



# **Impacts of Corona-virus Pandemic on the Preparedness of Dental Graduates at The University of Benghazi to Practice Dentistry**

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**This Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Dental Public Health**

**Benghazi University  
Faculty of Dentistry**

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University of Benghazi



Faculty of Dentistry

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## **DEDICATION**

I would like to dedicate this thesis to people who stood by me and encouraged, supported, and motivated me to continue this journey whom I could not have succeeded without them.

To my parents for the unconditional love and support without both of you, I would not be able to become who I am today. You provided me a great childhood, loving home, motivation for studying since primary school, that will continue to push me for years to come and I am eternally grateful for you.

To my dear husband, thank you for supporting my goals, for your trust on me and giving me the opportunity to accomplish them.

To my children, I am sorry for the dereliction towards you for a while, but I wanted to be an example for you to follow.

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## LIST OF ABBREVIATION

Abbreviation	Full Term
ADEA	American Dental Education Association
EPAs	EN-trustable Professional Activities
GDC	General Dental Councils
ORE	Overseas Registration Exam
ADEE	Association for Dental Education in Europe
ASEAN	Association of South Asian Nations
MRA	Mutual Recognition Agreement
ACFD	Association of Canadian Faculties of Dentistry
WFME	World Federation Medical Education
MOH	Ministry of Health
MOE	Ministry of Education
PBL	Problem Based Learning
GAPP	Graduates Assessment of Preparedness for Practices
GDP	General Dental Practices
CDC	Centre for Disease Control and Prevention
SPSS	Statistical Package for the Social Sciences
TA	Thematic Analysis
TMJ	Temporomandibular Joint
UoB	University of Benghazi
COVID-19	Corona virus Disease 2019
OSCE	Objective Structured Clinical Exam
MCQ	Multiple choice Question

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**Abstract**

**Aim and objectives:**

The aim of this natural experimental study was to assess the impact of COVID-19 pandemic on the preparedness of dental graduate at the faculty of dentistry, University of Benghazi.

**Study design:**

A cross sectional mixed study design, a predesigned questionnaire known as graduate assessment of preparedness for practice (GAPP) questionnaire was used for quantitative data collection and supplemented by semi structured qualitative interviews to fully understand the issue of preparedness among dental graduates.

**Results:**

The overall response rate of 68.2%.,nearly 59.5% of the respondents were from pre-pandemic batch, the study finding showed the area of weakness of graduates preparedness were more prominent in the TMJ

management (12%), orthodontics appliance repair (14.7%) and surgical extractions (37.2%) in clinical competences, most of the respondents considered themselves competent in taking history (86.2%), administering local anaesthesia (88.6%), and performing direct restorations (85.6%), and to lesser extent prepared for simple tooth extraction (%79.2), periodontal treatment (%78.3) and preventive advice (%74.5), the pre-pandemic graduates demonstrated better confidence and competence in practicing dentistry independently but some areas remained deficient in both groups which indicates inherent problems in the dental curriculum at the UoB.

### **Conclusion:**

The study findings suggest that the pandemic has negatively affected the learning process at the faculty of dentistry of UoB and highlights the need of curriculum reform and re-defining the competencies of Libyan dental graduate. Minimizing the numbers of admitted students and supporting the existing resources are mandatory to regain the quality dental training.

## **CHAPTER 1**

### **INTRODUCTION**

Dental education is considered as a complicated, critical and often stressful pedagogical procedure, consisting of 4 to 6 years of study to attain competences and skills based on developing psychomotor skills <sup>(1)</sup>. During the past two centuries, dentistry has developed markedly establishing itself as a "profession", with formal education and recognized competencies. The evidence-based approach to clinical education and practice has taken center stage. After many studies and reports from people and organizations such as the American Dental Education Association (ADEA), the structure of dental education has changed from monopolistic education to education within colleges affiliated to universities based on basic sciences <sup>(2)</sup>.

The development of dental education has moved from the beginnings marked by the "dark age" to a curriculum process and descriptive stage, to a scientific basis stage, to efficiency stage, now to multidisciplinary stage and prevention. For instance, in the United States of America, the authors' reports in the journals of dental educations show that the dental curriculum has changed in an incremental way since 1934 <sup>(2)</sup>. However, from 2003, the biggest change was the increased proportion of schools requiring community-based experiences, the introduction of problem-based learning and case-based learning resulting in an increased embrace of the competencies-based learning in dental education. Most dental schools presume the urgent need to change their system of teaching from a subject-specific approach to a more holistic approach that results in an

evidence-based quality of oral health care <sup>(3)</sup>. The definitive goal of any dental curriculum is to produce graduates who are ready to begin practicing safely, psychologically confident and with varying degrees of independence to be safe beginner, which mean “a rounded professional who, in addition to being a competent clinician, will have the range of professional skills required to begin working as part of a dental team and be well prepared for independent practice and be able to assess their own capabilities and limitations, act within these boundaries and will know when to request support and advice”<sup>(4)</sup>.

The emergence of COVID19 pandemic has resulted in disruption of all social and educational activities, that involves close contact activities <sup>(5)</sup>. Of particular concern was the dental education which involves both lectures and clinical training on patients resulting in dental team’s proximity to the patient and the aerosols generated during routine dental care, making dental care workers and students one of the highest risk groups <sup>(6-8)</sup>. The air generating procedures during routine dental can result in contamination of the contact surfaces and the whole environment in the dental office, putting both dental practitioners and patients at risk to contract the coronavirus <sup>(9)</sup>.

Additionally, unlike non-clinical faculties which instantly adapted to the unexpected COVID-19 crisis, dental schools were challenged by maintaining the balance between the safety of students, staff, the changing working environment and policies, and quality of the dental education with fully distant educational

activities to limited clinical training <sup>(10)</sup>. The new normal for working in clinics during the period of the pandemic was limited to emergency and severe cases to avoiding direct contacts with people, with restricted access to face-to-face dental services <sup>(11)</sup>. At high level of protection to prevent infections, by taking additional measures along with global standard precautions for infection control <sup>(12)</sup>.

The situation at the University of Benghazi, faculty of Dentistry is far more difficult, during the pandemic, because of the large numbers of students compared its actual capacity. Therefore, the pandemic could have negatively affected the preparedness of graduates to practice dentistry.



## **CHAPTER 2**

### **LITERATURE REVIEWS**

## **2.1 Conceptualization of Dental Graduates competencies**

In the health professions, preparedness for practice means graduate's readiness through attainment and demonstration of requisite competencies that broadly prepare college graduates for a successful transition into the workplace included any expectation of circumstances in which they may be employed in the future. Therefore, prepared for practice not only implies being competent in the practice of a health profession, but also that the feeling the readiness to work independently and responds to the full range of requirements presented in practice (13).

There are many concepts for evaluating the quality of health professions training such as competencies, En-trustable Professional activities (EPAs), or milestones, which reflect the knowledge, skills, and independency that health professionals are expected to make independent practitioners (14). Competency is defined as complex behavior or ability essential for the general dentist to begin independent, unsupervised dental practice (15). Lachiver and Tardif (2002) expanded on the definition of competence as follows: “A competence could be defined as a complex ability to act based on effectively mobilizing and using a set of resources. This ability highlights that each competence is active in nature, allowing an individual to implement a set of reflections, process, strategies, and actions in performing a given task. It helps distinguish competence from a simple procedure, preventing competence from becoming misconstrued as a synonym of

know-how. It therefore endows competence with comprehensive role and character.”<sup>(16)</sup>

According to a systematic review of literature, a conceptual framework explaining preparedness of dental graduates constituted by six domains has emerged<sup>(14)</sup>, which is summarized as following:

### **2.1.1 Academic and technical competence domain:**

It is defined as mix of theoretical knowledge and practical skills used in patient management, like proper history taking, patient examination, ask for required investigation and read the results of analysis, prescribing of the prober medication with adequate dose, manage common medical and dental emergencies, and appropriate referral for specific departments.

### **2.1.2 Communication and interpersonal skills domain:**

This domain consists of many skills that helps in the communications with patients, supporting staff members, caregiver, and colleagues and the general public, such as discussing the diagnosis and treatment plans with patients, discussing some sensitive matters, whether with the patient or colleagues, and discussing financial matters such as ways to pay for treatment costs.

### **2.1.3 Protective mechanisms and adaptive skills domain:**

These are the abilities or mechanisms that helped the clinician to handle a numerous set of clinical circumstances that any dentist may facing during

independent practice. for example, manage patients with special needs such as children, elderly, medically compromised persons, mentally disable person.

#### **2.1.4 Professional attitude and ethical judgment domain:**

This involves adhering to ethical standards of the profession such as respecting patients' dignity choices, lifelong learning to maintain up to date knowledge and skills, and technology. Keeping patient records, to ensure privacy, respect and follow up on the research process, maintain ethical and legal standards in governance.

#### **2.1.5 Clinical entrepreneurship and financial solvency skills domain:**

Entrepreneurship involve skills and ability to successfully run profitable independent dental practical clinics and ensuring the smooth functioning of the clinic, the ability to deal with treatment costs, negotiate with patients and other stakeholders, and deal with finances in clinic to ensure survival in business.

#### **2.1.6 Social and community orientation domain:**

Understanding the impacts of social determinate on dental health and understand of current issues relating to inequalities, in addition to manage the patient as whole person and not just look inside the patient mouth and the ability to conceive plans to address those needs.

## **2.2 Standards for preparedness of Dental Professionals**

The responsibility of quality assessment of dental graduates varies across countries in terms of assessment method and the organizing body. The aims of such quality control are protecting the general public from unqualified dental professionals. This means the dentists should have attained the highest standards in terms of knowledge, skills, including clinical and technical skills, and professional attributes, in particular putting the interests of patients first at all times <sup>(17)</sup>. In the next subsection, examples of quality assurance of dental profession in different countries are presented.

### **2.2.1 United Kingdom (UK)**

The General Dental Council's (GDC) which is an independent organization regulates dentists and dental care professionals in the UK <sup>(18)</sup>. The GDC become involved in the dental training process since 1956 to set and maintain standards for UK dentistry. Preparing for Practice according to the GDC standards is compulsory to gain admission to the UK register and practice dentistry. According to the GDC, any training program must define the anticipated outcomes and guarantee that they are achieved <sup>(17)</sup>.

In 2011, the GDC published 'Preparing for Practice' which is a document describes the outcomes that must be demonstrated by the end of dentists' training, in order to ensure that GDC registrants practice safely, effectively, and professionally within the context of the wider dental and healthcare team <sup>(19)</sup>.

This was updated in 2017 and included four domains of learning outcomes (table2-1) that all UK dental schools must include in their curricula to allow GDC registration <sup>(20)</sup>.

**Table 2-1: Core competencies for UK dentists**

<b>Competency</b>	<b>Description</b>
<i><b>Clinical skills</b></i>	Direct care to patients such as examination, diagnosis, extraction scaling, and root planning.
<i><b>Communication skills</b></i>	Effectively interacting with patients, their representatives, and colleagues as well as general public and policy maker
<i><b>Professionalism</b></i>	Work in ethical and appropriate manner to support trust in the dental team, by respecting patients’ dignity and choices, and take into account equality and diversity, and the skills of demonstrating a commitment to lifelong learning.
<i><b>Management and Leadership skills</b></i>	Ability to manage time and resources, and take professional responsibility for the actions of colleagues and other members of the team involved in patient care. Cooperation with local and national systems and processes to ensure safe practice.

New graduates are, then, required to spend a year in one of the approved practices in what is known as Dental Foundation Training. Doing so, the new graduates are introduced to the health care system while providing supervised dental care and observed for their behavior and for patient wellbeing <sup>(17)</sup>. For dentists trained outside the UK, GDC arranged Overseas Registration exam (ORE) which is a rigorous exam process to ensure the applicants are meeting the

GDC minimum standards to work in the UK <sup>(21)</sup>. The ORE consists of two parts. Part 1 assesses mainly knowledge and Part 2 which assesses candidates' clinical skills according to Miller's triangle (Figure 2-1).

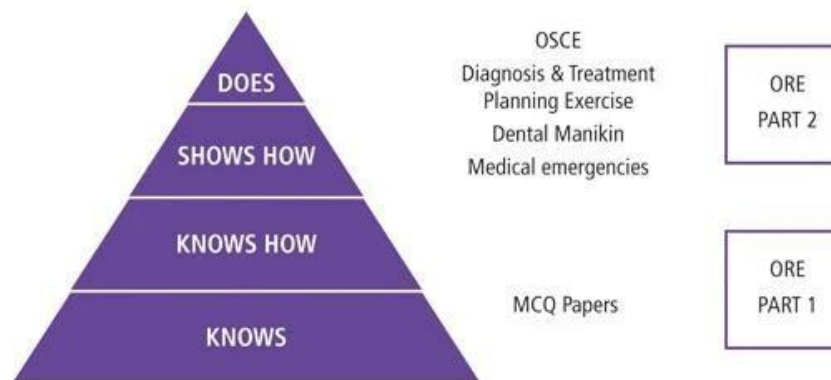


Figure 2-1: Miller's triangle applied to the ORE <sup>(22)</sup>.

### 2.2.2 European Union (EU):

In 1999, the European Union (EU) countries signed the Bologna Declaration to unite and match the higher educational systems across the European countries <sup>(23)</sup>, so that an automatic mutual recognition of health related professional qualification from the EU member countries made possible <sup>(24, 25)</sup>. To put this in practice, the Association for Dental Education in Europe (ADEE) implemented some projects to harmonize dental education and the quality assurance systems in EU <sup>(26-28)</sup>. In general assembly of the ADEE in Cardiff in 2004, “Pro-file and Competences for the European dentist” was accepted by European dental schools as a core competency for the European general dental practitioners <sup>(29)</sup>. The competency, curriculum content, structure and other fundamental component of dental education in Europe were discussed in the

ADEE and updated regularly <sup>(30)</sup>. The original “Profile and Competence”, updated in 2009, outlined seven different Domains <sup>(31)</sup>, which later updated in 2017, to adapt to a new movement for implementing outcome-based curriculum <sup>(32, 33)</sup>. The new framework comprised four domains (Table 2-2) that are accompanied by a series of ‘Learning Outcome’, guidance of ‘Methods of Teaching and Learning’ and ‘Methods of Assessment’ <sup>(32)</sup>. Therefore, dental educators and regulatory body in each member country provide quality of dental education to award diplomas, which mutually recognized in the EU.



**Table 2-2: Revised structure of the educational Domains and their Areas of Competence**

Domain I: Professionalism	1.1 Ethics 1.2 Regulation 1.3 Professional Behaviour
Domain II: Safe and effective clinical practice	2.1 Evidence-Based Practice 2.2 Management and Leadership 2.3 Team-working and Communication 2.4 Audit and Risk Management 2.5 Professional Education and Training
Domain III: Patient-centered care	3.1 Applying the Scientific Basis of Oral Health Care 3.2 Clinical Information Gathering and Diagnosis 3.3 Treatment Planning 3.4 Establishing and Maintaining Oral Health
Domain IV: Dentistry in society	4.1 Dental Public Health 4.2 Health Promotion and Disease Prevention 4.3 Population Demography, Health and Disease 4.4 Healthcare systems 4.5 Planning for Health and Oral Health

### **2.2.3 The Association of Southeast Asian Nations (ASEAN):**

The Association of Southeast Asian Nations (ASEAN) is a political and economic organization to promote economic growth and regional stability among 10-member countries in southeast region of Asia. In ASEAN “Competencies of the New General Dental Practitioner” was developed in 2015 to achieve the harmonization of dental education in the ASEAN countries, as part of the free mobility of skilled workers. these countries signed the Mutual Recognition

Agreement (MRA) of dentists in 2009 <sup>(34)</sup>. In 2017, “Common Competencies for ASEAN General Dental Practitioners” was proposed as 33 common major competencies which formed the foundation of educational development processes, developing curriculum, assessment and staff development <sup>(35)</sup>.

#### **2.2.4 United states (US) and Canada**

The Association of Canadian Faculties of Dentistry (ACFD) recently developed an Educational Framework for the Development of Competency in Dental Programs, which has been adopted by all Canadian dental schools as the basis for their ongoing curriculum development and assessment <sup>(36)</sup>. The framework identifies five areas of competence covering complex skills, knowledge, and behaviors that dental graduates must demonstrate to enter general dental practice (figure 2-2) <sup>(37)</sup>.

In the US, the ADEA has published a document entitled: ‘Competencies for the New General Dentist’ which was approved by the ADEA House of Delegates on April 2, 2008 <sup>(15)</sup>. This document identifies the competencies that new general dentists should be able to perform independently and competently. These include: knowledge, experience, critical thinking and problem-solving skills, professionalism, ethical values, and technical and procedural skills.

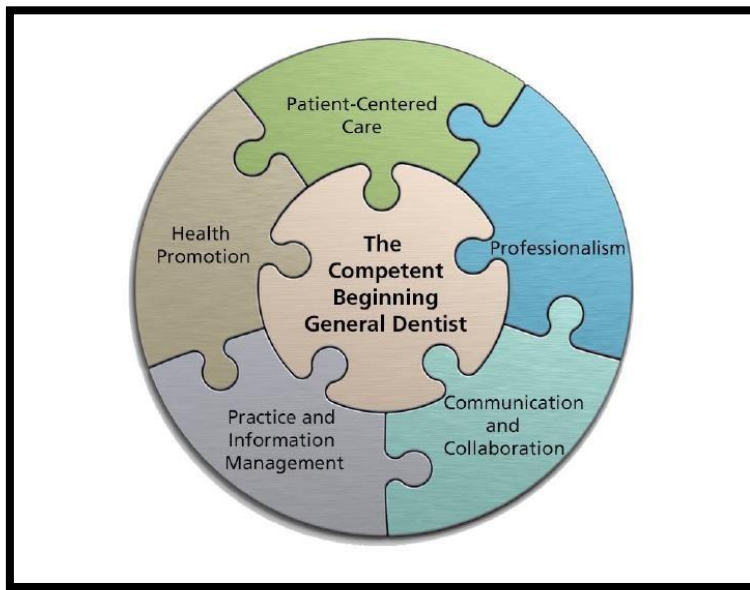


Figure 2-2: ACFD educational framework

### 2.2.5 United Arab Emirates (UAE):

In the UAE the professional competence standards of dental graduates training and education programs have been developed through a collaboration between the Ministry of Education, Ministry of Health and dental education stakeholder. Guided by different international standards, standards for Dental Program Reform and main milestones of the professional competence were developed in April 2021 with periodic review planned in the future, with full implementation expected to be reached by September 2022. The framework of developed competences consists of five domains (Professionalism, Patient-Centered Care, Health Promotion, Communication and Social Skills, and Scientific and Clinical Knowledge) each containing a set of competency statements against which students will be evaluated (Appendix A) <sup>(38)</sup>.

## **2.3 Dental education in Libya**

In Libya there is no standard competences for new dental graduates, although the specialized center for Accreditation named National Center of Accreditation and Quality Assurances of Teaching and Training institutes was established in 2007 under the supervision of Ministry of Education. The center has a guide line for quality assurances, according to the 2015 revision of the World Federation Medical Education (WFME) global standards for quality improvement of Basic Medical Education, comprising altogether 106 basic standards and 90 quality development standards. A recently published review in 2017 shows that more than 80% of the basic standards were not achieved in medical and dental education institutions <sup>(39)</sup>.

### **2.3.1 Challenges of medical and dental education in Libya**

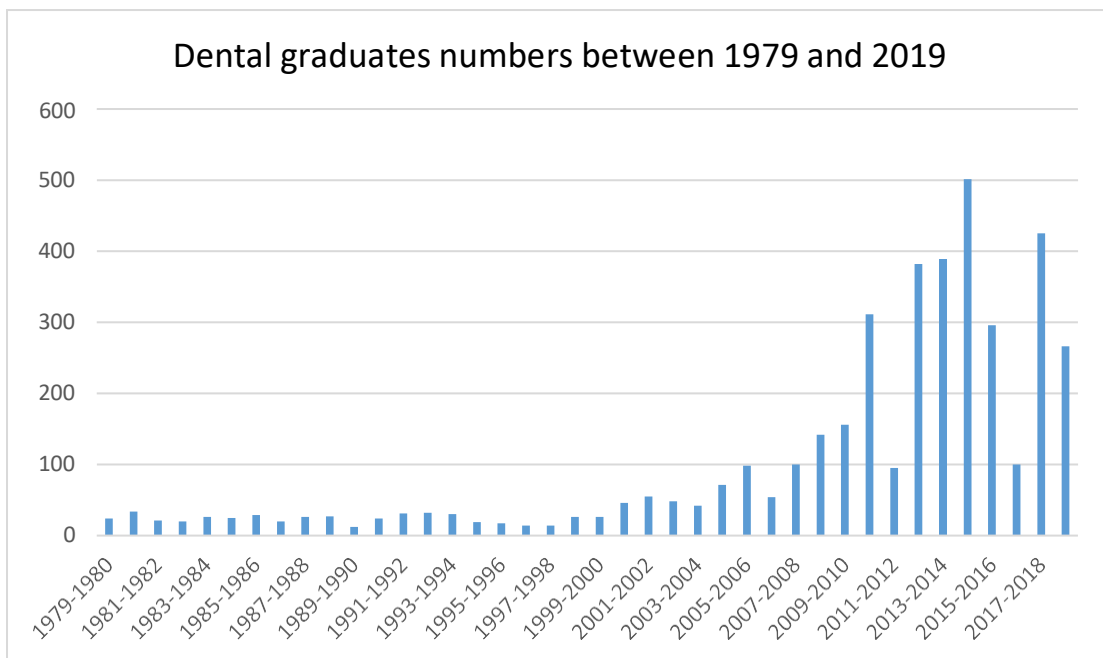
The first two medical schools were opened in Libya in 1970 and the mid-1980s, in which the number of students was small, not exceeding 50, teaching standards were good, and student's admission depended on the grades obtained by students in high school exams <sup>(40, 41)</sup>. Libyan education was of high quality, but with time did not keep up, the number of new schools has increased dramatically since the 1990s, which reflects a lack of coordination and communication between the Ministry of Health (MOH), the Ministry of Education (MOE) and the Medical Manpower <sup>(39, 41)</sup>. The Libyan medical education is struggling to meet the new requirements of the World

Federation of Medical Education (WFME), as all international medical schools must adhere to the new accreditation standard by 2023 in order to be internationally recognized <sup>(39)</sup>.

According to the recent review by the Ministry of Health to determine the extent to which Libyan medical school conform to the international WFME standards, which consist of 106 basic standards, the Tripoli medical school achieves 22 (21%) of the basic standards, 33 (31%) by Benghazi's medical school, and only 4 (3%) by Omar Mukhtar's Medical School <sup>(39)</sup>. Teaching methods are mainly based on lectures and spoon feeding, without adding the new teaching methods like non-technical skills that include professionalism, research, communication, collaboration, and leadership skills. What is more, the Libyan education uses traditional assessment technique that based on depth of knowledge by written and oral methods without adding the critical thinking in which the current assessment technique moved toward objective direct observation of the student, also teachers and faculty members in most Libyan medical schools were randomly selected without any clear selection criteria, which led to a lack of high qualifications and competence in the educational system <sup>(39-41)</sup>.

For dental education, this situation is even worse because of the lack of national strategy for dental education to determine the number of dentists and the number of dental colleges in Libya, Consequently, the number of accepted students and the number of graduates exceeding the capacity of the state and this

led to the job opportunities for the new generations of dentists in Libya seriously decreased (Figure 2-3). In addition, the curriculum is not in pace with modern dentistry and inability to give clinical teaching because of increased numbers of dental students which combined with limited dental clinic, teaching resources both in terms of space, facilities and staffing.



**Figure 2-3: Numbers of dental graduates between 1979 and 2019 in University of Benghazi**

#### **2.4 Measurement of the Preparedness:**

There is no ‘one way’ assess the readiness of graduates after a learning process. Preparedness mostly dependent on actual competence which can be measured in several ways such as a year evaluation through exams, evaluation of the unit, evaluation of teachers, and evaluation of tutors for their improvement. But the most real way that can be widely used to assess the curriculum and the

readiness of the graduates is to measure the perceptions of graduates regarding their competencies and confidence to work independently <sup>(42)</sup>. Such evaluation of preparedness gives a full picture of the entire curriculum, and whether the skills acquired are enough to start an independent professional life.

Researchers from Hong Kong used perceived self-preparedness to compare a problem-based learning (PBL) curriculum with a traditional undergraduate curriculum. A cohort of graduates from both curricula rated their self-perceived preparedness for dental practice in fifty-nine aspects of dentistry across nine domains. Both cohorts felt well prepared for the “bread and butter” aspects of dentistry, but less so for specific specialty disciplines. There was no significant difference between PBL and traditional graduates’ self-perceived preparedness in all domains of dental practice, except for orthodontics where PBL cohort felt more ill-prepared for practice <sup>(43)</sup>.

In Canada, the self-perceived competence at graduation was assessed among 1<sup>st</sup> PBL class in 1997 using a questionnaire that is based on the global competencies for dental practice. Most felt well-prepared for the basic everyday items such as diagnosis, local anesthesia and basic restorative, but less so for items that are not encountered as often in dental school, such as business matters, practice management, soft tissue biopsies and dentofacial trauma <sup>(44)</sup>.

The need to assess perceived preparedness has prompted the authors to create and development of the Graduate Assessment of Preparedness for Practice

(GAPP) questionnaire <sup>(17)</sup>. This questionnaire was built based on the required skills, as mentioned in the GDC curriculum preparing for practices, which specify those competencies expected of an independent dental practitioner post-graduation.

The GAPP questionnaire was used to assess the preparedness of new graduates for independent general dental practice (GDP) in England and Wales, among graduates and their supervisors. The graduates perceived themselves as well prepared for independent GDP, they rated their readiness well above the score that supervisors rated across the curriculum. Compared with the poll results of more experienced supervisors, they feel that graduates are less prepared, which may indicate that the graduates are likely to exaggerate their level of preparedness. Or that their training period was longer and more extensive <sup>(45)</sup>. Another study used the GAPP questionnaire for evaluating major curriculum changes and its impact on student's confidence which assessed their confidence in relation to a range of clinical procedures, and found that the graduates from new curriculum feeling more self-confident than others graduates within old curriculum <sup>(46)</sup>.

Australian study explored the preparation for practice of newly qualified dental practitioners used a mixed methods approach to map preparedness for practice from multiple perspectives. The quantitative analysis of GAPP questionnaire indicated that new graduates are particularly well prepared in



competencies such as communication skills; social and community orientation; and being aware of limitations, professional attitude, and ethical judgements <sup>(47)</sup>.

In Pakistan, a cross sectional study was conducted to investigate the self-perceived competence of new dental graduates and compare their preparedness to graduates from developed countries using GAPP. The study indicated several deficiencies in radiography, crowns, cast-partial dentures and endodontics on multi-rooted teeth, which inform the dental institutions and clinical educators involved in mentoring them to provide more targeted training, particularly during the undergraduate curricula <sup>(48)</sup>.

## **2.5 Dental Education at time of COVID19:**

Coronavirus was discovered for the first time in the city of Wuhan in China in December 2019, where acute respiratory symptoms began to appear on some residents accompanied by a rise in body temperature and general fatigue, and the symptoms were rapidly spreading among people and it was called corona virus disease 2019 <sup>(49)</sup>. The disease spreads from one country to another through tourists, and declared as a pandemic on March 11 by the World Health Organization (WHO) a pandemic, the WHO defines a pandemic “as global spread of a new disease”, and the CDC says it’s used when viruses “are able to infect people easily and spread from person to person in an efficient and sustained way” in multiple regions, the announcement was made in response to the rapid spread of the disease and its severe symptoms <sup>(50)</sup>.

Scientific studies have shown that there are two main routes of transmission of COVID-19: 1) direct (person-to-person touch or inhalation of short-range respiratory droplets) and 2) indirect (airborne). The transmission of infection through the air is very virulent and represents the predominant route of spreading the disease, and not imposing the wearing of a face covering was the main reason for the spread of the disease in the epicenters areas <sup>(51)</sup>. The virulence and speed of spread of the virus infection, have forced health authorities around the world to implement a policy of stay at home and lockdown as precaution measures, including suspending schools and universities <sup>(52)</sup>. After lockdown most schools tried to continue the educational process for the first time used the distant learning strategies out of class like online lectures and zoom meeting and later added the strategies of social distant in class, as the dental education based on mechanical skills and needs manipulations of materials in labs and training on patient the alternative strategies in dental school to word shifting to virtual curricula, simulation labs, workshops ,webinars and lectures as hybrid educational strategies<sup>(52)</sup>.

Results of a study in Jordan showed that students partially responded to the online system, but did not consider it a substitute for face-to-face clinical practice. The overall self-perceived level of preparedness was promising; however, students had reservations about the independent practice after graduation and they feel not prepared in practical skills because they miss the training during

pandemic <sup>(53)</sup>. The negative impact on the confidence of graduates, even those who graduated before the Corona pandemic <sup>(54)</sup>. The pandemic has been associated with students being exposed to high rates of anxiety due to their fear that they will not be able to acquire manual skills due to a lack of training <sup>(55)</sup>. Dental students are usually exposed to stress during their studies because of the curriculum, assessments, grades, training, work pressure and the difficulties of practical procedures, and this affects the general health of students and their educational attainment, so these influences must be discovered early by the college and students and dealt with them, the pandemic is considered a stressor as the study show and to coping with need to smoother transition and good faculty support <sup>(56)</sup>.

Other survey in Italy student feedback showed a good evaluation of the new methods and teachers' efforts to deliver as high-quality lectures as possible. But no operation training was largely seen as an important problem in the structure of their new curriculum <sup>(57)</sup>. And from prospective of teachers there were three webinars, in which dental educators from different countries participated to give presentations and discussions regarding information and experience in innovating dental education during the pandemic, the results show that the impact of the COVID-19 pandemic affects dental education a lot. The curriculum must be changed to be in line with alternative means of education. Smart technology has certain benefits for dental education <sup>(58)</sup>.

In Libya, all educational institutions were shut down as part of lockdown plan set by health authorities. Later, distant learning and social distancing strategies were applied at the educational institutions. However, no clinical training was applied, and this was replaced by case-based discussions and clinical based seminar. This may affect the graduate's preparedness to undertake the duties expected of them in respect of the provision of oral health. However, little is known about the preparedness of dental graduate in Benghazi before and during times of the pandemic.

## **Chapter 3**

### **AIM AND OBJECTIVES**

### **3.1 Aim of study:**

The aim of this study was to assess the impact of COVID-19 pandemic on the preparedness of dental graduate at the Faculty of Dentistry, University of Benghazi.

### **3.2 Objectives:**

1. Evaluate the preparedness of dental graduates at the Faculty of Dentistry, University of Benghazi in academic year 2019-2020 (during pandemic) and 2018-2019 (pre-pandemic) using GAPP questionnaire.
2. Compare the preparedness of graduates during pandemic year who graduated at the time of COVID19 with pre-pandemic data collected using the same questionnaire.
3. Explore the views and opinions of dental graduates at the time of pandemic on what influenced their preparedness.

## **Chapter 4**

### **MATERIALS AND METHODS**

#### **4.1 Study design:**

A mixed study design, including quantitative and qualitative methods, was adopted in the current study. This include a natural experiment, which mean the exposure in the study was determined by nature or another factor rather than investigator. The exposure in this case was the changes in teaching and training at the faculty of Dentistry, University of Benghazi because of the pandemic. COVID-19 pandemic has influenced the way dental education is delivered where distant learning (online) and case-based discussions rather than clinical training where applied for Batch 40 (during pandemic) dental graduates. A sectional survey of graduating dentists in the Batch 39 (Pre-pandemic) was conducted at the end of their internship year at the beginning of year 2019. The present study used the same questionnaire (GAPP) for data collection from Batch 40 (during-pandemic) using a predesigned questionnaire known as graduate assessment of preparedness for practice) questionnaire was used for quantitative data collection. This quantitative data was supplemented by semi structured qualitative interviews to fully understand the issue of preparedness among dental graduates.

#### **4.2 Setting:**

The study was conducted at the faculty of dentistry in the University of Benghazi (UoB) which is the oldest dental faculty of dentistry in Libya, that currently hosts more than two thousand students in different study years. The Faculty of Dentistry has 11 scientific, subject specific departments. The study



system at UoB is based on traditional approach, based on lectures and discussion in class room (face to face) and clinical training in advanced years. The study of dentistry at UoB spans 5 years after one pre-dental year. The first two are lectures and lab based and focused on basic sciences. The years three and four are clinical based and focused on applied dental sciences. The final year is an internship year and it's a full calendar year of in different clinical department to be prepared for independent in practice.

### **4.3 Questionnaire surveys:**

The data for questionnaire surveys were collected on two occasions. The pre-pandemic survey was conducted by the department of Dental Public Health as part of self-assessment process before the pandemic in 2019. A permission was obtained from the principal investigator who agreed to use this data as part of the present study (Appendix B). The methods of data collection and recruitment were the same survey which was carried out at the end of the year 2020.

#### **4.3.1 Study population and sampling:**

All dental graduates from the university of Benghazi in the during pandemic year and the pre pandemic academic year, who presented to registrar office to obtained their graduation certificate were invited to take part in the study.

#### **4.3.2 Data collection:**

Data for this study was collected through use of the graduate assessment of preparedness for practice (GAPP) questionnaire <sup>(59)</sup>. The GAPP questionnaire was developed and piloted using a cohort of educational supervisor and foundation dentists in the United Kingdom. The questionnaire comprised demographic data, and questions on preparing for practice in 34 competence areas, covering clinical skills, communication, professionalism, and leadership and management. All responses are provided on a 7 category Likert Scale ranging from completely unprepared, through very poorly prepared, poorly prepared, not well or poorly prepared, well prepared, very well prepared, and finally to completely prepared. The questionnaire was first piloted among teaching staff for its appropriateness for the Libyan dental graduates and whether any modifications were needed. No changes were suggested and the questionnaire was used in its original English language format.

The self- administered questionnaire was handed to the dental graduates at the end of their internship year through the registrar office. The workers at the registrar office provided the questionnaire as part of the paper work to get the graduation certificate. The participation in the study was voluntary, and the consent to take part in the study was implied by returning a completed questionnaire. Phone number of the principal researcher was given to allow any clarifications or questions related to the questionnaire or the study.

### **4.3.3 Data management and analysis:**

The quantitative data were numerically coded as the following: For genders males code as 0 and females as 1, for marital status single tack code 0 and 1 for married. For the second part the answers coded from 1 to 7, starting from completely unprepared take 1code and completely prepared take code 7. All numerical data were analyzed and managed by using Statistical Package for the Social Sciences (SPSS). Descriptive statistics was used to describe the distributions of responses to questionnaire items. A Chi-Squair test was used to compare pre- and during covid19 scores of preparedness. All statistical tests were conducted at  $p < 0.05$ .

## **4.4 Qualitative interviews:**

### **4.4.1 Sampling:**

A purposeful sample of dental graduates in the pandemic year were invited to take part in the qualitative interviews. The participants were selected randomly from the dental graduates presented at the registrar office. An invitation was also sent through their social media groups. The analysis and data collection were concurrent and hence interviews continued until saturation was reached. This means no new themes has emerged.

### **4.4.2 Data collection:**

The qualitative data was collected by a semi-structured interview with dental graduates. The interviews were started with an open question: *how did*

*COVID19 affected your dental training at the faculty of dentistry, University of Benghazi?* The interview was conducted using topic guide (Appendix C). The interviews were conducted in quiet room at the Library of the faculty of dentistry. All interviews were audio-recorded.

#### **4.4.3 Data management and analysis:**

The interviews were recorded then transcribed verbatim, then uploaded into Nvivo 12 software. This included all interviews, observations, field notes and memos. The audio-records were transcribed verbatim as soon as they were collected, by the principal investigator. Thematic analysis (TA) was performed to analyse interviews <sup>(60)</sup>. The analysis was performed in an iterative inductive-deductive process to develop a preliminary coding framework. As the analysis progressed the preliminary framework was refined and adjusted according to the emerging themes that were then explored in the subsequent interviews. Thus, analysis was undertaken concurrently with data collection. Constant comparison across interviews was applied so that emerging themes were based on converging the interpretation of all sets of data.

The TA started with 'Familiarisation stage which involved listening to the audiotapes, reading, and re-reading of the manuscripts, to become immersed in the data and to gain an overview of ranges and diversities of the gathered material. Before coding the themes using the NVIVO system, hand highlighting of key ideas was carried out on hard copy for all the transcripts, so that potential codes

and themes could be identified. This paved the way for a second stage of analysis which was the generation of initial codes. Initial codes were then systematically applied to all transcripts until all data has been assigned suitable codes. Only data that showed a relevance to research questions were coded.

Validity of analysis was assumed by involving a second experienced researcher in the analysis who questioned and discussed the interpretation of the developing coding scheme. As the analysis progressed, a discussion was held with the second researcher to remove unsupported themes, create new themes, collapse homogenous themes, and split heterogeneous ones. Finally, the themes were organised into overarching fewer themes. Producing the report was the final place of analysis where data extracts were selected to be presented and related back to the research story and supported by evidence from literature.

The analysis was performed at an interpretive level rather than simply describing the surface meanings within data. While the analysis can be classified as thematic analysis, it incorporated some elements of grounded theory approach such as inductive approach, constant comparison, analysing immediately, memo writing and theoretical saturation <sup>(61)</sup>.

#### **4.5 Ethical consideration**

Ethical approval for this study was obtained from the research ethics committee at the faculty of Dentistry, University of Benghazi. To maintain the anonymity, no personal identifiers were used in the questionnaire, and the

participants were allowed to withdraw from the study at any time, with no penalties associated with refusal or withdrawal from participation. Consent was implied by answering to the questionnaire.

## **Chapter 5**

### **RESULTS**

## 5.1 Sample profile and response rate

Out of 300 questionnaires distributed to pre-pandemic group and 200 questionnaires given to during-pandemic group, 203 and 138 questionnaires with completed data were received from the pre-pandemic group and during pandemic groups, respectively, which give an overall response rate of 68.2%. Demographic characteristics of respondents are summarised in (Table 5-1). Nearly sixty percent of the respondents were from pre-pandemic batch. The majority were females (79.8%, 272) and single. The average age was 25 years (SD= 1.05), ranging from 23 and 32 years of age.

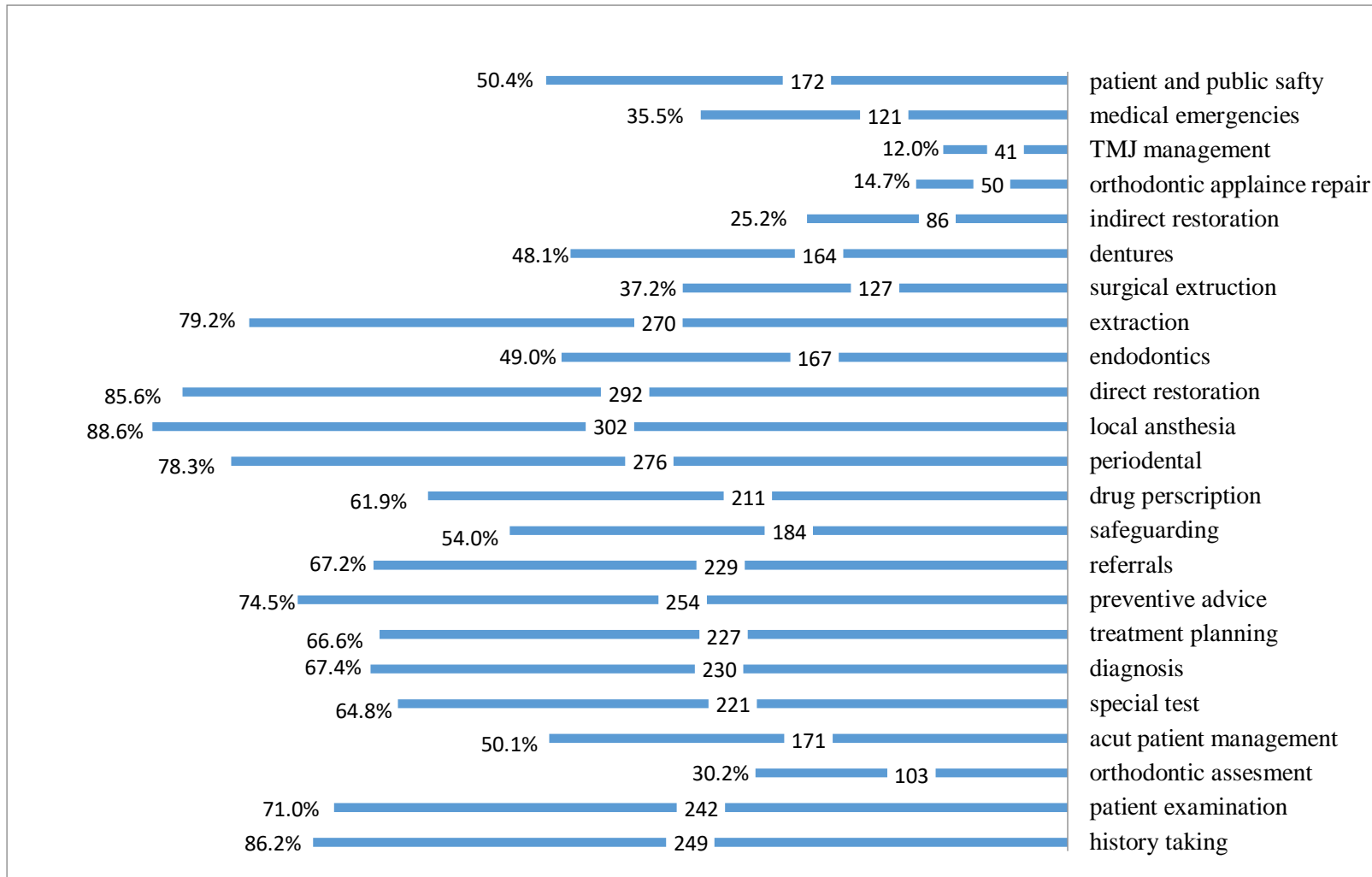
**Table 5-1: Characteristics of the study sample (n=341)**

<b>Variable</b>		<b>N</b>	<b>%</b>
Graduation year	Pre- pandemic	203	59.5%
	During-pandemic	138	40.5%
Gender	Male	48	14.1%
	Female	272	79.8%
Marital status	Single	305	88.9%
	Married	36	11.1%



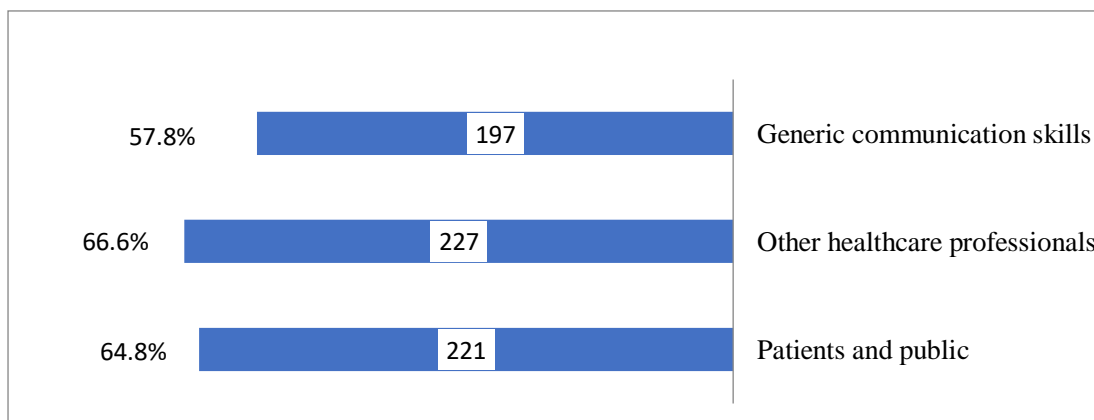
## **5.2 Perceived preparedness:**

(Figure 5-1) depicts the responses of the whole study sample to questions of self-rated preparedness to clinical competencies. Most of the respondents were reported themselves as competent in taking history (86.2%), administering local anesthesia (88.6%), and doing direct restorations (85.6%). These were followed by extraction, periodontal treatment and preventive advice, for which the majority of respondents (79.2%, 78.3%, and 74.5%). On the other hand, TMJ management (12%) and orthodontic appliance repair (14.7%) were the aspect showed least competence among the study group. Likewise, less than 40% of participants considered themselves competent in orthodontic assessment and medical emergencies and surgical extraction.



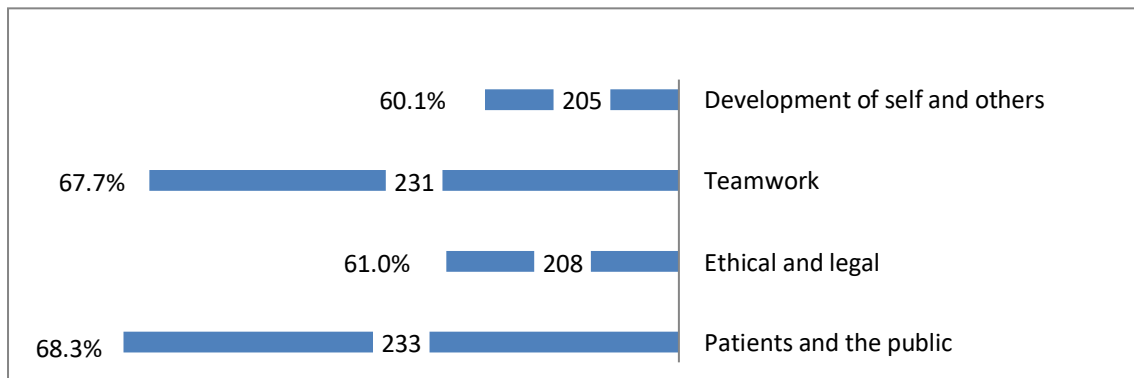
**Figure 5-1: Perceived preparedness to clinical competencies among all participants (N=341)**

(Figure5-2) shows the responses to questions on preparedness in relation to communication skill. The majority of respondents (nearly two thirds) considered themselves competent in communication with the public and other professionals but to lesser extent in the generic communication skills (57.8%).

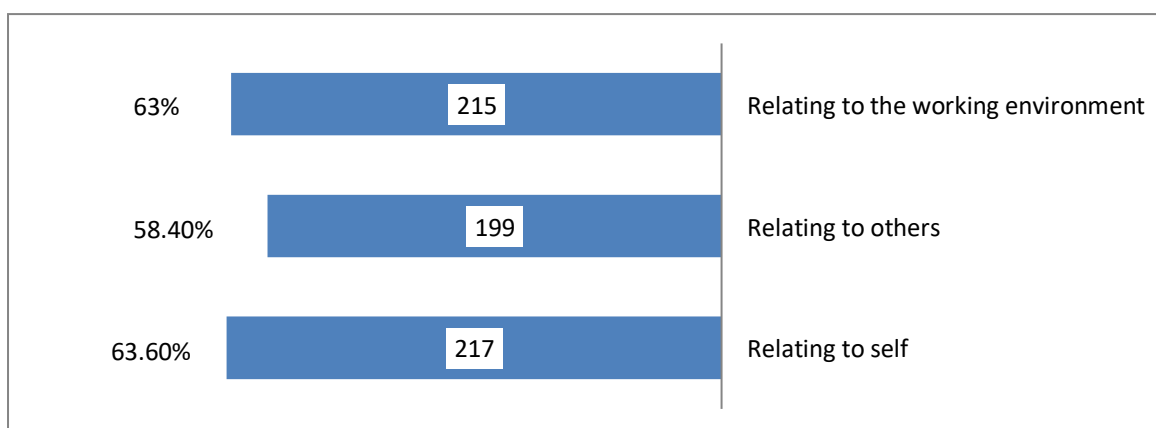


**Figure 5-2: Preparedness to communication competencies among all participants (N=341)**

(Figures 5-3) & (5-4) present the proportion of respondents who perceived themselves as prepared in terms on professionalism and leadership and management competencies. Teamwork and professional relation with the public were the highest attributes for which the respondents were prepared (67.7% & 68.3%) and to lesser extent the legal and ethical issues. Leadership and management skill were mastered by the majority of respondents (around 60%).



**Figure 5-3: Preparedness to Professionalism competencies among all participants (N=341)**



**Figure 5- 4: Preparedness to leadership competencies among all participants (N=341)**

### 5.3 Comparisons of Preparedness

Table (5-2) shows the comparison of clinical competencies before and during pandemic, this table showed a clear difference in competence between before and during the pandemic, these difference were significant ( $P$  value  $< 0.05$ ) in all competencies except for patient examination ( $p = 0.068$ ), referrals ( $p = 0.558$ ), safeguarding ( $p = 0.121$ ), indirect restorations ( $p = 0.136$ ) and TMJ management with ( $p = 0.498$ ). (Table 5-3) showed significant statically difference in comparison of Communication competencies before and during pandemic.

Comparison of professionalism, leadership and management competencies in (table 5-4) showed a significant different in between (before and during pandemic) in all competencies except for development of self and other ( $p = 0.055$ ), leadership and management relating to self ( $p = 0.051$ ), and relating to the working environment with ( $p = 0.173$ ).

**Table 5-2: Comparison of clinical competencies before and during pandemic**

Competency	Pre-Pandemic N (%)	During-Pandemic N (%)	P value
History taking	189 (93.1)	105 (76.1)	0.000
Patient examination	152 (74.9)	90 (65.2)	0.068
Orthodontic assessment	77 (37.9)	26 (18.8)	0.000
Acute patient management	117 (57.6)	54 (39.1)	0.001
Special tests	150 (73.9)	71 (51.4)	0.000
Diagnosis	147 (72.4)	83 (60.1)	0.019
Treatment planning	160 (78.8)	67(48.6)	0.000
Prevention advice	170 (83.7)	84 (60.9)	0.000
Referrals	139 (68.5)	90 (65.2)	0.558
Safeguarding	117 (57.6)	67 (48.6)	0.121
Drug prescription	148 (72.9)	63 (45.7)	0.000
Periodontal	185 (91.1)	82 (59.4)	0.000
Local anaesthesia	195 (96.1)	107 (77.5)	0.000
Direct restorations	190 (93.6)	102 (73.9)	0.000
Endodontics	121 (59.6)	46 (33.3)	0.000
Extraction	182 (89.7)	88 (63.8)	0.000
Surgical extraction	98 (48.3)	29 (21)	0.000
Dentures	121 (59.6)	43 (31.2)	0.000
Indirect restorations	57 (28.1)	29 (21)	0.136
Orthodontic appliance repair	42 (20.7)	8 (5.8)	0.000
TMJ management	22 (10.8)	19 (13.8)	0.498
Medical emergencies	85 (41.9)	36 (26.1)	0.004
Patient and public safety	116 (57.1)	56 (40.6)	0.003
Population-based care	140 (69)	61 (44.2)	0.000

**Table 5-3: Comparison of Communication competencies before and during pandemic**

Competency	Pre-Pandemic N (%)	During-Pandemic N (%)	P value
Patients and public	146 (71.9)	75 (54.3)	0.001
Other healthcare professionals	157 (77.3)	70 (50.7)	0.000
Generic communication skills	131 (64.5)	66 (47.8)	0.003

**Table 5-4: Comparison of Leadership competencies before and during pandemic**

Competency		Pre-Pandemic N (%)	During-Pandemic N (%)	P value
Professionalism	Patients and the public	154 (57.9)	79 (57.2)	0.000
	Ethical and legal	134 (66)	74 (53.6)	0.024
	Teamwork	147 (72.4)	84 (60.9)	0.033
	Development of self and others	131 (64.5)	74 (53.6)	0.055
Leadership and Management	Relating to self	138 (68)	79 (57.2)	0.051
	Relating to others	130 (64)	69 (50)	0.010
	Relating to the working environment	134 (66)	81 (58.7)	0.173

## **5.4 Qualitative analysis:**

Semi-structured interviews were conducted to understand why dental graduates were not fully prepared to practice on graduation and how covid-19 influenced their training. The following themes and subthemes were identified:

### **5.4.1 Theme 1: COVID19 influence:**

The emergence of COVID19 pandemic has affected the preparedness of dental graduates in different ways, which are summarized in the following subthemes:

#### **New polices:**

The health authorities have issues several polices to implement measures that prevent the rapid and wide spreading pandemic. These measures have affected every aspect of life including education. For example: lock down of schools and universities. Since the faculty of dentistry and its clinics are part of the university and the ministry of education. The faculty of dentistry in Benghazi was closed for several months although private and some public dental practices continue working to provide limited dental services.



### **Non-clinical internship:**

In response to pandemic and to enhance social and physical distancing, clinics were closed and the distant learning was adopted in the faculty of dentistry. This was used as alternative to complete the internship years as seminars and discussions rather than clinical training. Consequently, the interns attempted to get clinical training in private sector outside the skirts of dental school.

### **Public Fear:**

Another aspect of COVID19 was related to the public who are parents of students and dental patients. Fearing infection by COVID was a strong reason to not attend university as a student or patient.

### **Inappropriate management of the pandemic**

Many informants considered the faculty's management of the pandemic was not appropriate and negatively affected their training. The informant suggested better options could have been implemented which might offered a more clinic-oriented training rather than fully non-clinical internship. For example: some informants suggested postponing the internship training.

### **Different skills**

The changes brought about by covid19 were not all negative. Some positive impact has been noted such as learning presentation skills or become more vigilant about infection control practices.

#### **5.4.2 Theme 2: Pre-COVID deficiency (The already broken)**

It is not all about COVID19 that hindered appropriate training of dental graduates from the university of Benghazi. The informants indicated that several issues existed before the emergence of COVID 19 were hindering their training, (Appendix D) which are summed up in the following subthemes:

##### **Shortage of resources:**

The insufficient number of teaching staff and nurses at dental clinic was reportedly highlighted as one of the reasons that limit the chances of appropriate training. The lack of dental materials and properly working dental units has long been a problem at the dental school

##### **Administrative inefficiency**

The informants blamed the faculty and University administration for not being able to address the persistent problems mentioned previously and putting oil on fire by accepting large numbers of students beyond the actual capacity of the dental school.

This involves day-to-day management of assistant staff and working environment. For example, the management of dental nursing who missed the early morning and late clinical session has influenced the training internship students who were unlucky to be scheduled in these times.

### **Non-functioning departments**

Some departments were not working properly even before the pandemic. These departments lack the clinical training and hence they were not affected by corona. This by no mean indicates that these departments are better than other departments, but instead they were not functioning at all in proper way. For example, the informants did not feel that training at departments such as orthodontics were affected by COVID 19.

### **Shortage of clinical cases**

A long-standing problem in the dental school is that few patients come to receive the treatment and these are usually students' relatives. The long closure and limited resources and being treated by trainees were the provided reasons. What is more, the clinics of dental school are part of educational institution and it is not a health care facility that is supported by ministry of Health.

### **5.4.3 Theme 3: Curriculum**

Some issues related to the curriculum and teaching methods have emerged as key contributors to the preparedness of dental graduates, which are summarized in the subthemes below:

#### **Disorganized curriculum**

Many informants attributed the weakness in some areas to the conflicting information by different departments teaching the same topic or insufficient coverage of some topics are considered specialty topics and should not be covered in details such as TMJ problems. The informants highlighted that they got confused and ignored these topics.

#### **Theory based curriculum:**

Some informants consider the current curriculum and teaching to be mainly theoretical with minor clinical teaching. For example, the teaching of fixed prosthodontics was provided entirely in Lab-based environment rather than clinical training on real patients. Consequently, the graduates were assessed according to the teaching methods and no clinical exams were conducted.

#### **Compacted curriculum**

Informants indicated that the academic year was very short with large number of lectures postponed or given as an intensive course in short

period of time before exams. Therefore, the students focus on certain parts of the curriculum for exam purpose only.

#### **5.4.4 Theme 4: Individualistic attributes**

The analysis showed that some characteristics and views of the staff or students were identified by informants as contributing factors to preparedness of practicing dentistry. This has been reflected in variations of the experiences of the participants regarding the preparedness to practice dentistry.

##### **Staff attitude:**

The motivation of staff members to deliver the lectures in comprehensive and consider the audience to make sure that they made the most of the information provided and that the students understand and feel the importance of the subject has been identified as one of the influencers of the education process and hence the ability of the students to master what they have learnt.

##### **Attitude of students:**

The participants highlighted the role played by the motivation of students themselves to be prepared to face real life dentistry and take the opportunities to hone their clinical skills.

**Personal Merits:**

These are opportunities that are unequally available to some students because of their social position or having a health care professional in their social network which allow them to obtain better training at the private clinics or public clinics of the ministry of health.

**CHAPTER 6**  
**DISCUSSION**

This study was conducted to assess the preparedness of graduate's dentist in Benghazi University in academic year during the pandemic), and to compare this with pre-pandemic data collected using the same questionnaire. This was supplemented by a qualitative interviews to explore factor that influenced the preparedness of dental graduates at the University of Benghazi during the pandemic. To authors; best of knowledge, this the first study in the Libyan context that investigated the preparedness of dental graduates or the impact of COVID 19 on dental education.

The data showed that most of the respondents considered themselves competent in taking history, administering local anaesthesia, and performing direct restorations, and to lesser extent prepared for simple tooth extraction, periodontal treatment and preventive advice. These findings are consistent with what previously reported in other countries such as Hong Kong (43), Malaysia (62) and Canada (63). In terms of restorative dentistry, the graduates of UoB perceived themselves less prepared to perform indirect restorations and complicated restorative procedures, but felt competent to do direct restorations and manage uncomplicated endodontic treatment. These findings corroborate great deal the results reported in western Australia (64). On the other hand, Benghazi graduates in reported deficient preparedness in respect to TMJ



management and orthodontic appliance repair and surgical extraction. Taken together these findings support the notion that new dental graduates are more likely to feel competent in general dental procedures, described as "bread and butter" items of dentistry, such as basic restorative dentistry, examination, diagnosis, treatment planning, local anesthesia, and scaling, and less competent in specific clinical areas such as TMJ problems and orthodontic treatment (63-65).

Surprisingly, UoB graduates feel themselves prepared in medical emergency cases management which is lower than the finding reported in other studies (43, 62). One possible reason for this observation could be that the graduates did not receive sufficient training in this area during their undergraduate studies (66). However, the qualitative analysis in the present study revealed that '*disorganized curriculum*' is one of the characteristics of dental curriculum at the UoB. Therefore, it could be the case that this topic is lost between departments and sometimes it was taught differently causing confusion among the students and inability to comprehend this subject.

Management and leadership have been recognized as one of the four main domains in the GDC and ADEE competences for the graduating dentists under the domain of safe and effective clinical practice. The majority of UoB graduates considered themselves competent in leadership

and management skills as well as communication with the public and other professionals but to lesser extent in the generic communication skills. This agrees with the result of Hong Kong <sup>(43)</sup>, Malaysia <sup>(62)</sup> and England <sup>(66)</sup>. Communication with patients has been rated by UK vocational trainees as the single most important trait in a good dentist <sup>(67)</sup>. This finding is rather interesting since the teaching of communication skills at the UoB is diluted across subjects and is not taught as a separate subject. Looking at the other side, a considerable proportion of UoB graduates did not feel competent in communication activities. In fact, these finding should be approached with caution since they could be a manifestation of the lack of self-awareness in their ability <sup>(68)</sup>. In other words, it could be the case that the new graduates were not aware that they are incompetent in communication and management skills. Therefore, moving from a traditional to an outcomes- based, integrated, curriculum could have positive effect on student confidence <sup>(69)</sup>.

Comparison of clinical competencies before and during pandemic showed significant differences in most competencies in favour of the before-pandemic group. This finding indicates clearly that the changes in teaching strategy during the pandemic and adopting non-clinical case scenario based teaching negatively affected the preparedness of dental graduates at the UoB. On the other, non-significant differences were

observed in relation to patient examination ( $p = 0.068$ ), referrals ( $p = 0.558$ ), safeguarding ( $p = 0.121$ ), indirect restorations ( $p = 0.136$ ) and TMJ management ( $p = 0.498$ ). possible explanations for this observation could be that some subjects are complicated and specialist subjects which did not receive much attention even before the pandemic such as such as TMJ management and safe guarding, or cannot be taught due to shortage of resources such as indirect restoration. This latter was described as 'non- functioning departments 'in the qualitative analysis. Another explanation would apply to subjects such examination and referrals. These subjects are introduced early in 3<sup>rd</sup> year and 4<sup>th</sup> year, and hence it is not surprising that these subjects were not affected by the pandemic.

Another aim of this study was to conduct semi-structured interviews with the dental graduates to explore their experience of training at the time of pandemic. The analysis showed that the pandemic has negatively affected their training which was non-clinical internship, for which they blamed the poor management of the crisis, though a light in the dark was that they learned new skills such as how to find a paper or do presentation. Similar findings have been reported in another study conducted in Jordan where the majority agreed that they missed educational experiences as a result of the lockdown, and less motivated e-learning (70). Previous study among basic sciences students provided contradictory results and suggested positive impact of the pandemic on

students' performance (71). This could be attributed to the fact that dentistry is clinical profession and hands-on training is mandatory. These findings highlight the importance of clinical competencies for both graduate' confidence and satisfaction. In line with this, the present study highlighted inherent problems in at the UoB such as shortage of resources and disorganized curriculum. In fact, the informants suggested that even without the pandemic there are difficulties and barrier to the preparedness, which should be addressed in order to improve the quality of emerging dental workforce and enhance the provision of oral health services.

However, the current political situation in Libya mandates prompt action from non-governmental sectors to raise awareness about immediate and long-term consequences of mal-functioning dental education in a country that is a typical example of a fragile state.

A fragile state is defined as a state that failed or is vulnerable to fail in terms of its authority, legitimacy and service entitlements to their population (72). Very often, fragile states are affected by or emerging from conflict (73). Recently, the number of people living in fragile and conflict-affected states has increased, particularly in Middle East and North Africa region (74). State of fragility is associated with a range of difficult, complex and inter-related political, security, economic, and social challenges, with People's health being at the centre of these challenges (75, 76). Health systems in such states are faced with many challenges limiting their effective delivery of health care, for example, increased disease burden, shortage of manpower and financial resources, and lack of leadership (77, 78). Therefore, expectations that the Libyan government, alone, can solve the problem may not be practical.

Finally, the present study has some limitations, which should be addressed here. First, the study used cross-sectional design that has inherent limitations, though it is well-accepted method to develop baseline data for future assessment (79). In addition, the study used self-reported questionnaire that is developed in the UK according to the GDC standards. However, the questionnaire was piloted among group of dental teaching staff who found it appropriate for the dental curriculum in UoB. However, the questionnaire is still prone to social desirability bias. To minimize this, the participants were assured about the confidentiality of

information and that the aim of the study is to improve the education process (80). In addition, the study used convenience sample of dental graduates. However, this was the only to recruit participants. The sample profile reflects different age and gender groups of dental graduates. Finally, the study used pre-existing data which was collected before the pandemic. Although this gives a great source of information, the issue remains the principal investigator had little control over this data.

## **CHPATER 7**

### **CONCLUSIONS AND RECOMMENDATIONS**

## **7.1 Conclusions**

The data showed that the dental graduates of UoB perceived themselves competent in all basic dentistry procedure expect for medical emergencies. On the other hand, they felt incompetent in complex and specialized areas of dental care.

Overall, the pre-pandemic graduates demonstrated better confidence and competence in practicing dentistry independently, which reflects the significant impact of the conflict on dental training and the quality of emerging dental workforce. However, some areas remained deficient in both groups, which indicates inherent problems in the dental curriculum at the UoB.

The study findings suggest that the pandemic has negatively affected the learning process at the faculty of dentistry of UoB and highlights the need of curriculum reform and re-defining the competencies of Libyan dental graduate. Minimizing the numbers of admitted students and supporting the existing resources are mandatory to regain the quality dental training.

## **7.2 Recommendations**

1. Efforts should be made to enable dental graduates at the time of pandemic get appropriate dental training. This can take the form of workshops or additional internship.



2. Comprehensive reform of dental curriculum is necessary and this should be accompanied by setting up the competencies of Libyan dental graduate.

3. Continuing education programs for recent dental graduates should be implemented to mitigate the inherent deficiencies at dental school

4. Future research should focus on the external factors that influenced the learning process at dental school. For example, investigating the impact of social life on students' performance.

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# Appendix (A)



## The framework of developed competences in the UAE:

Competency domains	associated competencies
Professionalism Domain	<ul style="list-style-type: none"> <li>• Apply ethical and legal strands</li> <li>• Ensure safe practice</li> <li>• Knowing the limitations of the practice and when it is necessary for them to refer patients to the specialist doctor.</li> <li>• Showing empathy and caring behavior with patients</li> <li>• Respect patient confidentiality, dignity, prefer and privacy.</li> <li>• Maintain effective relationships with other colleagues.</li> <li>• Consider the continuous learning and professional development for self and all members of the dental team.</li> </ul>
Patient-Centered Care Domain	<ul style="list-style-type: none"> <li>• Clinical Information Gathering</li> <li>• Diagnosis and Management Planning</li> <li>• Clinical Treatment and Evaluation</li> </ul>
Health Promotion Domain	<ul style="list-style-type: none"> <li>• Ability to evaluate social determinant of patient which contribute in health or illness</li> <li>• Apply health promotion strategies and disease preventions to improve the quality of life and design implement evidence based promotions programs</li> <li>• Assess the risk factors of the diseases and apply caries risk assessment for different age.</li> </ul>
Communication and Social Skills Domain	<ul style="list-style-type: none"> <li>• Inter-professional Communication with others in the teamwork to deliver health care.</li> <li>• Communicate with the patient in effective manner to deliver information and advice and insure patient comply.</li> <li>• Effective communication within the organizational hierarchy.</li> <li>• Deal with cultural diversity in patient care and communities</li> </ul>
Scientific and Clinical Knowledge Domain:	<ul style="list-style-type: none"> <li>• Evaluate and critically apprise of the published scientific research and use the information in improve the oral health of the patient.</li> <li>• Knowing how to design and implement dental research in scientific manner</li> <li>• Knowing the risk, benefits manipulation and composition of dental materials, ionizing radiation and how to deal with its risk and improvement.</li> <li>• Demonstrate basic knowledge relevant to clinical skills relating to deferent dental procedures</li> </ul>

## Appendix (B)

## Graduate Assessment of Preparedness for Practice Questionnaire (GAPP)

عزيزي طبيب الامتياز:

في الوقت الذي نهنتكم فيه على تخرجكم نرجو منكم تعبئة هذا الاستبيان الذي يهدف الى الوقوف على مدى قدرة المنهج الدراسي بكلية طب و جراحة الفم و الاسنان على اعداد اطباء الاسنان .

فضلاً اختر الاجابة المناسبة و المتعلقة بحالتك

Gender الجنس Male ذكر Female أنثى

Age العمر .....

Marital Status الحالة الإجتماعية : Single عازب Married متزوج

How well prepared do you feel for general dental practice in order to...? الي مدى تعتقد انك جاهز لتطبيق المهام التالية?

Clinical		Completely unprepared غير جاهز بالمره	Very poorly prepared غير جاهز بشكل كبير	Poorly prepared غير جاهز	Neither well nor poorly prepared لست متأكد	Well prepared جاهز	Very well prepared جاهز جدا	Compl etely prepar ed جاهز تماما
History taking	Obtain, interpret and record a comprehensive patient history							
Patient examination	Complete a patient examination and be able to identify all relevant systemic and orofacial conditions.							
Orthodontic assessment	Carry out an orthodontic assessment and discuss treatment options with the patient.							
Acute patient management	Appropriately manage the patient presenting acute orofacial trauma, infection and pain.							
Special tests	Appropriately prescribe and/or undertake relevant special tests to aid diagnosis, including radiography. ( ex: vitality test)							
Diagnosis	Use all relevant data from the history, examination and special tests, formulate differential diagnoses, and from there, definitive diagnoses.							
Treatment planning	Formulate an appropriate treatment plan with the patient, taking into account the risks and benefits of treatment options.							
Prevention advice	Provide relevant, comprehensive, evidence-based preventive advice to patients.							

Referrals	Refer patients appropriately for advice, assessment or treatment. (completing the referral form)								
<u>Safeguarding</u> حماية المرضى	Be able to identify the signs of abuse or neglect in patients and raise concerns appropriately. ( تحديد حالات الاعتداء الجسدي و التبليغ عنها للجهات المعنية )								
Drug prescription	Appropriately prescribe and administer drugs and therapeutic agents.								
Periodontal	Appropriately assess and manage the health of periodontal and soft tissues, including monitoring, and prevention treatment.								
Local anaesthesia	Appropriately administer local anaesthesia.								
Direct restorations	Appropriately assess and manage caries and non-caries tooth surface loss, using <b>minimally invasive techniques</b> that are long lasting, aesthetic and restore or maintain function.								
Endodontics	Appropriately manage uncomplicated endodontic treatment.								
Extraction	Appropriately manage uncomplicated extraction of erupted teeth and roots.								
Surgical extraction	Appropriately manage simple surgical removal of teeth and roots.								
Dentures	Assess the need for, design, prescribe and provide partial and complete dentures.								
Indirect restorations	Manage indirect restorative procedures that preserve tooth structure, replace missing or defective tooth structure, maintain function, are aesthetic and long lasting, and promote soft and hard tissue health.  (crowns, bridges, post and core)								
Orthodontic appliance repair	Undertake limited orthodontic appliance emergency procedures.  تعديل و تصليح اجهزة التقويم و التعامل مع الحالات الطارئة فيما يخص التقويم								

TMJ management	Recognise and manage temporomandibular joint disorders.							
Medical emergencies	Identify, assess, and manage medical emergencies.							
Patient and public safety	Comply with current best practice guidance to ensure delivery of a high-quality service to the patient, including appropriate documentation of patient records, decontamination procedures and maintenance of a safe environment.							
Population-based care	Understand the current issues relating to oral health of the population, and how to plan to address these needs, including the role of evidence-based prevention. ( <u>health education and promotion programs</u> )							
<b>Communication</b>								
Patients and public	Communicate appropriately, effectively and sensitively at all times with and about patients, their representatives and the general public, and obtain informed consent.							
Other healthcare professionals	Communicate and feedback appropriately with colleagues from dental and other healthcare professions, and raise concerns when problems arise.							
Generic communication skills	Maintain accurate clinical records and use a range of communication methods to support clinical practice, within legal requirements.							
<b>Professionalism</b>								
Patients and the public	Put patients' interests first and act to protect them. Respect patients' dignity and choices and take into account equality and diversity.							
Ethical and legal	Recognise and act within the professional standards and within other professionally relevant laws, ethical guidance and systems.							
Teamwork	Understand the roles of and co-operate effectively with other members of the healthcare team in the interests of patients.							

Development of self and others	Demonstrate a commitment to lifelong learning, and the importance of reflective learning, feedback and development planning for you and your colleagues.							
<b>Management and leadership</b>								
Relating to self	Recognise the importance of and demonstrate personal accountability (المسؤولية) to patients, the regulator, the team and wider community. Put patients' interests first and act as their advocate where appropriate.							
Relating to others	Lead, manage and take professional responsibility for the actions of colleagues and other members of the team involved in patient care.							
Relating to the working environment	Recognise and comply ب يلتزم with local and national systems and processes to support safe patient care, including the safe use of equipment and materials.							

# Appendix(C)

## Interview guide:

Activity	Comments/Questions	Approximate Time
Introduction	<ul style="list-style-type: none"> <li>• Brief the participant.               <ul style="list-style-type: none"> <li>○ Introduce self.</li> <li>○ Explain goals of interview.</li> <li>○ Review interview method, use of data, confidentiality, and so on.</li> </ul> </li> </ul>	10 min
Open question	<ul style="list-style-type: none"> <li>• how did COVID19 affected your dental training at the faculty of dentistry, University of Benghazi?</li> </ul>	10 min
Discussion questions	<ul style="list-style-type: none"> <li>• Tell me about your preparedness?</li> <li>• To what extent you feel ready for practical life?</li> <li>• Why you feel you aren't preparing enough?</li> <li>• How we can improve this weakness in preparedness?</li> <li>• Are the case-based discussions and clinical based seminar sufficient for preparing?</li> <li>• What is the department that you feel unprepared for, in terms of practical and skills? Why?</li> </ul>	15 min



<b>Activity</b>	<b>Comments/Questions</b>	<b>Approximate Time</b>
finally	<ul style="list-style-type: none"><li data-bbox="683 421 1015 483">• Do you have anything you want to say?</li></ul>	

## Appendix (D)

Theme	Subthemes	Quotes
	New polices	تدربنا شهر ونص, بعد ذلك توقفنا لفترة طويلة , بسبب كورونا وبعد ذلك ردينا كان مضغوط الوقت وكل قسم طالب سيمينار كملنا الامتياز في 3 شهور. لم نتحصل علي فرصة التدريب العملي لأنه التدريب كان متوقف بامر من اللجنة الاستشارية كإجراءات احترازية لمواجهة الجائحة.
Influence of Covid-19	Non-clinical internship	كان الامتياز لمدة 12 شهر وكانوا يأخذو في حقهم في التدريب , اما نحن مدة ثلاث شهور وعبرة عن سيمينار وهذا اضطرنا الي استخدام الخطة البديله وهيا التدريب في عيادات خاصة والعمل كمساعده , يعني فرقت واجد في التدريب.
	Different skills	كان شي جديد لم يكن موجود في نظام كليتنا من قبل , حيث تعلمت كيف ابحت واعمل ورقة عمل وبرزنتيشن وكيف اقوم باللقاء بالاضافه الي ان بعض المواضيع التي كنت متحمسة فيها خاصة في ابيدو. بالنسبه لي زدت ال protection والاحتياطات عشن الاصابة , وغير هكي تعاملت بشكل عادي مع المرضى6
	Public Fear	التخوف كان من قسم البريو والكونس لان حتي المرضى كانوا يخافو من العلاج6
	Inappropriate management	الافضل انه يتاجل الامتياز , او كان مفروض في خطط بديلة مثل التدريب في مكان تخصصي مثل السلماني, او المستوصفات وهذا الشيء يحتاج لدراسة لتنفيذه , حيث يجب ان يكون معنى مشرفين من الكلية في مكانات خارج الكلية هذا حل عملت بيه كلية مصراته حيث تاجل الامتياز لمدة سنة وتدرّب الطلبة في المستوصفات
Inherent faculty problems	Shortage of resources	ممكن نحكي عن نفسنا لما كنا في سنة رابعه في ناس واجد ما اشتغلت, بسبب نقص المواد في قسم الكونس في طلبه دخلو الامتحانات بدون ما يشتغلوا ولا حالة بعضهم مجموعه في نهاية الدوام فلا يوجد تمرير ولا ادوات ولا مرضى . المجموعات المحظوظة كانت من 110-12 وانت وحظك ممكن في قلاز وممكن لا , مع انه اعطيناهم فكرة انه نحن ممكن نوفرنا النواقص ولكن رفضوا نيو نديروا حل لكن هما ماداروش حل . نقص المواد في الكلية كذلك الاعطال في الكراسي , عدم تعاون من اعضاء هيئة التدريس , يتعاملوا معنا كأننا مازلنا طلبه ,

	Administrative inefficiency	لو كان في شخص مسؤول في الكلية وضع خطة بديلة كان ينقص عدد الطلبة , تكون فترة الامتياز اطول ويمكن نحصل فرصة مرتين في الشهر افضل ما انه يتوقع افادتي بدون تدريب , بالعام طلبة كلية الاسنان مظلومين نتخرج لا يوجد تعيين ولا خبرة في بعض من الدفعة يعمل كتمريض اسنان كذلك بعض لانانية من الدكاترة منهم من لا يبرد تعليم الطلبة في العملي حتي خارج الكلية وكانه احتكار للمهنة.
	Non-functioning departments	اقسام كثيرة , مثل البريو والكونس عادة القسم يوجد به حالات كثيرة ويوجد فرصة للتدريب فية كذلك قسم البيديو كنا نعبو شارت فقط ولكن كنا نستفسدوا نشوفو الامتياز وهما يشتغلو الحالات (كلام علي سنة 4) لكن مثلا قسم الفيكسد والريموف لم تتاثر , الفيكسد كان دائما علي اسنان بلاستيكيه فلذا لم يتاثر كثيرا
	Shortage of clinical cases	ان تكون عياده , وليست مكان دراسه فقط لانها لو كانت مفتوحة حتي الفترة المسائية كعياده كان من الممكن انه نحصل علي فرص تدريب افضل خاصة انه معظم العيادة رجعت لاستقبال المرضى بطريقة المعتادة . تفتح الكلية في الفترة المسائية كعيادة , للاسف كانوا يوزعوا في المرضى من قدام باب الكلية وكانوا يمشوا لعيادة الدولية.
curriculum	Disorganized curriculum	التوبيك هذا واسع ويصفة عامة الدكاترة يعطوا فيه بطريقة سطحية ويقولو هذا الشئ : management postgrad. مش شوركم هذا تخصصي , لم يعطوا بالتفصيل هما في نظرهم هوا لل هوا اخذناه نظري ولكن العملي يقولك دور حاله خاصة واشتغل عليا , medical emergencies :: وين نحصل حالة فيها امراض معينة عشن نشتغل عليا , ولما تجي حالة مميزة وعندها مرض يدخلوها للغرفة الخاصة في قسم الدياقنوسس يتعامل معاها الدكتور او المعيد بدون شرح لنا كطلبة
	Theory focused	قسم الميديسن كنا لانعمل شيئا فقط الدكاترة يسالونا في المنهج فكن اندخل للكليتك خايفين من الاسئلة بينما هوا كان سهل وتعلمته في الخاص وكنت حانثضيع 12 شهر بدون تدريب كافي لو تاجل الامتياز
	Compacted academic year	خذيهاهم في اورال ميدسن في سنة ثالثة ولم نمحن فيه وفي بداية رابعة امتحنا الجزئي كان المنهج متراكم . وحاجات واجد ماقريهنش كويس وفي الكليتك كان بعض الدكاترة مهتمين ويشرحوا والبعض الاخر لا
Individualistic barriers	Attitude of staff	في اقسام داروا اللي عليهم, مثلا البريو لم يكن مجرد برزنتيشن كان معاها دسكشن ولم يكن استجواب كان مراجعة للمنهج لان كنا منقطعين فترة علي الدراسة , كذلك معلومات اخذناهن عن الاورال هياجين انستركشن , بينما هناك اقسام كانوا مسكرين ووقعولنا الكرت علي الدروج بدون أي تدريب او سيمينار ولا غيره في اقسام طلبوا سي دي . فيه اقسام حاولوا ان نستفيد من السيمينار غيرهم ل ا. , وكان مكان التدريب عندهم نفس الكلية لكن الدكاترة كانوا يعطوا بضمير وكله شرح كليك بفرق العطاء عند اغلب الدكاترة انصدمت في وسعة البال بل انه بعض الدكاترة لم نكن نراه في الكلية , كانت العيادة مجهزة بالكامل كذلك المواد توفرة عك سالكلية ممكن مرات تشتغل علي كرسي يكون السكشن عاطل او

		<p>مواد ناقصة. كذلك معتمدة علي المجموعات و سوبر فايزر , في بعض الدكاترة بدون ذكر اسماء لايقومون بالشرح علي حالات مهمه وغريبه في القسم يتعاملوا معاها بشكل شخصي بدون شرح للطلبة.</p>
	Attitude of students	<p>هي فترة كانت ايجابية لمن قدر يستغل الفرص وسلبه لمن قد ينتظر الكليه تفتح ابوابها ويبدأ الامتياز والكلينك والفرص كانت مش ضروري تحتاج امكانيات اشتغلت كمرضة لي اضل قريبه من الكرسي . والدكتور وتعلم اشياء كثيرة . هي مش كافية, ولكن كل حد وميوله لو في شخص يحب ان هيكون محاضر فهيا مفيدة جدا بالنسبة له كتدريب ومهارات ولكن كتدريب عملي ليست مفيدة لان اغلب عمل الاسنان محتاج عمل يدوي اكثر للممارسة</p>
	Personal merits	<p>انا اشتغلت اصلا قبل الامتياز تقريبا لمدة سنتين وانا اعلم كمساعده قبل الامتياز فكنت متدربة حتي قلت التدريب في الكلية لم يؤثر فيا. نعم, بعضهم تدرب في عيادات خاصة واخذ كورسات لكي يحصل علي فرصة عمل لان مستحيل تتحصل علي عمل بدون خبرة ,كذلك المعارف والامكانيات ساعدت في الحصول علي فرص , كذلك اتجهوا للعمل في شركات الادوية</p>

# تأثير جائحة كورونا علي استعداد خريجين طب الاسنان في جامعة بنغازي

## لممارسة طب الاسنان

قدمت من قبل:

امل أسامة رمضان الشويهدى

تحت اشراف:

د. ارحيم احميدة العوامي

## الملخص

### الغرض من الدراسة:

كان الهدف من هذه الدراسة التجريبية الطبيعية هو قياس تأثير جائحة كورونا على جاهزية خريجي طب الأسنان بكلية طب الأسنان بجامعة بنغازي.

### المواد والطريقة:

تم استخدام تصميم دراسة مقطعية مختلطة ، استبيان مصمم مسبقاً يُعرف باسم تقييم الخريجين للاستعداد للممارسة (GAPP) لجمع البيانات الكمية واستكمل بمقابلات نوعية شبه منظمة لفهم مسألة التأهب بين خريجي طب الأسنان.

### النتيجة:

بلغ معدل الاستجابة الإجمالي (68.2 %) ، وكان ما يقرب عن (59.5 %) من المستجيبين من دفعة ما قبل الجائحة ، وأظهرت نتائج الدراسة أن استعداد الخريجين من ناحية الكفاءات الأكلينيكية كان ضعيفا في علاج المفصل الفكي الصدغي بنسبة (12%) وإصلاح أجهزة

تقويم الأسنان بنسبة (14.7%) والحالات الطبية الطارئة بنسبة (35.5%) والخلع الجراحي بنسبة (37.2%) في الطب السريري. اعتبر معظم المستجيبين أنفسهم مؤهلين لأخذ التاريخ المرضي السني بنسبة (86.2%)، وإجراء التخدير الموضعي بنسبة (88.6%) ، وإجراء عمليات الحشو العادي بنسبة (85.6%) ، وبدرجة أقل استعدادًا لخلع الأسنان البسيط (79.2%) وعلاج اللثة (78.3%) واللنصائح الوقائية (74.5%)، حوالي ثلثي المشاركون يشعرون في التواصل مع المجتمع ومختصون آخرون في الرعاية الصحية وبنسبة (57.8%) يشعرون بانهم مستعدين في مهارات التواصل العام. أما بالنسبة للكفاءة المهنية فانهم يشعرون بالاستعداد في العمل الجماعي والعلاقة المهنية مع الجمهور بنسبة (67.7% و 68.3%) وأقل استعدادا في المهارة القانونية والاخلاقية. في مهارات القيادة والادارة كان اغلبهم مستعدين في حدود (60%). كما أظهر خريجو مرحلة ما قبل الجائحة ثقة وكفاءة أفضل في الممارسة طب الأسنان بشكل مستقل ولكن بعض المجالات ظلت ناقصة في كلا المجموعتين مما يشير إلى مشاكل متأصلة في مناهج طب الأسنان في جامعة بنغازي.

## الاستنتاج:

تشير نتائج الدراسة إلى أن الوباء قد أثر سلبيًا على عملية التعليم في كلية طب الأسنان بجامعة بنغازي وذلك يبرز الحاجة إلى إصلاح المناهج الدراسية وإعادة تحديد كفاءات خريج طب الأسنان الليبي. يعد تقليل عدد الطلاب المقبولين إلى الحد الأدنى ودعم الموارد الحالية أمرًا إلزاميًا لاستعادة تدريب طب الأسنان الجيد.



**تأثير جائحة كورونا علي استعداد خريجين طب الاسنان  
في جامعة بنغازي  
لممارسة طب الاسنان**

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قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في صحة  
الأسنان العامة وطب الأسنان الوقائي

جامعة بنغازي

كلية طب و جراحة الفم والاسنان

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