Dental Manpower

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Introduction

- Demand for the dental care and consumer awareness in the area of health services have been steadily increasing.
- The objective of dental profession should be the attainment by all peoples of the highest level of dental health. For such an objective to be approached requires thorough planning on a nation wide basis and rational and efficient utilization of resources .

- Considering that both common major dental diseases , dental caries and periodontal diseases are preventable , provision of dental services should be developed primarily on the basis of preventive approach both at the individual and community level.
- The heart of the dental public health program is the manpower required to carry it out . There are many factors involved in assessing manpower needs and number of them can inter - relate to produce complex situations.

- The control of dental health services never takes place without the involvement of political, social and economic settings.
- Most of the countries differ widely in their political systems, economic standing and social structure , hence no two countries have an identical organization of health services.
- A dental care delivery system is efficient when its structure , organization and performance satisfy the dental needs of the population it serves in best possible way.

- This requires efficiency in the production , distribution , consumption and financing of dental services , and also an ability to adapt to the changing needs of the population.
- Several alternatives to increasing and upgrading the delivery of services have been proposed. Other professions have delegated services to the various auxiliaries employed in that profession or created new para professionals.

- Dentistry has looked at its resources , the trained auxiliaries , as a viable solution to the problem of providing increased and more efficient delivery of services.
- The training of dental auxiliaries , not only helps in tackling the major problem of the common oral health problems but also the philosophy of preventive dentistry can be practised more efficiently .

- As advances are made in aspects of prevention and control of dental diseases , dental manpower utilization will have to change to keep pace with the developments.
- In order to deliver total dental care on community scale precise roles of each type of dental personnel has to be defined.

Levels of health care

- Health services are usually organized at three levels , each level supported by a higher level to which the patient is referred. These levels are
- **Primary health care**
- **Secondary health care**
- **Tertiary health care**

Primary health care -

- This is the first level of contact between the individual and the health system where “essential” primary health care is provided.
- The majority of the prevailing health complaints and problems can be satisfactorily dealt at this level.
- This level of care is provided by the primary health centers and subcentres in India, with community participation.
- This level of care is closest to the people.

Secondary health care -

- More complex problems are dealt at this level.
- It comprises essentially the curative services.
- It is provided by the district hospitals and community health centers.
- It serves as the first referral level in the health system.

Tertiary health care -

- This level offers super - specialist care.
- This level of care is provided by the regional/central level institutions.
- Along with the highly specialized care, these institutions also provide planning & managerial skills and teaching for specialized staff.
- In addition, it supports and complements the action carried out at the primary level.

Categorization of dental health services

The World Health Organization (1965) has categorized dental health services as follows:

Group I: Dental services provided by dentists and dental auxiliaries and financed by the consumer or through non-governmental organization. Prepayment plans , insurance plans are the main examples of non governmental organizations involved in financing the services.

Group II: Dental services provided by dentists and dental auxiliaries who are partly or entirely renumerated by the government but who are not considered to be government employees.

- Group 3 – dental services provided by dentists and dental auxiliaries who are employed by the government.
- These groupings are mainly based on the method of payment of the provider of dental services and the grouping is important because it may affect the types of services provided.

Development of dental manpower

- The World Health Organization (1969) has suggested that the following framework be considered in formulating the plan.
- 1. Analysis of the existing situation

  dental health needs and demands for services

  dental health manpower supply

  utilization of dental health manpower

- 2. Policy formulation

  dental health manpower planning

  incentives and controls

  levels of decision making

- Analysis of the existing situation –
- The need for dental care must be distinguished from the demand for care and from the use of services or utilization.
- A need for dental care exists when an individual has dental disease or disability for which there is an effective and acceptable treatment.
- A demand for care exists when an individual considers that he has need and wishes to receive care . Utilization occurs when an individual actually receives care.

- Need is not necessarily expressed as demand and demand is not necessarily followed by utilization.
- Dental health survey is an essential means of establishing the incidence and prevalence of dental diseases in a population , and patterns of utilization of dental health services , and serving as basis of determining priorities for dental health.

- The supply of dental health manpower -
- The measurement of dental manpower supply involves a number of variables that determine the validity of measurement . Among these variables , the most important is the personnel who are included and the functions that they perform.
- The measurement and analysis of present dental health manpower supply provide a profile of the amount and type of skills available for dental health work at a given time and demographic information such as age and gender distribution, retention rates .

- Such knowledge is essential for the projection of requirements and for outlining future policy .
- The primary sources of information on dental manpower varies according to country. The most frequent sources are professional registers , licensing institutions , dental societies and census data.

- Utilization of dental health manpower -
- Analysis shows that different patterns of utilization and supply of dental health manpower are crucially linked.
- Areas with greatest shortage of dental manpower have the poorest utilization of dental services.
- Reflected by under employment, poor geographic distribution, emigration , poor staffing patterns, and the absence of an inappropriate task specifications.

- A clearer picture of existing structure requires a scrutiny of whole problem of productivity in dental health care in general and of dental manpower utilization in particular.
- Dental productivity is often related to Quantity of work carried out and in dental terms to numbers of teeth filled, extracted and replaced.

- Measure of dental productivity are:
- Information on reduction of dental caries, incidence & prevalence
- Reduction in number of extracted teeth
- Increase in the number of people with complete dentition .

- Manpower productivity takes in to account not only the amount of disease prevented or treated but the level of training of the worker carrying out the procedures.
- Productivity is improved when functions are delegated from one level of performance to a lower one and by substitution of jobs.
- The more highly skilled workers should not be burdened with tasks which can be done by those with less training.
- This involves use of ancillaries for certain tasks carried out by professional personnel

- Policy formulation - dental health manpower planning
- With the information on the dental health needs and demands of the population , and on supply and utilization of dental health manpower , a policy for dental manpower can be formulated.

- Dental health manpower planning is the process of estimating the quantity of manpower , plus their varying types of knowledge and skills , needed to bring about planned alterations in the dental health service system, so that the chances of improvements in dental health of population are optimal.

- In general dental health manpower planning involves ,

1. The analysis and projections of dental health needs and demands for services by the population. Such data are obtained by epidemiological surveys and from treatment records.
2. The assessment of present dental health manpower availability and analysis of its pattern of utilization.
3. The formulation of policy
4. The estimation of future manpower requirements and of relevant education and training needs in the light of overall dental health plan.

- Incentives and control -
- Incentives offered by the type of work and the control imposed upon the dental health workers together play an important role in achieving desired dental health objectives.
- Incentive policies cover elements such as mission- oriented education , an adequate salary or pay structure , suitable work schedules, special provision for those working in rural areas and job stability.

- The types and levels of controls are important in determining productivity and efficiency . Controls may be applied by the state , third party agency , the profession and the consumer.
- Controls are more likely to be accepted by dental health workers if they have been closely involved in each stage of the decision making process of the dental plan.

- Levels of decision making -
- Decisions must be made at all steps in the process of dental health and manpower planning.
- If the decisions are to be effectively implemented those concerned in implementing the decisions should be represented during each stage in planning, analysis and implementation process.

- The stimulus to setting up of a dental manpower unit may come from the department of health , from the professional association or from dental schools , but the final decision to implement the plans remains in the hands of government whatever political systems exist.

Dental work force in India

1. Dentists
2. Dental auxiliaries
   - Dental hygienists
   - Dental assistant
   - Dental laboratory technician / mechanics
   - Dental secretary/receptionist

- Dentist population ratio –
- WHO recommended dentist to population ratio for developing countries (1:7,500).
- In 2004, the Dentist-Population ratio was 1:30,000.
- The Dentist-Population ratio in urban area is 1:10,000 and in rural areas is 1.25 lakh.
- According to World Health Report - 2014 , the dentist population ratio is 1: 10,000.

- In rural areas, the dentist to population ratio ranges from 1:30,000– 1:1,00,000. Whereas in most of the developed urban areas the ratio averages to 1:4,000.
- The current number of new dentists graduating per year in India is approximately 24,000.
- Assuming a 2% loss of manpower from practice, the total number of dentists available by 2020 will be more than 309,700 and there will be an overproduction of 100,000 of qualified dentists.

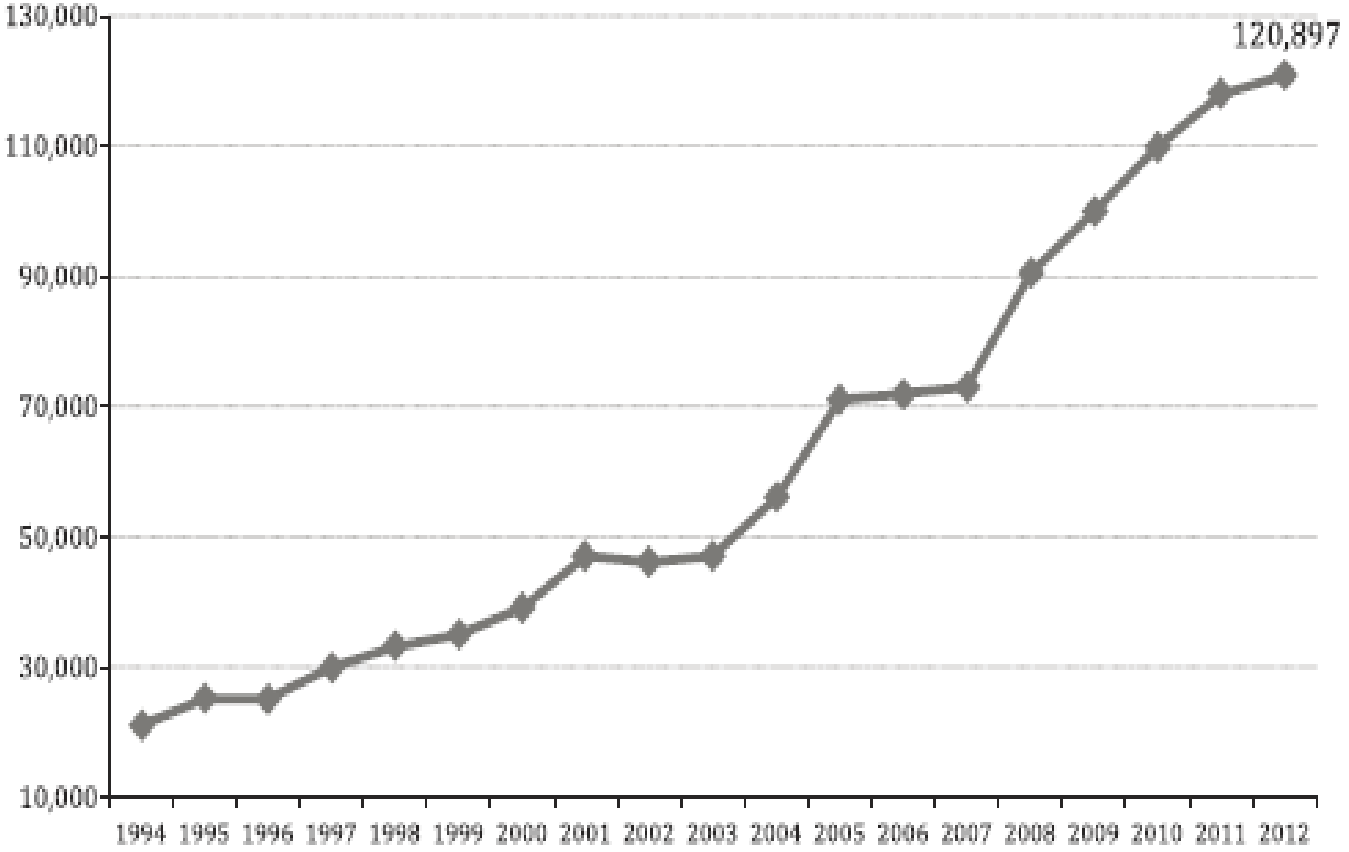

Figure 5. Trends in the increase of numbers of registered dentists in India.

- As per Dental council of India , the total number of dentists registered under various state dental councils till date were 206580.
- The number of registered dentists were higher under Karnataka state dental council (37528) followed by Maharashtra state dental council (34926).

- Vundavalli S (2014) conducted a study to estimate the need for dentists in India using various manpower assessment models which would help decision-makers and policy-makers in India to plan scientifically for dental manpower training and utilisation.
- **Vundavalli S. Dental manpower planning in India: current scenario and future projections for the year 2020. Int Dent J 2014;64:62-67.**

- Method of estimation: WHO/FDI technique
- In this technique, the projected population was divided into five age groups which were 0–5, 6–14, 15–29, 30–59 and 60 years and over. The dental service need was calculated on the basis of a lifetime of care for each age cohort. The service need also included the need for maintenance care, repeated care and replacement care.

Table 3 Percentage of age cohorts among Indian population[1]

Age group	%
0–14	36
15–29	32
30–64	26
65–79%	6
Total population = 1,210,193,422	

Vundavalli S. Dental manpower planning in India: current scenario and future projections for the year 2020. Int Dent J 2014;64:62-67.

- Estimation of health personnel requirements
- Two estimations of the dental health personnel requirements were done. In the first estimation, calculations were made using demand for services by different age cohorts and in the second calculation effective demand for service was used.

- The calculation of dental health personnel requirement in this method was based on the need for services.
- The prevalence of dental diseases in each age group was calculated from the trend of the diseases, which was previously obtained from the National Oral Health Survey and the cross sectional study.
- The prevalence of the diseases in the target year was converted to service needs, and the service needs were further converted to personnel requirements using the productivity norms.

- Annual working time of dentists
- Data derived from the cross-sectional study revealed that the average dentist in India works 7 hours a day, 290 days a year (2030 hours/year). Except for a very few dental hygienists, no other operative dental auxiliaries are currently working in India and an assumption applied for this study is that all dental treatments are provided only by qualified dentists.

Table 4 Dentist population ratio and minutes of treatment required based on patient demand

Cohort	% Demand	Minutes required	Minutes of demand × cohort% of population	Minutes per person
0–14	50	21.2	10.7 × 36	(385.2 + 310 + 195 + 31.2)/100 − 9.2 minutes per person 1:13,239 in a 2030-hour year
15–29	50	19.5	9.7 × 32	
30–64	35	25.0	7.5 × 26	
65–79	10	52.3	5.2 × 6	

The results of this calculation show that the average minutes (of care) required per person was 9.2, the dentist population ratio was 1:13,239 in a 2030 hour year and the total number of dentists required will be 91,411.

Table 5 Supply and requirements of dentists

Year	Indian population	Supply	Requirement		
			Population ratio (1:7,500)	WHO/FDI method using demand for care	WHO/FDI method using effective demand for care
2001		47,204	-	-	-
2011	1,210,193,422	117,825	161,359	91,411	64,592
2020	1,326,093,000	309,700	176,812	-	-

WHO, World Health Organisation; FDI, International Federation for Dentistry.

- India continues to show a yearly increase in the number of dentists, and hence the trend towards an increase in dental manpower seems likely to continue, along with employment problems for dentists.
- At the same time, oral health care remains under-utilised and unavailable to large parts of the rural population. Solving all these problems will require both informed public policy makers and public policies based on the best available scientific data and proper manpower planning.

- Dental auxiliaries –
- A dental auxiliary is a person who is given responsibility by a dentist so that he or she can help the dentist render dental care , but who is not himself or herself qualified with a dental degree. The duties undertaken by dental auxiliaries range from simple tasks such as sorting instruments to relatively complex procedures which form part of treatment of patients.

Classification - W.H.O , 1968

(Based on training received, tasks they perform and legal restrictions)

A) Non – operating auxiliary

(i) Clinical: This is a person who assists the professional in his clinical work but does not carry out any independent procedures in the oral cavity.

(ii) Laboratory: A person who assists the professional by carrying out certain technical laboratory procedures.

B) Operating auxiliary

A person who, not being a professional is permitted to carry out certain treatment procedures in the mouth under the direct supervision of a professional.

Revised Classification:

A) Non – operating auxiliaries

- Dental Surgery Assistant
- Dental Secretary/ Receptionist
- Dental Laboratory Technician
- Dental Health Educator

B) Operating auxiliaries

- School Dental Nurse (New Zealand)

- Dental Therapist

- Dental Hygienist

- Expanded Function Dental Auxiliary (EFDA)

- Frontier auxiliaries
- New auxiliaries -

  dental licentiate

  dental aide

- **Classification based on length of training:**

- Jeboda (1982) suggested a classification based on that adopted by WHO (1968) in New Delhi.

- He recognized the following categories:

1. Long term trained (2 to 4 years)

2. Short term trained (4 to 6 months)

Bhalla M , Yadav P , Siddiqui M , Bhalla A. Operating auxiliaries : A review. J Dent Med Sci. 2014;13(10): 56 – 61.

Degrees of supervision.

- ADA (2002) defined four degrees of supervision of auxiliaries, with the assumption that ultimate responsibility was assumed by the licensed dentist.
- General supervision
- Indirect supervision
- Direct supervision
- Personal supervision

- General supervision:

The dentist is not required to be in the dental office or treatment facility when the procedures are being performed by the allied dental personnel, but has personally diagnosed the condition to be treated , has personally authorized the procedures and will evaluate the performance of the allied dental personnel.

- Indirect supervision:

The dentist is in the dental office or treatment facility , has personally diagnosed the condition to be treated, authorizes the procedures and remains in the dental office or treatment facility while procedures are being performed by the allied dental personnel, and will evaluate the performance of allied dental personnel.

- Direct supervision

The dentist is in the dental office or treatment facility , personally diagnoses the condition to be treated , personally authorizes the procedures and remains in the dental office or treatment facility while procedures are being performed by the allied dental personnel and, before dismissal of the patient, evaluates the performance of the allied dental personnel.

- Personal supervision

The dentist is personally operating on a patient and authorizes the allied dental personnel to aid treatment by concurrently performing a supportive procedure.

- **Non operating auxiliaries -**
- **Dental surgery assistant -**
- The first dental assistant was hired in 1885 by Dr. C. Edmund Kells of New Orleans.
- Non operating auxiliary who assists the dentist or dental hygienist in treating patients but who is not legally permitted to treat patients independently.
- The function of dental surgery assistants is to ensure smooth running of the clinical area, and to help the dentist so that they are able to spend more time providing actual dental care to patients.

- The expert committee on auxiliary dental personnel of the WHO have listed the duties of dental assistants as follows ;
- Preparation of the patient for any treatment he or she may need
- Sterilization , care and preparation of instruments.
- Preparation and mixing of restorative materials including both filling and impression materials.

- Care of the patient after treatment until he or she leaves , including clearing away of instruments and preparation of instruments for reuse.
- Preparation of treatment for the next patient.
- Presentation of documents to the surgeon for his completion and filing of these.
- Assistance with X ray work and processing and mounting of X rays.
- After care of patients who have had general anesthetics.

- **Dental laboratory technician / dental mechanic -**
- Dental mechanic is a person , who makes or repairs dental appliances and dentures including inlay , crown and bridge work . He shall restrict his activities to purely mechanical laboratory work at the instance of registered dental surgeon. He shall not do any chair side work.

- Dental laboratory technicians receive their training through apprenticeship which is associated with formal training at a dental school . The formal training period covers 2 years.
- Duties -
- Casting of models from impressions
- Fabrication of dentures , splints, orthodontic appliances , inlays , crowns.

- Dental laboratory technicians may be employed by dentists in private or public health practice, they may be self employed and accept work from dentists in the area or they may be employed by commercial laboratories.
- By law or regulation , they have little or no direct contact with patients.

- The countries where dental laboratory technicians work includes ;
- Austria , Germany , Italy , Switzerland, Belgium , Denmark , France , Greece , Ireland , India, Netherlands , Luxembourg , Portugal , Spain , United kingdom.

- However in some states in US and other countries , laboratory technicians (denturists) are licensed to provide directly to patients.
- Formal training for dental laboratory technicians is offered by many health worker training schools located throughout China.
- The courses are usually of 3 year duration and are targeted for persons who have completed 9 years of school education.

- In United states of America , perhaps the most serious shortage of allied dental personal is with dental laboratory technicians.
- Since 1982 programs in dental laboratory technology have declined in enrolment by about two thirds. Currently only 487 lab technicians enter the workforce per year.

- **Dental health educator -**
- This is a person who instructs in the prevention of dental disease and who may also be permitted to apply preventive agents intra orally.
- In some countries, duties of some dental surgery assistants have been extended to carry out certain preventive procedures.
- Sweden - 2 additional weeks of training is given after which auxiliaries are allowed to conduct fluoride mouth rinsing programs to groups of school children. They are however not allowed to undertake any intra oral procedures

- In the private practice setting , the auxiliary not only educates patients about their own dental health but also has the opportunity to inform the patient of issues that are pertinent to the dental health of the community.
- By informing and educating each patient to facts about specific public health problems , the auxiliary can establish a powerful information network and thus effect changes within the community as well as within the individual.

- Dental secretary / receptionist –
- Non operating auxiliary who assists the dentists with his secretarial work and patient reception duties.

- **Operating auxiliaries -**

- **Dental Hygienist -**
- Dental hygienist is a person , not being a dentist or a medical practitioner who does oral prophylaxis , gives instructions in oral hygiene and preventive dentistry , assists the dental surgeon in chair side work and manages the office. He / she shall work under the supervision of dental surgeon.

- Dental hygienist was first employed in 1906 in a private dental practice in the USA, and in 1913 the first formal training course was started.
- Mrs Irene Newmann was the first dental hygienist.
- Dr. Alfred Civilian Fones - Father of dental hygiene.
- Duties -
- Scaling and polishing – oral prophylaxis
- Topical fluoride application, dental sealants
- Dental health education.

- Countries where dental hygienists work include ;
- Australia , Austria , Canada, Czech republic, Denmark , Fiji , Finland , Germany , Ireland , India , Israel , Italy , Japan , Korea, Nepal , Netherlands, Norway , Portugal , Russia, Singapore, South Africa , Spain , Sweden , Switzerland, United Arab Emirates , United Kingdom , United States of America.

International federation of Dental hygienists. Available online { http://www.ifdh.org/members.html} accessed on 17 April 2017.

- In Denmark and Netherlands , they are allowed to make a preliminary examination and charting of the teeth.
- The training period for dental hygienist is 1 – 2 years .
- About 6,087 dental hygienists graduate annually from USA.

- Duties of dental hygienist in USA –
- Dental health education to adults and children
- Scaling and polishing
- Application of fissure sealants
- Charting existing restorations and suspicious lesions for review by the dentist.

Cynthia pine, Rebecca Harris, Community Oral Health, 2nd Ed, Quintesence Publishing Co Ltd. 2007.

- **Dental therapist –**
- An operating auxiliary , who is permitted to carry out to the prescription of supervising dentist , certain specified preventive and treatment measures including cavity preparation and restoration of teeth.
- New Zealand pioneered the development of dental therapists, with the first class of 29 school dental nurses graduating from a two-year post-high school vocational training program in Wellington, New Zealand, in 1923.

- Dental therapists are reported to be established in over 54 countries most often in school based programs for children.
- Early adopters of dental therapists include Malaysia (1948), Sri Lanka (1949), Singapore (1950), Tanzania (1955) and the United Kingdom(1959).

David A Nash et al . A review of the global literature on dental therapists. Community Dent Oral Epidemiol 2014; 42: 1–10.

- The following countries use dental therapists as public employees serving children in a school dental service:
- New Zealand, Australia, Hong Kong, Singapore, Malaysia, Jamaica, Trinidad and Tobago, Bahamas, Anguilla, Papua New Guinea, Sri Lanka, Seychelles ,Brunei, Guyana, Samoa and Suriname

- Vocational training in a two-year curriculum has been the tradition in the majority of countries using dental therapists, with the awarding of a certificate or diploma on completion.
- In some countries, the training of dental therapists has expanded to three or four years.

O Keefe EJ et al . Evaluation of dental therapists undertaking dental examinations in school setting in Scotland. Community Dent Oral Epidemiol 2016; 44: 515–522.

- In New Zealand , Australia and the United Kingdom the training of dental therapists and dental hygienists has been integrated in to a three-year curriculum.
- The Netherlands has expanded its dental hygienists training to include dental therapists' skills, and extended the educational curriculum to four years.
- Singapore also provides opportunity for integrated training of dental therapists and dental hygienists.

- Worldwide, the scope of a dental therapist's practice generally includes;
- Examination, diagnosis and treatment planning;
- Exposing radiographs
- Oral health education;
- Preventive services such as prophylaxis, fluoridetherapy, fissure sealants and dietary counseling;

- Preparation of cavities in primary and permanent teeth and restoration with amalgam and composite
- Stainless steel crowns, pulpotomies and the extraction of primary teeth.
- In some countries, dental therapists may also extract permanent teeth.

- **Expanded function dental auxiliary –**
- Dental assistant or a dental hygienist , who had recieved further training in duties related to the direct treatment of patients , though still working under the direct supervision of dentist.
- The first large scale service applications of the expanded duty principle were made in Philadelphia . They were called Technotherapists.

- DUTIES –
- Applying topical fluorides
- Applying desensitizing agents
- Applying pit and fissure sealants
- Placing , carving and polishing amalgam restorations

- Placing and finishing composite restorations
- Placing and removing matrix bands
- Placing and removing rubber dams
- Taking impressions for study casts
- Removing sutures
- Exposing and developing radiographs
- Removing and placing ligature wires on orthodontic appliances.

- Development in the training and duties of EFDA in the Canadian province of Ontario , during the 1970 provide an example of an attempt to build a logical career structure for assistants and hygienists.
- Four levels of training and qualification were recognized,

  certified dental assistant

  preventive dental assistant

  dental hygienist

  dental hygienist with expanded duties.

- **School dental nurse –**
- This is a auxiliary who is permitted to diagnose dental disease and to plan and carry out certain specified preventive and treatment measures , including some operative procedures in the treatment of dental diseases in defined groups of people usually school children.

- The school dental nurse has to work under the direction of a dentist and refer to him those patients requiring diagnosis or treatment that he or she is not able or legally entitled to carry out.
- The dental nurse scheme was established in Wellington , New zealand in 1921 due to extensive dental disease found in army recruits during world war I.

- The person who influenced its formation was T.A Hunter , a founder of the New Zealand Dental Association and a pioneer in the establishment of dental school in New Zealand.
- The name of school where they were trained was The Dominion Training School for Dental Nurses. The training extends to over a period of 2 years.
- Upon completion of training, each school dental nurse is assigned to a school where she is employed by the government to provide regular dental care for children.

- The school dental nurses are predominantly in the school based salaried service and are expected to provide care for the children at nearly 6 – month intervals. They are under general supervision of a district principal dental officer.

- **Duties –**
- Oral prophylaxis
- Topical fluoride applications
- Advice on dietary fluoride supplements
- Administration of local anesthetics
- Cavity preparation and placement of amalgam fillings in primary and permanent teeth.

- Pulp capping
- Extraction of deciduous teeth
- Classroom and parent – teacher dental health education.
- Referral of patient to private practitioners for more complex services , such as extraction of permanent teeth , restoration of fractured tooth and orthodontic treatment.

- In Britain , the first operating auxiliaries based on the New Zealand school dental nurse model graduated in 1962.
- They were generally known as New Cross Auxiliaries , because the one training school was located in the New Cross Area of South London.
- Other countries that utilize dental nurses, include Malaysia , Singapore , Thailand, Vietnam, Myanmar , Indonesia, Hong Kong , Australia , parts of Africa and South America.

- **Frontier auxiliaries –**
- In developed countries , dentists remains in the urban centres and the number of areas too distant from public or private dental offices for the inhabitants to receive regular comprehensive care or emergency pain relief.
- Nurses and former dental assistants can in such areas, provide valuable service with the minimum of training.

- Simple dental prophylaxis can be performed , basic dental health education can be provided , dental first – aid can be rendered in cases with pain and patients can be referred to nearest dentists.
- They can also organize fluoride rinse programs and perform simple denture repairs.
- In 1981, a one week training program was conducted for frontier auxiliaries in Alaskan communities. Two years later , case reports from two of the communities showed that a large variety of simple dental problems had been solved and references has been made to urban dentists.

- **New auxiliary types –**
- The expert committee on auxiliary dental personnel of the WHO (1959) has suggested two new types of dental auxiliaries.
- The dental licentiate
- The dental aide

Dental Licentiate -

He is a semi-independent operator, trained for 2 years to perform

- Dental prophylaxis
- Cavity preparation and fillings of primary and permanent teeth
- Extractions under local anesthesia
- Drainage of dental abscesses
- Treatment of the most prevalent diseases of supporting tissues of the teeth
- Early recognition of more serious dental conditions

- **Dental aide –**

This type of auxiliary personnel preforms duties which include, elementary first-aid procedures for the relief of pain, including:

- Extraction of teeth under local anesthesia
- Control of hemorrhage
- Recognition of dental disease which is important enough to justify transportation of the patient to a center where proper dental care is available.

- They would operate only within a salaried health organization and be under supervision . The formal training extends from 4 to 6 months followed by a period of field training under direct and constant supervision.

- In India there are 2-year certificate/ diploma courses that are offered for para dental training, such as dental mechanics (dental laboratory technology), dental hygiene and dental assistance.
- A total of 68 dental colleges offer para dental courses in dental mechanics and dental hygiene. Only 1,186 positions are available for dental mechanics and 833 for dental hygiene training.

- Impact of Auxiliaries in Indian scenario -
- There exists a serious maldistribution of the dental professionals with nearly 75% of the dentists practicing in the urban area catering to only 25 % of the total population.
- Under such circumstances , services of dental auxiliary in meeting the dental needs of the deprived segments of the population will be significant.

- The only auxiliary dental personnel who exist in India are the dental surgery assistant , laboratory technician and dental hygienists.
- The most suitable type of auxiliary for the Indian set up will be the School dental nurse and Expanded function dental auxiliary (EFDA).
- These auxiliaries will not only provide the basic dental care but also play an important role in the prevention of dental diseases both for school going children and general public .

Models for assessing manpower requirements.

- Depending upon the social philosophy towards dental health care the following models or organizational patterns may be applied in assessing manpower requirements.

1. Supply demand model
2. Functional analysis model
3. Target setting approach model

- Supply and demand model –
- Most commonly used method of assessing requirements and often implemented for political reasons

STEPS:

- Indices of demand are constructed based upon the utilization rates by age, sex, occupation and race
- The dentist: population ratio is projected at a given date.
- Then assumptions are made on the increase in numbers of dental visits to be made per year based upon reduction of financial barriers or increase in Per capita income.

- The model poses a number of methodological problems -

1. The assumption is incorrect that there is no underlying hypothesis regarding the nature of the overall services which are to be provided.

2. Model does not analyze changes which are occurring in the functions and the productivity of dental health personnel . It assumes that present staffing pattern are adequate and changes in demand can be met by increasing number of dentist.

3. The users of the model assume that supply of dentist will rise according to market demands.

- Functional analysis model –
- This method is based on the assumptions of supply demand and on cost benefit methods
- Involves matching qualifications of dental health personnel to the requirements of 'job performance.
- There are numerous studies on the activities of dentists , dental hygienists , but the relationship between the activities performed and the actual function has not been reported.

- Neither has there been any analysis of the extent to which dental care programs have been redesigned as a result of these studies.
- The examples of how functions have been transferred is found in the training and the use of dental nurses in New Zealand. The auxiliaries perform dental tasks which are usually carried out by dentists.
- There has been no redesigning of dental care system as a result of the above studies .

- Target setting approach model –
- Concentrates on identifying deficiencies in health service system which are identified by the desire to attain specified social priorities.
- Reduce the need for dental care by prevention of dental diseases (FDI, 1968).
- fluoridation of water and reduction in refined sucrose consumption; reduces dental caries prevalence leading to reduction in manpower required to treat dental caries and reduction in cost of dental services

- The target setting approach seeks to establish goals to be achieved and its purpose is to influence the future course of development of the health services.
- Although the dental profession gives outward appearance of following a target setting approach , the actual method used is supply demand model. That model is not used successful in the past.

Information required for the estimation of manpower .

- The following information are required for the estimation of manpower – WHO 1968 .
- 1) Essential profiles –

a) Population

- total
- rate of growth
- distribution - urban
  - rural

b) Economics

- socio economics status
- source of funds for health

c) Political factors-

- Attitude of the government
- Level of authority
- Prevalent status of dentistry , private orgovernment

d) Communications

- transport
- distance between centres

e) Dental disease pattern

f) Present manpower

- availability

- distribution

- general education standards.

2) Desirable profiles-

These are profiles which any planner would desire but which when not attained does not stop planning

3. Variable profiles

These are features which are essential in some countries, desirable in some and of little importance in some.

a) General-

Geography

Climate

Economic factors

b) Dietary pattern

c) Attitudes of dental personnel towards practice.

Challenges to oral health work force in India

1. deficient manpower planning and projection,

2. the changing disease pattern affecting the workforce.

Shobha Tandon. Challenges to the Oral Health Workforce in India. J Dent Edu. 2004; 68(7): 28-33.

- Deficient manpower planning and projection -
- This is one of the key issues as the basic fault lies in the defective planning of the workforce and no projection or forecast for the future. Strategies are not developed taking into consideration what could happen in the future.

- DENTAL EDUCATION -
- The dental education sector in India provides training at the undergraduate, postgraduate levels. The first degree, BDS (Bachelor of Dental Surgery), comprises undergraduate training of 4 years followed by 1 year of internship.
- Postgraduate training includes residency programmes of 3 years duration, culminating in MDS (Master of Dental Surgery). Also there are 2-year diploma courses in postgraduate training.

- In addition, there are 2-year certificate/ diploma courses that are offered for paradental training, such as dental mechanics (dental laboratory technology), dental hygiene and dental assistance.
- Dental education in India was formally established in 1920 when Dr Rafiuddin Ahmed established the first dental college in Kolkata.

- In 1966, the first private dental institution was established; up to the year 1966 all dental colleges belonged to the government sector. Soon after this period there was increase in numbers of dental colleges. However, the growth was not uniform in the government and private sectors.

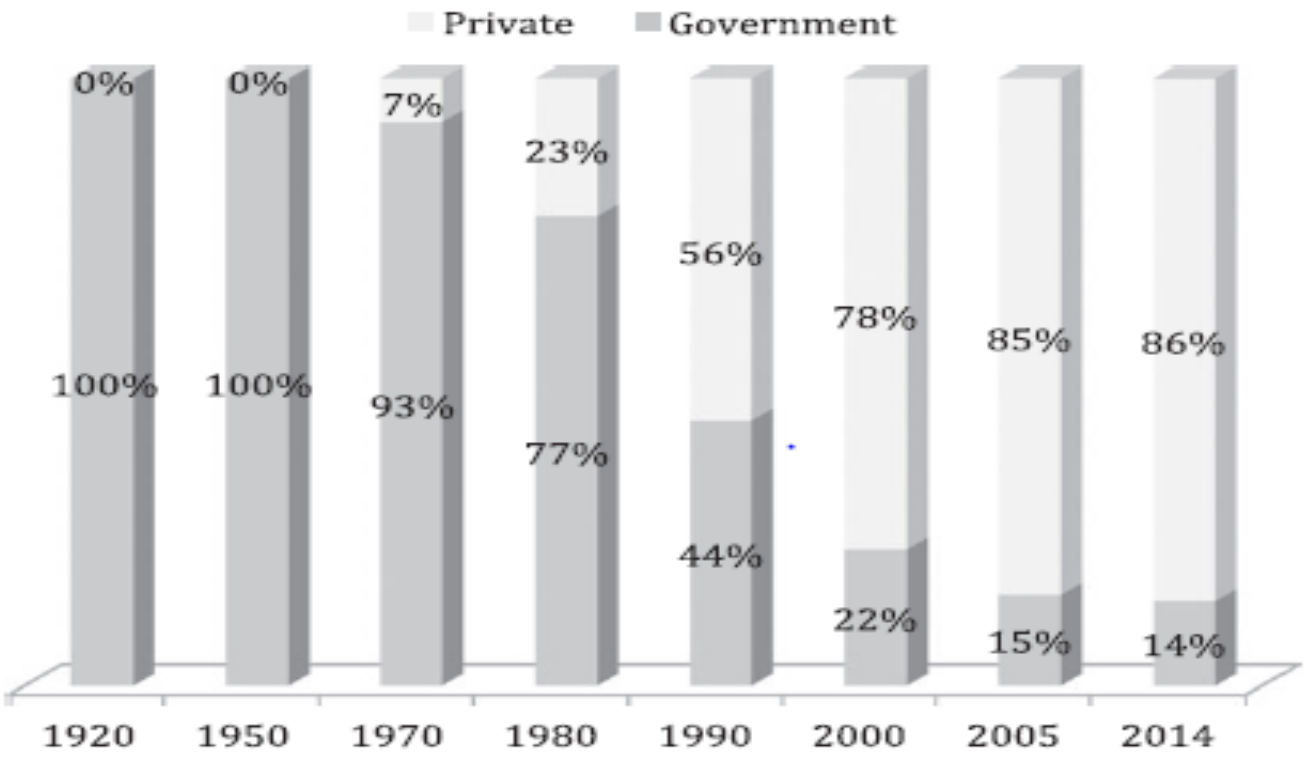

Figure 1. The changing ratio in government and private dental colleges in India.

- In the 1970s, most colleges were government owned (92%) and only a negligible fraction belonged to the private sector (7%).
- After this period there was tremendous growth in the establishment of private dental colleges that led to the present scenario. The current data show that only 14% of the dental colleges are now owned by government and the remainder are in the private sector.

- The current data show that there are 301 dental colleges in India; of these, 259 belong to the private sector and 42 are government owned.
- The present data shows that there are a total of 26,600 positions available for students to enter dentistry in India, of which 89.47% are offered by private colleges and 10.53% by the government colleges.

Ashish K. Jaiswal, Pachava Srinivas, Sanikommu Suresh. Dental manpower in India: changing trends since 1920. Int Dent J.2014; 64: 213-218.

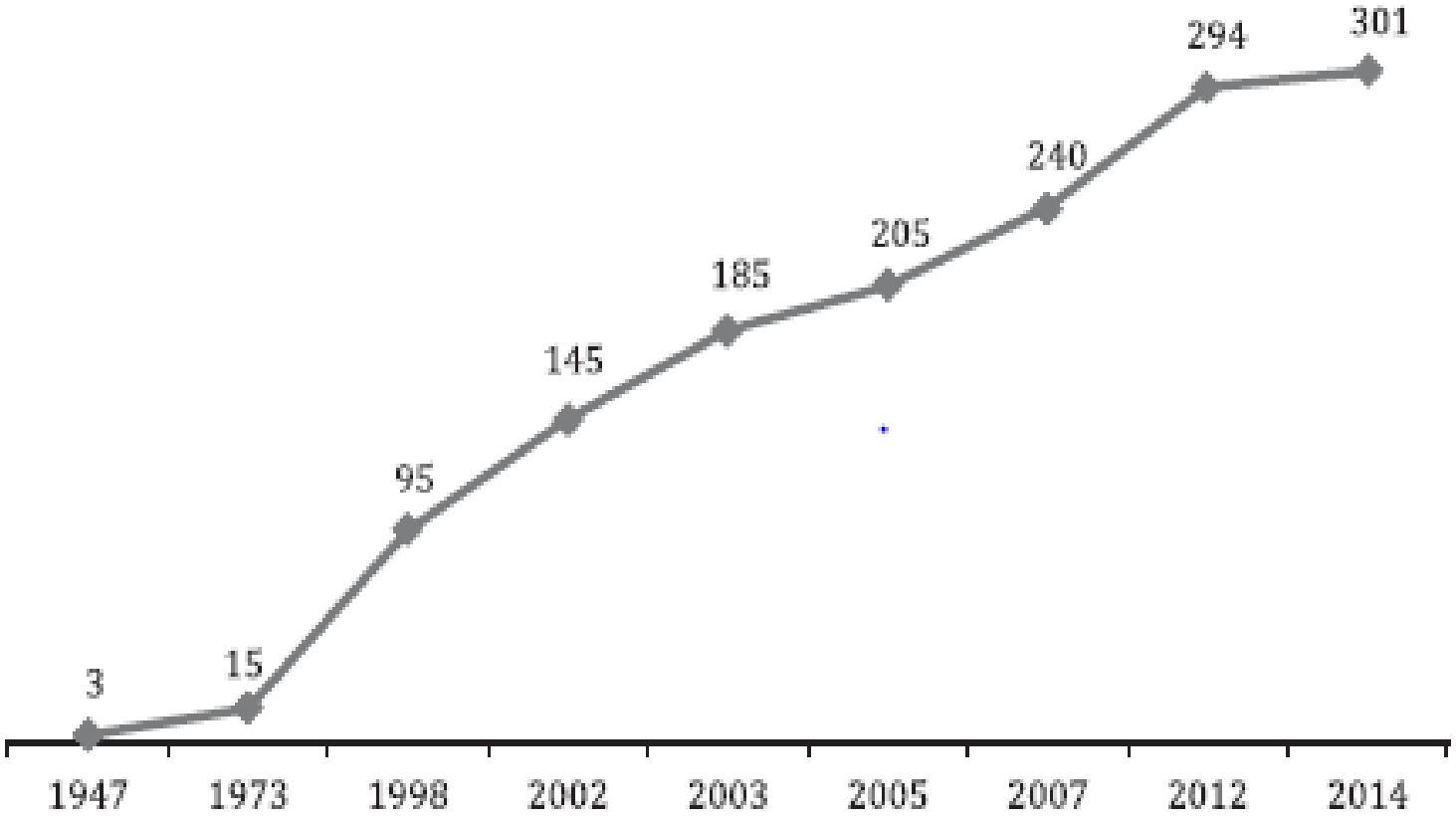

Figure 3. Trends in the increase of numbers of dental colleges in India.

- GEOGRAPHICAL IMBALANCE –
- The number of colleges has increased to meet the demands of the society, but there has been a non uniform growth of these colleges across the country. This is because there is a massive flaw in the geographic distribution of the colleges.
- Forty-five dental colleges exist in the state of Karnataka, whereas services of single institute are unavailable in north-eastern states such as Arunachal Pradesh, Sikkim, Meghalaya, Nagaland, Mizoram, Tripura and Manipur.

Ashish K. Jaiswal, Pachava Srinivas, Sanikommu Suresh. Dental manpower in India: changing trends since 1920. Int Dent J.2014; 64: 213-218.

- MISGUIDED DENTIST POPULATION RATIO –
- The current data show that in India the dentist to population ratio is 1:10,000. The dentist to population ratio has markedly improved from 1960s when it was 1:301,000.
- However, there is considerable variation in the distribution of dentists across various states.

- Some states/union territories, such as Delhi, Karnataka, Maharashtra, Kerala, Tamil Nadu, Punjab, Goa, Chandigarh and Pondicherry, have dentist to population ratios in the range 1:2000–1:5000, while most states/union territories have dentist to population ratios in the range 1:10,000–1:25,000.
- Some states are totally void of registered dentists.

- LACKING DENTAL AUXILIARIES –
- An increase in the number of dental auxiliaries should be another high priority. Since there are district hospitals where no dental service is available, dental auxiliaries should first be placed in those locations.
- In 1990 there were 3,000 registered hygienists and 5,000 laboratory technicians in India. This implies that the service of one hygienist was available to seven dentists, and one laboratory technician renders service to four dentists, whereas it should be a 1:1 ratio.

- INADEQUATE WORK FORCE IN RURAL AREAS –
- Dentistry faces serious problems regarding accessibility of its services to all. In many developing countries like India, oral health services are offered by dentists, who practice in the cities and treat the affluent parts of the urban population.
- It is often difficult for the poor urban and the rural population to get access to emergency care.

- One potential way of balancing in the rural–urban inequality could be through integration of dentists into the primary health-care system.
- The primary health-care system of India has a strong network of health centres and manpower.
- On March 31, 2011, there were 148,124 subcentres, 23,887 primary health centres (PHCs) and 4,809 community health centres (CHCs) with 31,530 health assistants and 260,083 health workers.

- In addition to utilising these paramedical personnel in oral health education and prevention activities, if one dentist is recruited in every PHC and CHC, as suggested by the High-Level Expert Group on Universal Health Coverage, about 30,000 dentists would have been working in the rural areas in government hospitals.

- However, the total number of dentists working in government hospitals, both rural and urban, as of January 1, 2012 was 3,875.
- The failure of the government to appoint sufficient number of graduating dentists into the primary health-care system partly resulted in mushrooming of private dental clinics.
- Urban polarisation of private dental practitioners has made dental services entirely inaccessible to rural people

- **Changing Disease Patterns and Treatment Needs –**
- With increasing awareness and advancements, there has been a decline in certain diseases in urban areas or developed areas. To cope with these changes, the workforce should be equipped and capable of satisfying the changing demands and needs of the society.

- Because of the changing disease patterns, the dental sector is going through a transition from a service mix that has been predominantly therapeutic to a service mix that will be mostly preventive. There has been a decrease in the demand for extractions of teeth and an increase on conservative modalities such as root canal treatment and crown placement.

- Changing Treatment Needs:
- People across the world are becoming more knowledgeable about dental health and what is required to maintain it. As the population has become more affluent and educated, the value placed on oral health has increased.
- Changes of this magnitude will have profound effects by reducing the demand for some services and enhancing the demand for others. The workforce should be able to sustain and satisfy the demands of the society.

CONCLUSION

- As advances are made in aspects of prevention and control of dental diseases , dental manpower utilization will have to change to keep pace with the developments.
- In order to deliver total dental care on community scale precise roles of each type of dental personnel has to be defined.
- They are likely to differ from country to country , and therefore need to be reorganized and reached within the social and cultural context of each individual society.

- India continues to show a yearly increase in the number of dentists, and hence the trend towards an increase in dental manpower seems likely to continue, along with employment problems for dentists.
- At the same time, oral health care remains under-utilised and unavailable to large parts of the rural population. Solving all these problems will require both informed public policy makers and public policies based on the best available scientific data and proper manpower planning.

- The incorporation of dentists into the primary health-care system, as suggested by the High-Level Expert Group on Universal Health Coverage, may help in bridging the rural–urban gap in the dental manpower distribution.

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