.231	0.361	1.260
Carrying snacks of sweets daily……	-0.020	0.947	0.980
Daily drink being soft drinks……..	1.189	0.012**	3.283
Sometimes going to bed with sweets…	-0.435	0.045**	0.647
School tuckshop gives easy access to sweets……..	-0.214	0.342	0.807
Lunch box is made up of cookies/ juices.	-0.157	0.697	0.855
Eating cookies or cakes everyday…….	0.240	0.323	1.271
Knowledge of what causes tooth decay.	0.651	0.003***	1.918
Can tell difference between tooth decay and gum disease……	0.058 -0.295	0.784 0.134	1.060 0.744
Distance to nearest dental clinic being within 10 km…….	0.054	0.821	1.056
Visiting the dental clinic at least once a year…….			
Method 2: Forward selection method			
Constant…….	-0.294	0.098*	0.745
Daily drink being soft drinks……..	1.122	0.013**	3.071
Knowledge of what causes tooth decay.	0.619	0.003***	1.857
Method 3: Backward Selection Method			
Constant……	-0.168	0.381	0.845
Daily drink being soft drinks……..	1.205	0.008***	3.338
Knowledge of what causes tooth decay.	0.624	0.003***	1.866
Distance to nearest dental clinic being within 10 km…….	-0.330	0.082*	0.719

[1] One star * indicates significance at the 10% level
** indicate significance at the 5% level
*** indicate significance at the 1% level

Views Collected From Health Professionals

Out of the targeted 30 individuals of whom 6 were interviewed and 24 sent questionnaires, a total of 22 responses were eventually accounted. This was considered a good response as it was stated clearly in the instructions that their response to the supplementary questionnaire was on voluntary basis. After going through all the responses, the views and suggestions were then categorised and summarised under the following: (i) contributions comprising reports on caries incidences in the different regions of the country with some individuals quoting as much as 90% caries cases recorded in their various clinics on a daily basis; (ii) contributions comprising of various factors responsible for caries occurrences in different population groups within the country; and (iii) contributions comprising of possible caries intervention strategies and oral health promotion programs in local communities.

Input On Oral Health Policy Process

Some crucial ideas on oral health care and policy recommended by health professionals included the following:

(i) The need to use WHO oral health policy guidelines for the African region as a framework for the process;
(ii) Intensive identification of oral health needs in the country on commencement of the policy process;
(iii) Extensive stakeholder consultation during the process; (iv) using the primary health care approach as adopted by the Ministry of Health & Social Welfare; (v) reflecting to other African countries' policies for oral health care. Also putting into perspective the new oral health goals set by the WHO in preparation for the period up to 2020 were considered of significance for the exercise in order to ensure focus on the future.

Further, the participants came-up with the following issues that needed to be reviewed and investigated during the process. These included: National budget, National developmental plan, Oral health manpower, Oral health goals and objectives, Oral health services, Oral health information system and disease pattern, Dental equipment and supplies, Oral health planning and programming, Monitoring & evaluation of oral health programs, and oral health program integration with other sectors. The estimated resources for the exercise and a project plan were also highlighted.

DISCUSSION

Dental Caries Experiences

These findings are not different from caries experiences in other developing countries. As already indicated, 43.3% of the pupils reported to have been having one or more carious teeth. Further analysis also revealed that more than half of the respondents had at least one tooth decayed or missing or filled (54.9% as against 45.1%). These results confirm the caries status as indicated in the hospital statistics which indicated more than half of the patients reporting for caries related problems. Surprisingly, the study has revealed that a proportion of 87.4% of the pupils already knew that sugary foods were the main cause of tooth decay. When testing the significance level on having decayed teeth against knowledge of cariogenic foods, the χ^2 value of 0.33 was such that $0.25<p<0.75$. When tested, the critical value is 3.841. Whilst this value is not statistically significant; it can be concluded that knowledge on food types has no effect on caries

development. The results suggest that whether you are knowledgeable or not about cariogenic foods you are equally at risk from caries. But the issue is on how you handle your dietary habits when it come to cariogenic foods. The logistic regression also revealed similar findings in that pupils with such knowledge had instead increased their odds of being found with tooth problems by 1.866 times as compared to those who did not possess such knowledge. These however, were non-the-less strange indications in the study that could not be explained.

Whether you are in Swaziland or anywhere in the world, for dental caries to develop on the tooth you have to have certain types of bacteria present in the oral cavity. In addition, the individual has to consume refined sugars frequently (Sheiham 2001; van Palenstein Helderman *et al.,* 1996; van der Hoeven & van Palenstein Helderman 1998; Chestnutt & Gibson 2002). What was also noted in this study was that In the case of caries occurrences between day-scholars and borders, the significance level on the number of decayed teeth per an individual was such that $0.25<p<0.75$. When tested, the critical value is 9.488. however, this value is not statistically significant, implying that the number of carious teeth per individual is not determined by whether a pupil is a boarder or day-scholar. On having decayed teeth against distances away from the dental clinic the findings were that the χ^2 value of 0.72 was such that $0.25<p<0.75$. When this value was tested, the resulting value implies that being far-away or closer to the clinic has no effect on caries experiences. Still that depends on knowledge, attitude, and behavioural circumstances. In contrast, the logistic regression results suggest that pupils who were within 10km of a dental clinic significantly reduced the odds of being found with caries by a factor of 0.719 compared to pupils who lived more than 10km away. In a way this sounds logic.

From these findings it can therefore be concluded that, whilst all the other suggested explanatory variables were not statistically significant; it indicates to a large extent that the high incidence of caries found in the Northern region of Swaziland affects children alike. To some extent the study suggest that caries affect pupils uniformly, whether they are young or older; whether they are boarders or day-scholars; whether their gums bleed while brushing their teeth or not; whether they have knowledge of carbohydrates foods that cause teeth to decay or not; whether they retire to bed chewing sweets or not; whether they snack with cookies or sweets; whether they visit the dental clinic at least once a year or not. In other words, these mentioned factors did not seem to strongly affect the pupil's probability of having dental caries.

Framework For Oral Health Care And Policy Process

It is therefore worth mentioning that the results of the study do suggest that there is a indeed there are caries related problems in this part of the county, hence there is a need to come-up with the necessary intervention strategies supported with the appropriate framework. This led to the researcher to design an appropriate framework that would be applicable to the country's oral health system. Hence a framework for the prevention of dental diseases and the promotion of oral health care in the country has been proposed. The key issues surounding the development of the proposed framework entails a variety of processes including extensive consultations. For instance, proposed thematic areas should involve: (i) defining the purpose of the framework; (ii) its theoretical foundation; (iii) how the framework evolves, including its schematic representation.

It must be mentioned that the sole purpose of the framework is to assist health professionals in Swaziland to formulate and implement effective oral health strategies that would promote the oral health in Swaziland. This will include rendering improved oral health services to all people in Swaziland; also bearing in mind that a majority of the people live in the rural areas where there is always a shortage of manpower. Whilst not being judgemental, it is now clear that there is a huge gap between national oral health objectives and current service delivery throughout the country. For instance, most individuals do not access their preferred services in the region due to a number of constraints within the health sector including: lack of dental supplies, mal-functioning of equipment, manpower shortages, amongst others. The framework aims at addressing issues based on: (i) primary prevention – to ensure that diseases do not occur; (ii) secondary prevention – by promoting early intervention among those already affected; (iii) and tertiary prevention – whereby treatment of well established diseases are applied to restore normal functioning of body organs (Chestnutt & Gibson 2002:128). It is anticipated that the framework will be backed by an oral health policy for Swaziland to be formulated soon.

When reviewing the oral health systems of neighbouring African countries such as Botswana and South Africa, and Tanzania; it was felt that the basic principles of the proposed oral health framework have a lot in common. For instance, policy guidelines for oral health care in Tanzania (2002) are based on objectives such as to improve the oral health of Tanzanians with focus on those most at risk by ensuring that: (i) oral health services are available and accessible to both urban and rural areas; (ii) sufficiency of oral health care personnel at all levels; (iii) and sensitising communities on preventable oral health problems, and involve the community in solving them (Tanzania Ministry of Health, 2002). These provided some insight on key issues to be addressed through the proposed oral health framework. Not to ignore other health approaches such as the Evidence-Based health care approach propagated by among others, Wiggers & Sanson-Fisher (1998); were also reviewed for input during the development of the framework. This new approach in health care management still needs to be explored and supported by all key players in oral health. Amongst the strong points propagated through this approach is the need for a paradigm shift from the current management of oral health. In his analysis, Singh (2003) uncovered that the Evidence-Based oral health care could help promote: (i) the incorporation of most stakeholders and community workers in promoting oral health care; (ii) networking within oral health; (iii) and promoting social development in communities. It was based on some of these principles that the formulated framework put emphasis on the role of other stakeholders and non-oral health workers at the grass-root level to be recognised as alternative drivers of oral health in Swaziland. Views and opinions that were collected from health professionals around the country also played a significant role in the development of the framework. Due to the fact that these views were products of empirical findings, were regarded as valid information for this process. All these were indications of a process that was well grounded on solid structures.

In addition, the proposed framework was designed with an open mind of the global oral health village and trends in technological development. This became evident as a result of using the new oral health goals set by WHO (2003:31) in preparation for the period up to 2020. It was noted that this process requires broad oral health objectives and targets in order to bear fruitful results in the future. All this was done in order to cover significant ground in terms of the various needs of the population groups in Swaziland.

The Structure Of The Framework

Based on the above analysis, a 4-level framework for oral health care delivery was developed for Swaziland. The 4-levels include: (i) Primary Oral Health Care Delivery (at the local community); (ii) Secondary Oral

Health Care Delivery (at the rural clinic center); (iii) Referral Oral Health Care Delivery (at the regional or sub-regional health center); (iv) and Specialised Oral Health Care Delivery (at the specialists care unit). The framework intends to incorporate both curative and preventive service delivery, including the administration of oral health in Swaziland. It was designed such that it fitted well with the local oral health care system to avoid conflicting with programmes.

Primary oral health care delivery

As the term implies, it is proposed that at the local community there shall exist primary health care services inline with the MOH&SW primary health care concept (MOH&SW 2007). The overall objective of primary health care is to assist in prevention and health promotion, thereby maintaining good health rather than to wait until problems of ill health necessitate action. To a great extend even WHO strongly encourages all developing countries to actively engage the primary health care approach in national health programs (WHO 1989:11). The purpose at this level shall be to raise oral health awareness throughout the communities in Swaziland. Raising awareness on any program should be taken as a continuous process in society as life evolves and new people resettle whilst others are born. Individuals and groups shall be assisted right where they are through: health education, problems identification, needs assessment, and local means of intervention (WHO 1989). This exercise will definitely require additional manpower. However, this should be regarded as an investment for a healthy society in the years to come. The key individuals to drive oral health activities at this level will be Community Oral Health Educators (COHE). These individuals, under the guidance of Oral Health Coordinators (OHC) in local clinics and health centers will educate the public on good oral health care at the grass-root level. The COHE in the communities will be given in-service trainings through workshops. These educators (COHE) will be selected at community level especially those already engaged in primary health care activities. These may be individuals currently under government, NGOs, or just community workers such as: Rural health motivators, Community based care workers, Teachers, Nurses, Health educators, Pastors, and many others. Health education centers shall not be restricted to institutional facilities or buildings but even on open arena or under trees where current community gatherings normally take place. It is the responsibility of oral health workers based in local clinics and health centers to ensure effective delivery of these services at this level.

Secondary oral health care delivery

To maintain a proper link between all levels, the secondary oral health care delivery, with its base in rural clinics and small health centers in the countryside (Swaziland) shall complement services provided at the primary level. This is important so that there are no gaps between the levels of oral health care delivery in the country. In addition, this level shall also strengthen multi-sectoral approach to oral health care at the local level (MOH&SW 2007). There shall be some professional approach to oral health care delivery at this level. The separation of functions between curative and preventive dentistry shall be evident from this level upwards. Hence key activities could include: oral examinations, regular checkups, community and school oral health programs, and provision of minimal pain relieving services, amongst others. It is proposed that the current workforce could still provide the necessary services at this level. Due to the magnitude of the work, some additional staff may be needed under auxiliary services such as: Dental Hygienists, Dental Nurses, and Dental Assistants where possible. These are the same individuals that shall be responsible for integrating oral health programs with other sectors within their working environment in the community under the supervision of Oral Health Coordinators (OHC) in the health centers. Service centers will include rural clinics, company clinics, mission clinics, and outreach centers.

Referral oral health care delivery

It is further proposed that there should be a strong referral care system that will comprise of preventive, curative, restorative, and rehabilitative oral health care that are not feasible in the lower levels. Major hospitals in the regions shall be upgraded accordingly in order to fulfill these functions effectively. It is therefore without doubt that properly qualified oral health professionals such as: Dentists, Dental Therapists, and Dental Technicians shall be deployed in these referral centers and regional hospitals throughout the country to render the necessary services to the public. Oral health professionals in this level will be responsible for providing regular in-service trainings to the personnel in the rural clinics at the secondary level, and also to their equivalent health care workforce as an attempt to integrating oral health intervention programs.

Specialised oral health care delivery

For specialised oral healthcare, it is proposed that a section of the Mbabane government hospital (dental unit) be converted into a specialist operation unit where only specialised oral health care services that are not feasible at the regional hospitals be provided there. Specialists' Dental surgeons from both the public sector or from private practice shall be engaged in providing skilled operational services. All operations will be under the supervision of a senior surgeon within the unit. This individual shall also provide regular in-service training sessions for dentists based in the regional hospitals. Whilst the framework puts emphasis on community dentistry; it is also crucial to maintain the balance in service delivery with the cadre of clinical specialists.

National Oral Health Policy Process

In addition to the above oral health framework, the findings of the study also suggest that there is a need for an oral health policy in the country that will provide directives in the implementation of oral health programs that are: viable, simply, and rationale-based. It is therefore proposed that the policy process should be staggered in a total of five phases namely: (i) Proposal and logistics; (ii) Formulation phase; (iii) Policy advocacy; (iv) Implementation, and (v) Evaluation phases. However, the immediate and significant stage is the actual formulation of the policy. The policy shall be the product of extensive consultations and empirical evidence on oral health needs in Swaziland. A policy is an important instrument for every program to function efficiently and be able to deliver services effectively.

Structuring the policy process

The first stage of the process shall deal with the logistics and compiling of a proposal for the project. However, a proposal (report) for this exercise has already been developed by the current researcher, and has already been submitted to the Ministry of Health & Social Welfare (October 2008). Some additional logistics shall include the appointment of a technical working team for the exercise, which will be followed by the subsequent creation of a project reference-group. Identification of the oral health problems and needs of the country will commence as soon as the team is in place. The second stage shall deal with the policy formulation process through: investigations, reviews, consultations, analysis, and oral health programming. This exercise shall be conducted through group activities by the technical working committee. The third stage shall deal with advocacy and lobbying for the adoption of the policy. The fourth and fifth stages shall

deal with the implementation and evaluation of the policy. The rationale and conceptual framework to be followed for this exercise shall be based on oral health policy guidelines recommended by the World Health Organization for the African region (WHO 2005). Such an approach in policy analysis has the likelihood of producing a vibrant and comprehensive policy. In addition, whilst not prescribing any rules to member states, WHO recommends that the national oral health policy should comprise of broad statements that deal with principles and vision for oral health in each member state (WHO 2005).

Study Limitations

There is no study without limitations, for instance the sample used during the study represented an approximately 0.84% of the estimated total teenage population (Swaziland Population Census 2007). Hence raises questions on generalization purposes. Another limitation is that a section of teenagers who were out of school during the exercise could not participate in the study. Again, the subjects did not undergo any clinical oral examination to detect their dental care status, data were derived through self-administered questionnaires, a situation which has a likelihood of bringing in confounding variables.

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