

An Impact of COVID-19 On Dental and Oral Health Care Workers: An Online Survey in Nepal

Saroj Prasad Deo (✉ drsrijdeo@gmail.com)

National Medical College, Biganj, Nepal

Dharanidhar Baral

B.P. Koirala Institute of Health Sciences

Research Article

Keywords: COVID-19, SARS-CoV-2, Psychological Impact, Professional impact, Academic impact, Dental and Oral Health Care Worker

Posted Date: March 12th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-283274/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

COVID-19 (COrona Virus Disease-19) outbreak is an alarming situation for all health care workers. Dental and oral health care workers (DOHCWs) are invariably at a higher risk of getting infected or transmitting disease due to the nature and duration of work. The objective is to determine the effect of the COVID-19 pandemic on Nepalese dental and oral health care workers and their practices.

Methods

A cross-sectional observational, online survey was designed and conducted via Google form from 24 June 2020 to 13 July 2020 among DOHCWs of Nepal. The study tool developed after reviewing pertinent literature and international guidelines.

Results

A total of 51.9% were aged 20 to 29 years, 61.7% were male, 52.6% were single; 92.5% had no morbidity. Of the respondents, majority 60.2% of DOHCWs were working in routine duties on the COVID-19 crisis. They reduced their current practice to before the pandemic; 48.2 % of them working less than 20 hours per week, while only 10.5 % of them working more than 40 hours per week. Moreover, 73.7% performed only selective or lesser procedure; 18% closed dental practices / stayed home; only 1.5% worked more; 6.8% shifted practice to online (teledentistry). The majority of the respondents restricted their activity to an emergency (21%) and urgent procedures (22.7%). A considerable proportion of participants reported symptoms of depression (21.9%), anxiety (24.2%), and distress (8.4%). Bivariate analysis showed a statistically significant level of satisfaction with logistic support provided by the administrative agency in the different workplace (oral health service centre) with relation to the availability of masks other than N95, N99 ($p = 0.04$), availability of PPEs ($p = 0.06$) and facility of cleaning area ($p = 0.01$).

Conclusion

The impact of the COVID-19 pandemic among DOHCWs is widespread and adversely affect the personal, professional and academic lives of DOHCWs of Nepal. The participants reported experiencing psychological burden, precipitated by financial burden and worries about an uncertain future.

1. Background:

BAAt the end of December 2019 at Wuhan Central Hospital, Hubei Province, China, the death of many people in a local hospital with an unknown disease was reported by Dr Li Wenliang [1]. Rapidly spreading diseases involved many of the people of Wuhan suffering severe pneumonia of unknown cause [2]. The

emergence of the unknown disease was caused by the novel coronavirus (2019 n CoV), which is called Severe Acute Respiratory Syndrome CoronaVirus-2 (SARS-CoV-2) [2,3]. Later on, the disease was named COVID-19 (COrona Virus Disease-19), has resulted in an unprecedented global public health crisis [4], prompting the world health organization (WHO) to declare it a public health emergency of international concern (PHEIC) [5]. It gives threat and danger to people because of clinical features of COVID-19 range from an asymptomatic state to severe acute respiratory distress syndrome and multi-organ dysfunction. The symptomatic COVID-19 may present with a dry cough, fever and dyspnea [6], but also anosmia, ageusia and, in few cases, diarrhoea [7]. Oral and cutaneous manifestations have been reported [8]. SARS-CoV-2 is considered a threat and danger in human than previous epidemics because of its mode of transmission-it has a high spreading potential via all possible mode of transmission [9-12].

The COVID-19 outbreak has spread exponentially and unpredictably across the world causing, along with the so mentioned health burden, devastating global, personal, social, economic impacts. All health professionals have been overwhelmed by the effect of COVID-19 on healthcare resources. Dental and oral health care workers (DOHCWs) activities were limited exclusively to emergency treatments with proper personal protective equipments (PPEs) by the Centers for Disease Control and Prevention (CDC) [13]. The simple logic was put forward behind this strict guideline that DOHCWs were placed on the backseat to reserve the manpower if medical health professionals infected or scarcity occurred, preserve scarce personal protective equipment (PPE), observe social distancing, and protect the employees and patients from risks of potential exposure and illness. However, this strict guideline gives extensive work to DOHCWs working in the oral and maxillofacial surgery field who are working in an emergency department, encounter a high number of patients. Even, simple oral and dental problems are presenting in an emergency as a result of the closure of the oral health care centre, and patients have only insight way to get treatment. Additionally, they are receiving only conservative treatment (mainly antibiotic and analgesic) in an emergency, the simple diseases have progressed to severe disease with extensive extra-oral swelling, trismus and airways obstruction which have needed urgent intervention to save life patient. This is incense the burden on hospitals emergency departments already struggle with the pandemic; affect management urgent conditions such as oral and facial injuries, facial bone fracture, acute bleeding, incision and drainage. Looking at this devastating impact on oral health care services and patients, oral health experts' response is much visible [1,14-16]. However, impacts on DOHCWs have been described in literatures in multidimensional aspect [17-22]. COVID-19 affect the DOHCWs personal and psychological wellbeing; social life with family, friends and community; monthly income. DOHCWs are invariably at a higher risk of contracting SARS CoV-2 due to their direct exposure to saliva and blood, longer duration of work and work close physical contact with the patients [23-25]. They possess a threat to transmit SARS-CoV-2 among patients, family members, and the community from the workplace [26]. This pandemic has created hostile environments for DOHCWs due to violence, discrimination and harassment [27]. Moreover, they are more concern about physical isolation, social distancing and quarantine; are only insight management modalities for COVID-19, separate them from loved ones and peers when they are the desire to be present with their families. All of those factors develop psychological issues and scare, hesitant to continue their service. Additionally, majorities of oral health services of

Nepal have been provided by private sectors or owned dental clinic [28]; closer of service centre lead to no patient care, even in emergency or urgent cases. Patients receive dental treatments only from 10% of the dentist [29]. Consequently, two-third DOHCWs are severely affected by the financial burden as most dentists (over >90%) work in the private sector [30]. They are not receiving a salary during or partial monthly salary this lockdown even from university private institutions or hospital and clinics. Most of them are on forced leave.

This is the state of the oral health crisis, unable to access oral health services in public may precipitate anger and aggression against DOHCWs. Therefore, this pandemic brought new challenges to the dental professionals include: protecting the health of the family, students, faculty, staff and public; ensuring the continuity and quality of oral health services and dental education; keeping up with guidance [31-33]. Many decision and practice modification should need managing, support from all sectors of the community is need to establish oral health service in full strength.

Learnings from a past similar type of pandemic (SARS CoV-1) evidence, professional priority shifted to contagion limitation in the oral health service centre. They are keeping themselves updated with developments in practice protocols for the present situation and future practices. Creative interventions 'Eagle- Eye Observers' have been suggested to reduce risks of infection in a clinical setting [34]. Standard infection control precautions are mandatory; it is a set of practices that are applied to the care of patients, regardless of the state of infection (suspicion or confirmation), in any place where health services are provided. Considering every individual patient as a potential candidate for COVID-19 infection, protocols have developed as patient triage, mouth rinses prior to the procedure, hand hygiene, personal protective equipment for DOHCWs, the limit of APG, cleaning of potentially contaminated surfaces. The patients' triage is strongly recommended when patients entered dental clinics [16,25]. The purpose of triage is to identify possible critical cases, reduction of the number of patients in the waiting room, exclude patients with COVID-19 related symptoms (coughing, sneezing, respiratory difficulty). Body temperature should be registered, possibly with a contact-free forehead thermometer [16]. Further, hygiene could be maintained by providing disinfectant and surgical mask supply to all patients while waiting in the waiting room. Mouth rinses containing 1% hydrogen peroxide or 0.2% povidone can be used to reduce the microbial load in saliva, with a potential effect on SARS-CoV-2. In particular, mouth rinses are strongly recommended in cases where the rubber dam is not used for the dental procedure.

Dental armamentariums, work surfaces and personal items such as pens, stethoscopes and mobile phone may get contaminated with aerosol or droplet containing SARS-CoV-2. Cleaning of potentially contaminated surfaces is much needed for the clinic environment. Metal, glass, and plastic surfaces are the fomites of virus live for several days [35,36] and its virulence at room temperature remains from 2 hours up to 9 days. Their activity is a decrease in decreasing the humidity from 50% to 30%.

A dry, well-lit airy clinical environment is recommended. The predictable shortages of supplies are associated with a high infection rate in HCWs i.e. availability of personal protective equipment and sanitisers [37]. To limit the aerosol transmission of SARS COV-2, the use of protective equipment,

including gloves, masks, protective outerwear, protective surgical glasses, and shields, is strongly recommended to protect the eye, oral, and nasal mucosa [16]. Each dental procedure will result in direct contact with body fluids and aerosol production [38]. Therefore, such as infrastructure modification, duration of the working hour (full time), environmental hygiene and hand hygiene [39]. Nosocomial transmission of SARS CoV-2 is associated with overcrowding, absence of isolation room facilities and environmental contamination in dental practices.

Procedure prioritization has shifted to limit the aerosol-producing procedure. It is advisable to minimize the operations involving the generation of aerosol and droplets while employing the use of personal protective equipment. Oral health education and academic activities are rapidly being moved to online platforms in dental school. Traditional, clinical practice is moved to teledentistry, teleconsultation and telediagnosis [40]. Similarly, oral health educators grasp the opportunity of free time from clinical work to research in the field of oral and dental health during this COVID-19 outbreak. They are focusing innovation for safe practice to develop evidence and impact of COVID-19 on DOHCWs and dental practice.

The primary objective of this study is to determine the effect of the COVID-19 pandemic on Nepalese dental and oral health care workers and their practices. A secondary objective is to identify factors that may limit access to adapt to new normal COVID-19 and to estimate the adequacy of access to PPEs. By identifying those factors, we may address those factors in future management in dental practices. However, to the best of our knowledge, this is the first study conducted in Nepal to find the impact of the COVID-19 pandemic on DOHCWs.

2. Methods:

2.1 Study design and setting:

This study protocol followed the American Association for Public Opinion Research (AAPOR) reporting guideline. The reliability tool was validated through an intra-class correlation with a strong relation of 0.80. This study was conducted following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational studies [41]. A cross-sectional observational, online survey was designed and conducted via Google form from 24 June 2020 to 13 July 2020 among dental and oral health care workers (DOHCWs) of Nepal. During this period, the total confirmed cases of COVID-19 exceeded ten thousand (10,099 to 16945) in Nepal. This study ended just 1 week before the first lockdown in Nepal ended on 21 July 2020. Since lockdown was started on 24 March 2020 in Nepal; most dental services were closed until 1 July 2020. DOHCWs from private hospital / Clinic, community/ Public Hospital, government or private teaching hospitals from 7 provinces of Nepal were included. The inclusion criteria were DOHCWs of any gender above the age of 20 years able to read English/Nepali and co-operative and providing informed consent for this study. The Exclusion Criteria were repeated entry and incomplete form fill up or a participant who was not providing informed consent for the study and want to drop out of the study within 2 weeks.

2.2 Participants:

Participants were all DOHCWs including faculties, specialist dental doctors, dental surgeon or medical officer, dental nurses, security guards, ambulance drivers who had had a high risk of cross-infection. The sampling method was snowball non-probability sampling. The target sample size of participant was determined using the formula $N = (Z\alpha)^2 P (1 - P) / d^2$; where, $\alpha = 0.05$, $Z\alpha = 1.96$, $d = .05$; type I error = 5% and $P = 51\%$ assumed. Due to restricting the time frame (3 weeks) and lesser responses, this study used a sample size of 50% less than the actual sample size. Thus, this study included 133 completed questionnaires from participants.

2.3 Data Collection Tools:

The questionnaire was developed as guided by Regmi PR et al 2016 in Google Forms [42]. This platform was chosen because it is free, easy to use for both the researchers and respondents, and it provides easily extrapolated data for use in Excel (Microsoft).

The questionnaire was produced in English, Nepali language and included open-ended or closed-ended type questions of multiple choices or Likert scale questions or matrix questions. The questions on the survey were developed after reviewing pertinent works of literature and international guidelines [14,43,44] and aimed at measuring the impact of this turmoil on the dental profession overall. To achieve this goal, this study questionnaire was developed in 4 domains: 1st, general demographics, 2nd personal impact; 3rd professional impact and 4th academic impact of COVID-19. The domain 1, included most of the primary outcome variable, was defined as the respondent's perception to evaluate logistic support from the administrative agency of oral health service provider and surgeons coded as yes/ no. All variables used for this study are specified in table 1. The Pearson correlation showed significant in 3 direct variables of this survey ie type of intuition, work position and place of current work profile with capacity building and logistic supports provided from an administrative agency of oral health institutions. Domain 2, was constructed to determine the personal impact on DOHCWs that include prevalence exposure to SARS-CoV-2, psychological distress during the pandemic, social and family reaction and economic loss due to pandemic in form of the questionnaire. The domain 3 questions were focused on the professional impact of COVID-19 that is patient care (categorization of current practice), workforce and staffing issues, logistic support ie PPEs, equipment and infrastructure from the administrative agency, procedural prioritization, preventive measures in the clinic. Last domain 4 was centred to evaluate academic impact in oral and dental health care system that are cancellation of elective and routine dental procedures, teaching-learning activities, public oral health education and conduction of research in the dental institution.

2.4 Reliability and validity of the tool:

A 23-item survey instrument was developed using WHO course materials on COVID-19 and interim guidance 1 for health care workers as well as guidelines published by professional organizations for COVID-19 [45]. The survey covered DOHCWs' characteristics, exposure risk assessment, personal and

professional perceptions related to COVID-19. The developed draft survey instrument was made accessible through a link and was distributed to 10 experts from 7 provinces of Nepal to comprehensively assess the content domains of the questionnaire (encouraged open commentaries) and rated the ease of re-adaptability of the questionnaire ranging from 0 to 100 (0-30: confusing; 31-50: difficult; 51-70: standard; 70-90: easy; and 90-100 very easy). The materials used for developing the survey questionnaire were provided to the experts for any further clarifications; 10 randomly selected faculty members were allocated to read the questionnaire for 15 minutes and asked for their suggestion and correction. Finally, the pilot web survey was conducted among 10 randomly selected DOHCWs to assess clarity, relevance, and acceptability. The feasibility and time required to answer the survey were evaluated on another 5 participants. Those participants were not included in the research.

2.5 Data Collection Methods:

The sampling method used the convenience snowball sampling technique. This method was applied because it was difficult to access participants personally due to the unavailability of individual e-mail. The questionnaire was transferred into Google form and an internet link was created. The participants were recruited by the researchers sending the survey link among their acquaintances DOHCWs via e-mail, messenger, WhatsApp, LinkedIn to DOHCWs. Again, the enrolled participants were requested to recruit more participants among their acquaintances. However, in case the person did not respond at the first instance, two reminders message and link were sent weekly for two weeks. Sample collection was ended at 3 weeks.

2.6 Variables:

The primary outcome variable was defined as the respondent's perception of COVID-19 coded as yes/ no. The indirect variables were socio-demographic characteristics.

The direct variables for this study were knowledge, skill, attitude score of DOHCWs about COVID-19. Demographic data were self-reported by the participants, including age (20-29, 30-39, >40 years), gender (male or female), co-morbidity, type of oral health service centre, geographic location ie provinces, marital status, work position ie occupation, place of residence, and current work profile. Participants were asked whether they were directly engaged in clinical activities of diagnosing, treating, or providing oral care to patients in ambulatory setting or patients presented in the emergency department. Those who responded yes were defined as frontline workers, and those who answered no were defined as second-line workers. Table 1 is the questionnaire that was circulated to the participant, formed targeting all the direct and indirect variables of this study.

2.7 Statistical Analyses:

The spreadsheet (excel) was generated and downloaded from Google form doc. The incomplete entry of data especially in open-ended questions was corrected and the Nepali front was erased. All the nominal, ordinal variables responses were categorized and coded numerically. The string variables of liker type

questions were assigned a score ranging from 0 to 4. Data analysis was performed using SPSS statistical software version 11.5 (IBM Corp). The confidence level was set at 95%. and all tests were 2-tailed. Descriptive analysis was done by calculating frequency and percentages for each question in categorical variables; mean and standard deviation for continuous variables. The Pearson chi-square test and a one-way Analysis of Variance (ANOVA) were used to investigate the level of association among variables as appropriate. Multivariable linear regression analysis between independent variables and the outcome variable was conducted to identify associated factors. Binary logistic regression models were built to assess the correlation between different type of workplace and current work profile of DOHCWs in the availability of adequate PPEs, the guidelines used, current practice. The significance level was set at < 0.05.

3. Results:

3.1 Demographic Characteristics:

In the study, among the 450 dental and oral health care workers asked to participate, only 134 respondents (29.77%) completed the survey. Of the respondents, 20.3% worked province-1; 27.8% worked in province-2; 39.8% worked in Bagmati; 1.5% worked in Gandaki; 6.8% worked in Lumbini; 0.8% worked in Karnali; 3% worked in Sapurpaschim. In work position (occupation) categories, 16.5% respondents were junior resident, 1.5% respondents were senior resident, 20.3% respondents were faculty, 54.4% respondents were dental surgeon and 2.3% respondents were sanitation worker. The response rates for residents, faculty member and dental surgeon were 73.33%, 54.0 % and 31.5% respectively. Among respondents affiliated with the health service centre, 44.4% associated with university / medical/dental teaching college, 12% were from private dental hospitals, 18% were from government hospitals; 25.6 % were from private dental clinics. Most respondents (61.7%) were male gender; 51.9% were in the age group 20 to 29 years; 52.6% were single and married living with a spouse; 92.5% had no morbidity.

All respondents (100%) lived in urban areas of Nepal. The mean age was 31 (SD 7.42) years, 43.6% were married living with a spouse, 3.0 % married and staying away from the spouse, 52.6 % single, and 0.8% divorced, separated or widowed (Table 1).

3.2 Personal impact:

Only 3% of DOHCWs were exposed to SARS CoV-2 during treatment either direct contact with confirmed COVID-19 patients or contract tracing whereas 15.7% of them were not known exposure condition. 14.3 % of them were quarantined (Table 1). Table 2 are showing the clinical exposure in different workplaces, psychological issues and family reactions of DOHCWs. DOHCWs reported experiencing more severe psychological symptom ie depression, anxiety and stress among non-working: 14(31.18 %), 12(27.27 %), 5(11.36 %); P = 0.52; whereas COVID-19 symptoms and family reactions were higher among frontline workers. However, the p-value was not significant.

3.3 Professional impact of COVID-19:

Of the respondents, the majority 60.2% of DOCHWs were working in routine duties on the COVID-19 crisis. 2 % of DOHCWs reported working less than 20 hours per week, while only 10.5 % reported working more than 40 hours per week. DOCHWs were significantly reduced their current practice than before the COVID-19 pandemic; 73.7% performed only selective or lesser procedure; 18% closed dental practices / stayed home; only 1.5% worked more; 6.8% were shifted practice to online ie teledentistry. They guaranteed telephone availability for dental emergencies. They understood the reasons for the change of dental practices: majority 45.1% followed government order/guideline; 34.6 % claimed lockdown; 19.5% felt psychological and emotional issues; 31.6% had a shortage of PPEs; 5.3% had a scarcity of axillary staff (Table 1). The majority of the respondents restricted their activity to an emergency (21%) and urgent procedures (22.7%).

The respondents from the different type of oral health service centres were a statistically significant level of satisfaction with logistic support provided by the administrative agency with relation to the availability of masks other than N95, N99 ($p=0.04$), availability of PPEs ($p=0.06$) and facility of cleaning area ($p=0.01$) (Table 3). The respondents who mainly worked exclusively in university medical or dental teaching college had a higher percentage of all the responses. The preventive measures taken by university college to cope with the COVID-19 pandemic were significantly higher with body temperature measurement ($p=0.07$) and environment aeration & sanitation ($p=0.01$) only (Table 4).

3.4 Academic impact:

Only 6.8% of respondents were involved in teaching and learning activities; they have shifted their activities to an online platform. Other, such as research activities were shifted to the online survey.

4. Discussion:

In this cross-sectional observational online study, a total of 133 DOHCWs responded to 450 survey links send. The response rate was low (29.77%), which may be explained by the short period of study sampling or probably due to a lack of time, willingness, and harshness amongst professionals. Since the COVID-19 pandemic, many studies were conducted worldwide in countries where preparedness and response for COVID-19 were excellent. However, front-line workers of low economic countries were not prepared for the pandemic like in developed or developing countries [46]. This may be because of a lack of knowledge, training and capacity building on all critical aspects of COVID-19. This pandemic is different from earlier and it has a significant impact on DOCHWs life. To best our knowledge, probably this is the first study conducted to assess the multidimensional impact of COVID-19 on DOHCWs of Nepal. For our simplicity impacts are classified into three heading: 1. Personal impact; 2. Professional impact and 3. Academic impacts.

2.1. PERSONAL IMPACTS:

A personal impact is the effect of the pandemic in DOHCWs' personal and psychological wellbeing; social relationship with family, friends and community; financial loss and its consequence in life. They are at a

higher risk of getting SARS CoV-2 infection themselves at the workplace, mainly due to the nature and duration of work close contact with the patients [23, 24, 47, 48]. Similarly, 48.2 % of respondents of this study worked less than 20 hours in a week to reduce exposure themselves. However, evidence has not supported less work duration per week there should be provision for quarantine/self-isolation for 2 weeks after 2 weeks of continuous work [13]. Unfortunately, none of the oral health service centres of Nepal has the provision of self-isolation but only 35.4% of the centre have provision for quarantine in case DOHCWs are infected. Therefore, they are feeling insecure to go to the workplace in centres without the provision of quarantine. In this study, 33.1% of DOHCWs were responded currently not working on patients. Similarly, another study from Nepal found that only 24% of DOHCWs were not going to the workplace during the lockdown [30]. Only 14.3% of respondents were quarantined for 14 days. Surprisingly, a higher percentage of the non-working respondent (52.6%) have stayed in quarantine than working respondents (47.4%). This could be due to respondents may have responded during the quarantine time. Both part-time or fulltime currently working DOHCWs (60.2%) in patients are at high chance of exposure with asymptomatic COVID-19 cases during an emergency, indoor and outdoor duty. Moreover, any patients can serve as a reservoir for SARS CoV-2. Respondents of this study were exposure incidence only 3%, however, 15.7% of respondents did not know the exposure status; many times, they knew the exposure when they got a call from a contact tracing officer. A recent epidemiologic study found that nearly 17% of the patients with COVID-19 were asymptomatic and the transmission rate was 4.1% in asymptomatic patients; 6.3% in symptomatic patients [6]. In this study, approx. 50% of respondents were no COVID-19 symptoms (dry cough, fever, dyspnea, anosmia, ageusia and diarrhoea); probably they might be asymptomatic. They had responded having some symptoms in decreasing order; tiredness (49.6%), conjunctivitis and sore throat (27.8%), diarrhoea (18.8%), dry cough and difficulty breathing (15%), anosmia (7.7%), a rash on the skin (6.8%), fever (6%).

Development of symptoms was more in DOHCWs currently working than nonworking on patients, binary logistic regression analysis did not find statistically significant (Table 2). Probably, the above symptoms may occur due to SARS CoV-2 infection or viral flu, common cold, seasonal flu, this study did not show COVID-19 statistic in DOHCWs because confirmation tests for COVID-19 (Rt PCR test for SARS CoV-2) were not readily available and accessible in oral health service centres (available in only 37.6%). A huge number of asymptomatic or unconfirmed symptomatic respondents of this study are possessed threat to transmit the infection to staff, public and family.

Overall, 21.9%, 24.2%, and 8.2% of all respondents reported symptoms of depression, anxiety, and distress, respectively. They may afraid of physical isolation, dying, or losing their family members from loved ones and peers when they are desire to be present with family. Further, depression (31.18 %), anxiety (27.27 %) and stress (11.36 %) were found in respondents currently not working on patients; highest anxiety (55.6%) among the DOHCWs who were involved in teaching-learning activities only. Probably, they had left clinical work due to fear of getting COVID-19 infection and high apprehension toward COVID-19. Moreover, these symptoms were more extensive when clinicians had shortages of personal protective equipment's (PPEs) including a gown, gloves, facemask, and a face shield or goggles

[50]. Additionally, lack of training, supervision and education about infection prevention and control may give cause psychological distress to DOHCWs.

All health authorities of the world actively took the step to awareness and preventive measures. Mass media, communication and community engagement have been used which gave excellent knowledge about COVID-19 disease to the family of health care workers. Families know the vulnerable groups, mode of transmission, prevention and treatment modalities SARS CoV-2 infection which naturally arise strong family reaction toward the DOHCWs to perform their professional duties. In this study, 51.1% of respondents' family was not happy being on duty; 86.5% and 87.2% of respondents' family was worried about getting an infection at home and love one respectively. Several team members have moved out of their family home to self-isolate, while others follow a strict protocol at home if they live with at-risk family members such as seniors over the age of 65. The reactions were highest among the respondents who worked in routine duties on the COVID-19 crisis (Table 2).

The pandemic has spread exponentially and unpredictably across the world causing devastating global economic impacts [28]. Studies were conducted in this pandemic to estimate financial liability among health care workers all over the world; it showed a great amount of income loss in health care sectors. Nasta AM et al found the majority of 52% of surgeons of India has experienced a drop of more than 75% of their monthly income, while 22% faced a reduction of income 50–75%⁵¹. Another study by Cintia CP et al found one third (33%) of respondents who owned a hospital was expecting a monthly financial liability of 2.25 million rupees (30,000 US dollars) [52].

Similarly, Humagai M et al, found 70 % of the dentist were severely affected by the financial burden and were not receiving a salary during this lockdown as most dentists (> 90%) work in the private sector [30]. The selective procedure, only emergency or urgent procedure or closer of dental service centres would be reasons for that huge economic damage for many DOHCWs. This study did not quantify the exact financial loss of DOHCWs directly but 18% of respondents of this study were completely close to the dental practices and stayed at home; 37.6% of respondents were worked in the private dental clinic or private dental hospitals (Table 1). Government hospitals have paid their monthly salary regularly, a private hospital has not paid or partially paid to their employee. The majority of DOHCWs have on forced leave or forced to work less than 20 hours a week even in private medical and dental intuitions. Moreover, 25.6 % of respondents of this study had their owned private dental clinic; closure led to a complete financial cutoff. Of respondents, 51.9 % were in the age group 20–29 years; they are key active working forces in society and are, therefore, mostly affected by redundancies and business closures. The exact amount of financial loss and their impact on DOHCWs is not the aim of this study; further study should be needed to evaluate the economic impact on dentistry. Best of my knowledge, there are going research which has been conducted by Nepal dental association.

2.2. PROFESSIONAL IMPACTS:

The oral health service was severely affected by this pandemic. This study showed that the practice of the majority of DOHCWs in Nepal has been drastically affected by the COVID- 19 pandemic.

Its' impact was observed on the patients, staff and workforce, long term consequence (deterioration of skill).

Most dental clinics were closed which contribute to limited dental and oral care services to the community; only 10% of patients were received dental treatments from the dentist in lockdown [30].

Clinicians were performing only emergency (22.4%) and urgent procedures (24.8%), at the same time, elective procedures (16.2%) were propounded during the lockdown period. Patients had access to emergency and teledentistry where they had received symptomatic treatment (21.8%) (analgesic and antimicrobial therapy), before their appointments (mitigation).

Those acts might have greed consequence on the future oral health of the public. Due to unable to get treatment at an early stage of oral disease, simple dental caries in the tooth may progress to pulpitis↔ periapical lesion ↔ odontogenic infection/abscess leading to extensive extra-oral swelling, trismus. Our emergency department may encounter a higher number of patients with serious complications such as dysphagia and partial airway obstruction requiring immediate intervention and drainage. In our ambulatory service may receive more than 50% (approx.) patients with the more severe disease with a hopeless prognosis requiring extraction of the tooth. Similarly, data from our service centre has been reported a significant increase in extractions performed whereas a decrease in endodontic treatment and other dental procedure. This is expected and acceptable due to the following guideline and economic repercussions during the COVID-19 crisis. Additionally, strict instructions, triage and delay treatment may precipitate patient's hate, anger, aggression and violence against dental and oral health care workers (DOHCWs). COVID-19 has led to a significant worldwide change in dental practice.

DOHCWs should keep themselves updated with developments in practice protocols. The protocols keep changing rapidly as new and more information on this novel disease is discovered. However, DOHCWs level of knowledge and perceptions, availability of logistic support, policy and action plan toward COVID-19 are a barrier for them to keep upgraded. Similarly, during this crisis, more doubt and disagreement between professional have been noticed, mainly due to the level of knowledge and perceptions of DOHCWs toward COVID-19 remain unclear leading difficult for them to go further in crisis. Knowledge of disease may influence clinicians' attitudes and practices, and incorrect attitudes and practices directly increase the risk of infection [53, 54]. Knowledge about clinical features, pathophysiology, diagnosis and management help clinicians to recognize and handle COVID-19 patients, identify the high-risk dental procedure. However, attitude can be built by relevant training and policies during the outbreak and guide HCWs in prioritizing protection and avoiding occupational exposure which helps the clinician to change their existing practice. Therefore, WHO and the Public Health Administrators throughout the world [5, 49] are actively working toward prevention strategies and the control of the spread of the SARS CoV-2 by disseminating awareness ie timely educational videos, educational brochures, and social media and training for health care practitioners.

Although, experts are kept themselves updated with developments in practice protocols. The protocols keep changing rapidly as new. Similarly, this study did not find a consistent pattern of practice in various

oral health service centres of Nepal. 18% of responder closed their practice stayed in the home safely completely; 73.7% of them select less procedure than before; 6.8 % of respondents were shift practice online ie teledentistry. They stated reasons of chance their practice as follows: psychological distress (19.5%), lockdown (34.6%), following guideline (45.1%), lack of PPEs (31.6%) and workforce and staffing scarcity (5.3%). The possible absence of staffs is encountered during a pandemic due to test positive, quarantine or not willing work which affect the patient's management in an oral health care setting. Aerosol-generating procedures (AGPs) reported a high risk of transmission of SARS-CoV-255, it is wise to stop AGP and reduce the aerosol in the clinical setting with extremely cautious and follow rigorously infection control precautions⁵⁶. DOHCWs of Nepal reacted to the rapidly evolving crisis by procedural prioritization. They are self-aware of the possible risks of AGPs therefore, they were responded to closed clinical practices (18%) or doing selective or less procedure than before (74%). The majority of respondents (50% approx.) knew APG in the dental setting and prioritized procedure to non-aerosol-generating ie extraction and emergency oral surgical procedure only. 70.6 % of respondents reacted to the reduction in APG.

Furthermore, this aerosol may spread to the dental environment where they are working for hours [55–57]. It is suspended four many hours in form of fomite (aerosol or droplet contains SARS-CoV-2), can remain on metal, glass, and plastic surfaces of the dental armamentarium for an hour to several days [35, 36] and suggest that keeping surfaces clean and dry [35]. In this study, DOHCWs have responded to a good number of the preventive measures apply during a clinical activity. Surprisingly, we found a significant difference in the availability of PPEs ($p = 0.06$), Mask ($p = 0.04$) and cleaning area ($p = 0.01$) while comparing between oral health service centre of Nepal (Table 3,4). University Medical and dental college are well prepared for the COVID-19 pandemic then other oral health service centre of Nepal; logistic supports availability is seen good in higher (tertiary) oral health care centres than other centres. Also, the level of preventive measures adopted in the tertiary centre was higher than in other centres. Probably, this could have occurred due to the higher educational status of tertiary centre DOHCWs and good support provided by administrative agencies of those organisations. Higher levels of education are associated with high knowledge, attitude and practices about COVID-19. A financial burden or lack of knowledge to establish the dental service into new criteria could be a challenge to Nepalese DOHCWs. All of these increase the service cost to the service provider leads to an increase in procedural charge to the patients.

2.3. ACADEMIC IMPACTS:

Many of DOHCWs (44.4%) has been working as an academicians in dental school where they perform three major works; 1st, teaching-learning activities of university undergraduate and postgraduate students; 2nd, clinical work and 3rd, research and oral health education in the community. Respondent of this study was a faculty member (20.3%), senior residents (1.5%) and junior residents (16.5%). The academicians are faculties member with excellent knowledge and perception toward COVID-19. They had actively taken their mentorship toward the other DOHCWs, knowing the fact of unique exposure risk. The

judgmental decision was taken to cancel all elective procedure to prevent community transmission of COVID-19. Furthermore, physical distancing and stay at home measures were implemented by suspending all teaching and learning activities to prevent community transmission. Various dental institutions were completely shut down and suspended all teaching-learning activities for all dental students and residents. In Nepal, dental licensing examinations are postponed by Nepal medical council until further notice. In our study, among the participants (32,4 %) were worked in a university medical or dental college, only 60.2% of DOHCWs were working in routine duties whereas 6.8% were involved in teaching-learning activities on the crisis of COVID-19. Most dental institutions were modified their education and training practices to ensure the safety of residents, faculty, and staff; was rapidly transformed physical presence classes into online classes.

Anxiety (55.6%) were found faculty involving in teaching-learning activities only; probably this was the apprehension about unfamiliar new online learning technical tool used, the pressure to keep up with guideline or ensure the continuity and quality of dental education [31, 40]. Soon, educators have identified many barriers to online learning in medical education [58, 59]. The educators faced a challenge to ensure students the teaching, skill and competency. Later, the educator has implemented social distancing and safety measures (PPEs) in laboratories, exam and clinical areas to deliver teaching on clinical and practical skills [60].

Limitations of this study include its cross-sectional design with a short time interval. A low response rate (29.77%) is a serious issue for researchers to conduct an online survey which may be explained by the short duration of study sampling (2 weeks) or willingness, and harshness amongst professionals. Also, selection bias and sampling error may have occurred, as participants were approached using social media, dedicated mailing lists, and forums. Nevertheless, the sample size may be considered to be small, hence the long-term impact on DOHCWs is worth further investigation with an adequate sample size.

5. Conclusions:

The experience and results of this study show that Nepalese oral and dental health care workers are facing widespread impact on their personal, professional and academic life. They are more concern about the financial burden and worries about an uncertain future.

6. Recommendation:

It is noteworthy that oral health has not received adequate attention from the government despite its high burden. This further increases due to the COVID-19 pandemic [meng Brian Z et al, 2020]. To maintain global standards of oral health care, the WHO standard precaution of infection control and prevention is the benchmark criteria for all dental practices. Presently, DOHCWs in Nepal are working under moderate to extreme pressure amidst limited resources and barriers (policy, regulatory, workforce, and reimbursement). As an oral health care researcher, I need to highlight the role that DOHCWs play in society in oral health care (an important component of health and overall well-being) as well as emergency surgical management, and this must be recognised and addressed by the relevant authorities.

Following recommendations are suggested based on the finding of this study. Firstly, psychological mitigation on dental clinicians should be the focus on to reduce its unfavourable impact not only on their well-being but also on the oral health system at large. Secondly, oral health awareness program, as well as reduction of stigma in public, should be prioritised through the mobilization of mass media and community engagement strategies. Awareness programs should be conducted in public to follow the COVID-19 safety precaution while visiting the dental service centre. Thirdly, there should be a favourable work environment for DOHCWs with a good support system, adequate availability of PPEs and other personal hygiene products, proper training of clinicians about infection prevention and control, focus on incentives that boost their work morale. It is necessary to provide educational interventions for clearing doubts of dentists about COVID-19 and provide adequate logistic support to increase protection. Fourthly, the segment on the economic impact of COVID-19 is still under development as the full extent of the impact is yet to be known; however, the venerable practitioner should be identified and financial support might be required, especially economic aid or loan in accordance with the losses incurred by the sector. Finally, the use of technology should be encouraged in dental education as well as clinical setting. 7.

7. Abbreviations

APGs- Aerosol-generating procedures; COVID-19- COrona Virus Disease-19; CDC- Centers for Disease Control and Prevention; DOHCWs- Dental and oral health care workers; HCWs-Health care workers; PPEs- Personal protective equipments; SARS CoV - Severe Acute Respiratory Syndrome CoronaVirus; WHO- World health organisation,

Declarations

Ethics approval and consent to participate: This study was approved by the ethical review board (ERB) of the Nepal health research council (NHRC) (Reg 445/2020P/ Ref No 2710) before the initiation of this study. Participation in the survey was implied by providing informed consent. Eligible DOHCWs' participation in this survey was voluntary and was not compensated.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that there is no conflict of interest regarding the publication of this article.

Funding: None

Authors' contributions: SPD involved in designing the study, collection and interpretation of the data and drafting of the manuscript, table. DB did the statistical analysis. All authors read and approved the final manuscript.

Acknowledgements: I wish to thank all the participants who responded to the survey invitation. I especially thanks Dr Sajan Thakur, Dr Prenit Pokhrel, Dr Kaushal Singh, who help and support this study to collect data's.

References

1. Coulthard P. Dentistry and coronavirus (COVID-19) - moral decision-making. *Br Dent J*. 2020 Apr;228(7):503–505. doi: 10.1038/s41415-020-1482-1. PMID: 32277203.
2. Lai X, Wang M, Qin C, Tan L, Ran L, Chen D, Zhang H, Shang K, Xia C, Wang S, Xu S, Wang W. Coronavirus Disease 2019 (COVID-2019) Infection Among Health Care Workers and Implications for Prevention Measures in a Tertiary Hospital in Wuhan, China. *JAMA Netw Open*. 2020 May 1;3(5):e209666. doi: 10.1001/jamanetworkopen.2020.9666. PMID: 32437575; PMCID: PMC7243089.
3. World Health Organization. Report of the WHO – China Joint Mission on Coronavirus Disease 2019 (COVID-19). 2020. Available at <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf> (accessed March 2020).
4. Purcell LN, Charles AG. An invited commentary on World Health Organization declares global emergency: A review of the 2019 novel Coronavirus (COVID- 19): emergency or new reality? *Int J Surg* 2020;76(March):111, <http://dx.doi.org/10.1016/j.ijsu.2020.03.002>
5. World Health Organization. WHO announces COVID-19 outbreak a pandemic. World Health Organisation;2020. <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>. Accessed April 3, 2020.
6. Shah SGS, Farrow A. A commentary on "World Health Organization declares global emergency: A review of the 2019 novel Coronavirus (COVID-19)". *Int J Surg*. 2020 Apr;76:128–129. doi: 10.1016/j.ijsu.2020.03.001. Epub 2020 Mar 10. PMID: 32169574; PMCID: PMC7128929.
7. Russell B, Moss C, Rigg A, Hopkins C, Papa S, Van Hemelrijck M. Anosmia and ageusia are emerging as symptoms in patients with COVID-19: What does the current evidence say? *Ecancermedicalsecience*. 2020 Apr 3;14:ed98. doi: 10.3332/ecancer.2020.ed98. PMID: 32269598; PMCID: PMC7134577.
8. Galván Casas C, Català A, Carretero Hernández G, Rodríguez-Jiménez P, Fernández-Nieto D, Rodríguez-Villa Lario A, Navarro Fernández I, Ruiz-Villaverde R, Falkenhain-López D, Llamas Velasco M, García-Gavín J, Baniandrés O, González-Cruz C, Morillas-Lahuerta V, Cubiró X, Figueras Nart I, Selda-Enriquez G, Romaní J, Fustà-Novell X, Melian-Olivera A, Roncero Riesco M, Burgos-Blasco P, Sola Ortigosa J, Feito Rodriguez M, García-Doval I. Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases. *Br J Dermatol*. 2020 Jul;183(1):71–77. doi: 10.1111/bjd.19163. Epub 2020 Jun 10. PMID: 32348545; PMCID: PMC7267236.
9. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, Xia J, Yu T, Zhang X, Zhang L. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in

- Wuhan, China: a descriptive study. *Lancet*. 2020 Feb 15;395(10223):507–513. doi: 10.1016/S0140-6736(20)30211-7. Epub 2020 Jan 30. PMID: 32007143; PMCID: PMC7135076.
10. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, Spitters C, Ericson K, Wilkerson S, Tural A, Diaz G, Cohn A, Fox L, Patel A, Gerber SI, Kim L, Tong S, Lu X, Lindstrom S, Pallansch MA, Weldon WC, Biggs HM, Uyeki TM, Pillai SK; Washington State 2019-nCoV Case Investigation Team. First Case of 2019 Novel Coronavirus in the United States. *N Engl J Med*. 2020 Mar 5;382(10):929–936. doi: 10.1056/NEJMoa2001191. Epub 2020 Jan 31. PMID: 32004427; PMCID: PMC7092802.
 11. Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K., Lau, E., Wong, J. Y., Xing, X., Xiang, N., Wu, Y., Li, C., Chen, Q., Li, D., Liu, T., Zhao, J., Liu, M., Tu, W., ... Feng, Z. (2020). Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *The New England journal of medicine*, 382(13), 1199–1207. <https://doi.org/10.1056/NEJMoa2001316>
 12. Rothe, C., Schunk, M., Sothmann, P., Bretzel, G., Froeschl, G., Wallrauch, C., Zimmer, T., Thiel, V., Janke, C., Guggemos, W., Seilmaier, M., Drosten, C., Vollmar, P., Zwirgmaier, K., Zange, S., Wölfel, R., & Hoelscher, M. (2020). Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *The New England journal of medicine*, 382(10), 970–971. <https://doi.org/10.1056/NEJMc2001468>
 13. Centers for Disease Control and Prevention. CDC Recommendation: Postpone Non- Urgent Dental Procedures, Surgeries, and Visits. Available online: <https://www.cdc.gov/oralhealth/infectioncontrol/statement-COVID.html> (accessed on 27 March 2020).
 14. American Dental Association (ADA) (2020). American Dental Association Interim Guidance for Minimizing Risk of COVID-19 Transmission.
 15. Dave M, Seoudi N, Coulthard P. Urgent dental care for patients during the COVID-19 pandemic. *Lancet*. 2020 Apr 18;395(10232):1257. doi: 10.1016/S0140-6736(20)30806-0. Epub 2020 Apr 3. PMID: 32251619; PMCID: PMC7270877.
 16. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *J Dent Res*. 2020 May;99(5):481–487. doi: 10.1177/0022034520914246. Epub 2020 Mar 12. PMID: 32162995; PMCID: PMC7140973.
 17. Chamorro-Petronacci C, Martin Carreras-Presas C, Sanz-Marchena A, A Rodríguez-Fernández M, María Suárez-Quintanilla J, Rivas-Mundiña B, Suárez-Quintanilla J, Pérez-Sayáns M. Assessment of the Economic and Health-Care Impact of COVID-19 (SARS-CoV-2) on Public and Private Dental Surgeries in Spain: A Pilot Study. *Int J Environ Res Public Health*. 2020 Jul 17;17(14):5139. doi: 10.3390/ijerph17145139. PMID: 32708838; PMCID: PMC7400048.
 18. Wu KY, Wu DT, Nguyen TT, Tran SD. COVID-19's impact on private practice and academic dentistry in North America. *Oral Dis*. 2020 May 30;10.1111/odi.13444. doi: 10.1111/odi.13444. Epub ahead of print. PMID: 32472974; PMCID: PMC7300727.
 19. Guo H, Zhou Y, Liu X, Tan J. The impact of the COVID-19 epidemic on the utilization of emergency dental services. *J Dent Sci*. 2020 Dec;15(4):564–567. doi: 10.1016/j.jds.2020.02.002. Epub 2020 Mar 16. PMID: 32296495; PMCID: PMC7156222.

20. Passarelli PC, Rella E, Manicone PF, Garcia-Godoy F, D'Addona A. The impact of the COVID-19 infection in dentistry. *Exp Biol Med* (Maywood). 2020 Jun;245(11):940–944. doi: 10.1177/1535370220928905. Epub 2020 May 21. PMID: 32436748; PMCID: PMC7427177.
21. Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. Epidemiological Aspects and Psychological Reactions to COVID-19 of Dental Practitioners in the Northern Italy Districts of Modena and Reggio Emilia. *Int J Environ Res Public Health*. 2020 May 15;17(10):3459. doi: 10.3390/ijerph17103459. PMID: 32429193; PMCID: PMC7277877.
22. Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, Khurshid Z. Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak. *Int J Environ Res Public Health*. 2020 Apr 19;17(8):2821. doi: 10.3390/ijerph17082821. PMID: 32325888; PMCID: PMC7216192.
23. Lai THT, Tang EWH, Chau SKY, Fung KSC, Li KKW. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. *Graefes Arch Clin Exp Ophthalmol*. 2020 May;258(5):1049–1055. doi: 10.1007/s00417-020-04641-8. Epub 2020 Mar 3. PMID: 32124000; PMCID: PMC7087729.
24. Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. *Lancet*. 2020 Feb 22;395(10224):e39. doi: 10.1016/S0140-6736(20)30313-5. Epub 2020 Feb 6. PMID: 32035510; PMCID: PMC7133551.
25. Li Y, Ren B, Peng X, Hu T, Li J, Gong T, Tang B, Xu X, Zhou X. Saliva is a non-negligible factor in the spread of COVID-19. *Mol Oral Microbiol*. 2020 Aug;35(4):141–145. doi: 10.1111/omi.12289. Epub 2020 May 31. PMID: 32367576; PMCID: PMC7267240.
26. Volgenant CMC, de Soet JJ. Cross-transmission in the Dental Office: Does This Make You Ill? *Curr Oral Health Rep*. 2018;5(4):221–228. doi: 10.1007/s40496-018-0201-3. Epub 2018 Oct 25. PMID: 30524929; PMCID: PMC6244620.
27. World Health Organization. Critical preparedness, readiness, and response actions for COVID–19. Available from: <https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19>. [Last accessed on 2020 Jun 24].
28. World Health Organization. Attacks on health care in the context of COVID-19, 30 July 2020. <https://www.who.int/news-room/feature-stories/detail/attacks-on-health-care-in-the-context-of-covid-19>. Accessed 23 Nov 2020.
29. Shrestha RM, Shrestha SS, Kunwar N. Dentists in Nepal: A Situation Analysis. *J Nepal Health Res Counc*. 2017 Sep 8;15(2):187–192. doi: 10.3126/jnhrc.v15i2.18199. PMID: 29016593.
30. Humagain M et al. Dental Practice during COVID-19 in Nepal: A Descriptive Cross-sectional Study *JNMA J Nepal Med Assoc*. 2020 Sep;58(230):764–769 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7654486/pdf/JNMA-58-230-764.pdf>
31. Iyer P, Aziz K, Ojcius DM. Impact of COVID-19 on dental education in the United States. *J Dent Educ*. 2020 Jun;84(6):718–722. doi: 10.1002/jdd.12163. Epub 2020 Apr 27. PMID: 32342516.

32. Deery C. The COVID-19 pandemic: implications for dental education. *Evid Based Dent.* 2020 Jun;21(2):46–47. doi: 10.1038/s41432-020-0089-3. PMID: 32591653; PMCID: PMC7317244.
33. Desai BK. Clinical implications of the COVID-19 pandemic on dental education. *J Dent Educ.* 2020 May;84(5):512. doi: 10.1002/jdd.12162. Epub 2020 Apr 26. PMID: 32335909; PMCID: PMC7267231.
34. Izzetti R, Nisi M, Gabriele M, Graziani F. COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy. *J Dent Res.* 2020 Aug;99(9):1030–1038. doi: 10.1177/0022034520920580. Epub 2020 Apr 17. PMID: 32302257.
35. Kampf, G., Todt, D., Pfaender, S., & Steinmann, E. (2020). Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *The Journal of hospital infection*, 104(3), 246–251. <https://doi.org/10.1016/j.jhin.2020.01.022>.
36. Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hosp Infect.* 2016 Mar;92(3):235–50. doi: 10.1016/j.jhin.2015.08.027. Epub 2015 Oct 3. PMID: 26597631; PMCID: PMC7114921.
37. Chinazzi M, Davis JT, Ajelli M, Gioannini C, Litvinova M, Merler S, et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. NY: Science (New York; 2020.
38. Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. *Lancet* 2020;395:514–23.
39. Ran L, Chen X, Wang Y, Wu W, Zhang L, Tan X. Risk Factors of Healthcare Workers with Corona Virus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America* 2020
40. Theoret C, Ming X. Our education, our concerns: The impact on medical student education of COVID-19. *Med Educ.* 2020 Jul;54(7):591–592. doi: 10.1111/medu.14181. Epub 2020 May 23. PMID: 32310318; PMCID: PMC7264564.
41. Von Elm, E.; Altman, D.G.; Egger, M.; Pocock, S.J.; Gøtzsche, P.C.; Vandenbroucke, J.P. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *J. Clin. Epidemiol.* 2008, 61, 344–349. [CrossRef] [PubMed]
42. Regmi PR, Waithaka E, Paudyal A, Simkhada P, van Teijlingen E. Guide to the design and application of online questionnaire surveys. *Nepal J Epidemiol.* 2016 Dec 31;6(4):640–644. doi: 10.3126/nje.v6i4.17258. PMID: 28804676; PMCID: PMC5506389.
43. Nepal dental association, 2020. Interim guidance for dental practices during covid 19 global emergency in Nepal. <https://nda.org.np/pdf/InterimDentalGuidelines.pdf>
44. National Health Commission of China, 2020. Guidelines for psychological assistance hotlines during 2019-nCoV Pneumonia epidemic (in Chinese). <http://www.nhc.gov.cn/jkj/s3577/202002/f389f20cc1174b21b981ea2919beb8b0.shtml>.

45. World Health Organization. (2020). Protocol for assessment of potential risk factors for coronavirus disease 2019 (COVID-19) among health workers in a health care setting, 23 March 2020, version 2.2. World Health Organization. <https://apps.who.int/iris/handle/10665/332071>. License: CC BY-NC-SA 3.0 IGO
46. Khan S, Khan M, Maqsood K, Hussain T, Noor-Ul-Huda, Zee-shan M. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey [published online April 1, 2020]. *J Med Virol*. doi:10.1002/jmv.25814
47. Seah, I., Su, X., & Lingam, G. (2020). Revisiting the dangers of the coronavirus in the ophthalmology practice. *Eye (London, England)*, 34(7), 1155–1157. <https://doi.org/10.1038/s41433-020-0790-7>
48. Zhu, H., Wang, L., Fang, C., Peng, S., Zhang, L., Chang, G., Xia, S., & Zhou, W. (2020). Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Translational pediatrics*, 9(1), 51–60. <https://doi.org/10.21037/tp.2020.02.06>
49. Volgenant CMC, Persoon IF, de Ruijter RAG, de Soet JJH. Infection control in dental health care during and after the SARS-CoV-2 outbreak. *Oral Dis*. 2020 May 11;10.1111/odi.13408. doi: 10.1111/odi.13408. Epub ahead of print. PMID: 32391651; PMCID: PMC7272817.
50. Chan-Yeung M. Severe acute respiratory syndrome (SARS) and healthcare workers. *Int J Occup Environ Health*. 2004 Oct-Dec;10(4):421-7. doi: 10.1179/oeh.2004.10.4.421. PMID: 15702757.
51. Nasta AM, Goel R, Kanagavel M, Easwaramoorthy S. Impact of COVID-19 on General Surgical Practice in India. *Indian J Surg*. 2020 Jun 26;1–5. doi: 10.1007/s12262-020-02443-0. Epub ahead of print. PMID: 32837079; PMCID: PMC7319195.
52. Chamorro-Petronacci C, Martin Carreras-Presas C, Sanz-Marchena A, Rodríguez-Fernández M, María Suárez-Quintanilla J, Rivas-Mundiña B, Suárez-Quintanilla J, Pérez-Sayáns M. Assessment of the Economic and Health-Care Impact of COVID-19 (SARS-CoV-2) on Public and Private Dental Surgeries in Spain: A Pilot Study. *Int J Environ Res Public Health*. 2020 Jul 17;17(14):5139. doi: 10.3390/ijerph17145139. PMID: 32708838; PMCID: PMC7400048.
53. Kamate SK, Sharma S, Thakar S, Srivastava D, Sengupta K, Hadi AJ, Chaudhary A, Joshi R, Dhanker K. Assessing Knowledge, Attitudes and Practices of dental practitioners regarding the COVID-19 pandemic: A multinational study. *Dent Med Probl*. 2020 Jan-Mar;57(1):11–17. doi: 10.17219/dmp/119743. PMID: 32307930.
54. Sah MK, Singh A, Sangroula RK. Knowledge of novel coronavirus disease (COVID-19) among dental surgeons of Nepal: a nationwide study. *BMC Infect Dis*. 2020 Nov 23;20(1):871. doi: 10.1186/s12879-020-05620-4. PMID: 33225910; PMCID: PMC7681182.
55. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PLoS One*. 2012;7(4):e35797. doi: 10.1371/journal.pone.0035797. Epub 2012 Apr 26. PMID: 22563403; PMCID: PMC3338532.
56. van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO, de Wit E, Munster VJ. Aerosol and Surface

- Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med*. 2020 Apr 16;382(16):1564–1567. doi: 10.1056/NEJMc2004973. Epub 2020 Mar 17. PMID: 32182409; PMCID: PMC7121658.
57. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020 Feb 24 [online ahead of print].
58. O'Doherty D, Dromey M, Loughheed J, Hannigan A, Last J, McGrath D. Barriers and solutions to online learning in medical education - an integrative review. *BMC Med Educ*. 2018 Jun 7;18(1):130. doi: 10.1186/s12909-018-1240-0. PMID: 29880045; PMCID: PMC5992716.
59. Kampf G, Brüggemann Y, Kaba HEJ, Steinmann J, Pfaender S, Scheithauer S, Steinmann E. Potential sources, modes of transmission and effectiveness of prevention measures against SARS-CoV-2. *J Hosp Infect*. 2020 Dec;106(4):678–697. doi: 10.1016/j.jhin.2020.09.022. Epub 2020 Sep 18. PMID: 32956786; PMCID: PMC7500278.
60. Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. *Med Educ Online*. 2020 Dec;25(1):1764740. doi: 10.1080/10872981.2020.1764740. PMID: 32400298; PMCID: PMC7269089.

Tables

Table 1

Survey questionnaire composed of 23 questions that include all the study variables and number of responses with percentage to investigate an impact of COVID-19 pandemic on DOHCWs.

Questions (Characters)	Keys (Categories)	No of respondents (%)
1. Are you a dental clinician? (Mark only one oval)	Yes	136 (100)
	No	0
3. Are you agree to participate in this survey? (Mark only one oval)	Yes	133
	No	3
5. Your Age (in years) (Mark only one oval)	20–29	69 (51.9)
	30–39	48 (36.1)
	≥ 40	16 (12.0)
8. Your Gender (Mark only one oval)	Male	82 (61.7)
	Female	51 (38.3)
	Others	0
11. Co-morbidities (Check all that apply.) Yes, then	None	123 (92.5)
	Yes	10 (7.5)
	Hypertension	4 (3.0)
	Diabetes mellitus	3 (2.3)
	Asthma/COPD	4(3.0)
	Chronic heart disease	0
	Stroke	0
	Substance/drug use	0
	Chronic pain	0
	Pre-existing psychiatric illness	0
	Others	2 (1.3)
22. Categorize your oral health service center (Mark only one oval)	University / Medical / Dental teaching college	59 (44.4)
	Private Dental hospital	16 (12.0)
	Government hospital	24 (18.0)

Questions (Characters)	Keys (Categories)	No of respondents (%)
	Private Dental clinic	34 (25.6)
26. Your working place (City/Town)		
27. Your work province (Mark only one oval)	Province 1	27 (20.3)
	Province 2	37 (27.8)
	Bagmati	53 (39.8)
	Gandaki	2 (1.5)
	Lumbini	9 (6.8)
	Karnali	1 (0.8)
	Sudurpashim	4 (3.0)
34. Your Marital status (Mark only one oval)	Single	70 (52.6)
	Married and living with spouse	58 (46.6)
	Married and staying away from the spouse	4 (3.0)
	Widowed	1 (0.8)
	Separated	0
39. Your Work Position (Mark only one oval)	Junior Resident	22 (16.5)
	Senior Resident	2 (1.5)
	Faculty Member	27 (20.3)
	Dental surgeon	79 (59.4)
	Dental Nurse	0
	Dental hygienist	0
	Dental chair side assistant	0
	Technician	0
	Clerical staff	0
	Administrator	0
	Security Staff	0
	Sanitation worker	3 (2.3)

Questions (Characters)	Keys (Categories)	No of respondents (%)
	Maintenance worker	0
	Driver	0
	Other (please specify)	0
54. Place of current work profile (Mark only one oval)	Working in routine duties on crisis of COVID-19	80 (60.2)
	Currently do not working on patients	44 (33.1)
	Involved in teaching learning activities only	9 (6.8)
	On special duties involved in Sampling of COVID-19 patients.	0
	Involved in cleaning and sanitation	
	On special COVID-19 duties-contact tracing.	0
60. Weekly average working time (in hours)	Any other job; please specify	0
	Less than 20	64 (48.2)
	20–30	45 (33.8)
	30–40	10 (7.5)
61. Have you been contacted or treated to confirmed COVID-19 patient? (Mark only one oval)	More than 40	14 (10.5)
	Yes	4 (3.0)
	No	108 (81.2)
64. Date of first exposure:	Not Known	21(15.7)
	Date (DD/MM/YYYY): __/__/____	
65. Have you been quarantined during this period of COVID-19? (Mark only one oval)	Yes	19 (14.3)
	No	114 (85.7)
67. If yes, then please mention the date of starting of quarantine?	Date (DD/MM/YYYY): __/__/____	
68. Have you experienced any of the following	Fever	8(6.0)

Questions (Characters) symptoms in the last 2 weeks? Rate on the basis graphic rating scale 0 to 4 (Mark only one oval per row.)	Keys (Categories)	No of respondents (%)
	Dry cough and difficulty breathing	20(15.0)
	Tiredness	66(49.6)
	Flu like symptoms ie nasal congestion, headache, conjunctivitis	37(27.8)
	Sore throat	37(27.8)
	Digestive symptoms; Diarrhea	25(18.8)
	Anosmia ie loss of taste or smell	10(7.7)
	A rash on skin or discoloration of fingers or toes	9(6.8)
76. Due to COVID-19, How would you categorize your current practice? (Mark only one oval)	Closing dental practices / stay home	24(18.0)
	Selective or less procedure than before	98(73.7)
	More work load than before	2(1.5)
	Telemedicine or online consultation	9(6.8)
80. What could be reasons for the change of practices? (Check all that apply.)	Psychological disturbance	26(19.5)
	Lock-down	46(34.6)
	Follow government order/guideline	60(45.1)
	Unavailability of DOCHWs	7(5.3)
	Lack of PPE	42(31.6)
	Others	2(1.5)
86. How is your family reacting to your being on duty? (Mark only one oval per row.)	My family is happy for me being on duty	72(54.1)
	My family is worried about me getting ill	114(87.2)

Questions (Characters)	Keys (Categories)	No of respondents (%)
	My family is worried about me getting the infection	113(86.5)
89. Since the beginning of the pandemic, how would you evaluate your preparedness to combat it especially necessary personal safety measures and supply provided by health service the administrative agencies? (Mark only one oval per row.)	Availability of sanitizers/ hand wash	98(73.6)
	Availability of Masks (N95)	67(50.4)
	Availability of Masks other than N95	70(52.6)
	Availability of PPEs	54(40.6)
	Facial mucosa protection (face shield, eye visor, goggles)	66(49.7)
	Cleaning of the area	78(58.7)
	Transport	59(44.3)
	Food	66(49.6)
	Provision of testing	50(37.6)
	Provision of quarantine, in case you are infected	47(35.4)
22. During clinical activity, which measures do you use to prevent COVID-19 infection? (Check all that apply.)	Telephone screening to exclude COVID-19 related symptoms	120(90.2)
	Identify possible critical cases	118 (88.7)
	Reduction of number of patients in the waiting room	121(90.9)
	Body temperature measurement	105(78.9)
	Environment aeration/ Environment sanitation	81(60.9)
	Disinfectant agents and surgical mask supply to all patients while waiting in waiting room	107(80.4)

Questions (Characters)	Keys (Categories)	No of respondents (%)
<p>23. How do you follow the guideline for COVID-19 pandemic? Select the dental conditions or diseases in five treatment options has been suggested (listed below).</p> <p>(Mark only one oval per row.)</p>	Use of PPEs (Respirator masks, disposable gowns, double layered gloves, etc.)	87 (65.4)
	Reduction of AGPs	94(70.6)
	Emergency operation/procedure	1007 (22.4)
	Urgent conditions that can be managed with minimally invasive procedures and without aerosol generation	1090 (24.8)
	Urgent conditions that need to be managed with invasive and/ or aerosol-generating procedures	655 (14.8)
	Non-urgent – Mitigation	985(21.8)
	Elective – propounded	719(16.2)

Table 2

Personal impact of DOHCWs; exposure rate, symptoms, family reaction, psychological distress in DOHCWs working in different place.

	No. (%)				P-value
	Place of current work				
Characteristics DOCHWs responded	Total	Working in routine duties on COVID-19 crisis	Currently do not working on patients	Involved in teaching learning activities only	
Quarantined					
No	114(85.7)	71(62.3)	34(29.8)	9(7.9)	0.09
Yes	19(14.3)	9(47.4)	10(52.6)	0(0.0)	
COVID-19 Symptoms Developed					
Fever	8(6.0)	6(75.0)	2(25.0)	0(0.0)	0.59
Dry cough and difficulty breathing	20(15.0)	10(50.0)	9(45.0)	1(5.0)	0.46
Tiredness	66(49.6)	36(54.5)	27(40.9)	3(4.5)	0.13
Flu like symptoms ie nasal congestion, headache, conjunctivitis	37(27.8)	13(44.8)	12(41.4)	4(13.8)	0.08
Sore throat	37(27.8)	27(73.0)	9(24.3)	1(2.7)	0.14
Digestive symptoms; Diarrhea	25(18.8)	11(44.0)	12(48.0)	2(8.0)	0.17
Anosmia ie loss of taste or smell	10(7.7)	7(70.0)	1(10.0)	2(20.0)	0.09
A rash on skin or discoloration of fingers or toes	9(6.8)	5(55.6)	3(33.3)	1(11.1)	0.85
Family reacting to be on Duty					
Happy for me being on duty	72(54.1)	45(62.5)	22(30.6)	5(6.9)	0.79

	No. (%)				P-value
	Place of current work				
Characteristics DOCHWs responded	Total	Working in routine duties on COVID-19 crisis	Currently do not working on patients	Involved in teaching learning activities only	
Worried about getting ill myself	114(87.2)	74(63.8)	35(30.2)	7(6.0)	0.08
Worried about getting the infection at home	113(86.5)	68(59.1)	38(33.0)	9(7.8)	0.45
Psychological distress					
Depression	29(21.9)	13(16.25)	14(31.18)	2(22.22)	0.52
Anxiety	32(24.2)	15(18.75)	12(27.27)	5(55.55)	0.18
Stress	11(8.4)	5(6.25)	5(11.36)	1(11.11)	0.73
Total					

Table 3

Evaluation logistic support from the administrative agency of oral health service provider to the DOHCWs.

Particulars	Frequency of responses (%)				
	University / Medical / Dental teaching college	Private Dental hospital	Government hospital	Private Dental clinic	P-value
Logistic support provided by administrative agencies					
Availability of Sanitizers/ hand wash	44 (44.9)	14(14.3)	14(14.3)	26(26.5)	0.19
Availability of N-95 Masks	30(44.8)	12(17.9)	8 (11.9)	17 (25.4)	0.08
Availability of Masks other than N95, N99	29 (41.4)	12 (17.1)	8 (11.4)	21 (30.0)	0.04
Availability of PPEs	24 (44.4)	10 (18.5)	5 (9.3)	15 (27.8)	0.06
Facial mucosa protection (face shield, eye visor, goggles)	27 (40.9)	10 (15.2)	8 (12.1)	21 (31.8)	0.11
Facility of cleaning area	31 (39.7)	12 (15.4)	9 (11.5)	26 (33.3)	0.01
Transports	27 (45.8)	10 (16.9)	8 (13.6)	14 (23.7)	0.32
Food	28 (42.4)	8 (12.1)	13 (19.7)	17 (25.8)	0.95
Provision of testing	23 (46.0)	8 (16.0)	10 (20.0)	9 (18.0)	0.38
Provision of quarantine, in case you are infected	24 (51.1)	5 (10.6)	10 (21.3)	8 (17.0)	0.34
Categorization of current practice					

P = 0.05 is significant

Particulars	Frequency of responses (%)				
	University / Medical / Dental teaching college	Private Dental hospital	Government hospital	Private Dental clinic	P-value
Closing dental practices / stay home	13 (54.2)	3 (12.5)	1 (4.2)	7 (29.2)	0.20
Selective or less procedure than before	37 (37.8)	13 (13.3)	22 (22.4)	26 (26.5)	
More work load than before	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Telemedicine or online consultation	7 (77.8)	0 (0.0)	1 (11.1)	1 (11.1)	
Reasons for the change of practices					
Psychological disturbance	54 (50.5)	10 (9.3)	19 (17.8)	24 (22.4)	0.02
Less patients/ lock-down	44 (50.6)	7 (8.0)	17 (19.5)	19 (21.8)	0.06
Strict to government order/guideline	28 (38.4)	14 (19.2)	10 (13.7)	21 (28.8)	0.01
Clinician scarcity	56 (44.4)	16 (12.7)	22 (17.5)	32 (25.4)	0.71
Lack of PPE	38 (41.8)	13 (14.3)	15 (16.5)	25 (27.5)	0.48
Others	58 (44.3)	15 (11.5)	24 (18.3)	34 (26.0)	0.34
Total					
P = 0.05 is significant					

Table 4
measures do you use to prevent COVID-19 infection

Particulars	Frequency of responses (%)				
	University / Medical / Dental teaching college	Private Dental hospital	Government hospital	Private Dental clinic	P- value
During clinical activities					
Telephone screening to exclude COVID-19 related symptoms	55 (45.8)	13 (10.8)	21 (17.5)	31 (25.8)	0.51
Identify possible critical cases	53 (44.9)	13 (11.0)	20 (16.9)	32 (27.1)	0.44
Reduction of number of patients in the waiting room	54 (44.6)	15 (12.4)	20 (16.5)	32 (26.4)	0.51
Body temperature measurement	50 (47.6)	15 (14.3)	17 (16.2)	23 (21.9)	0.07
Environment aeration and Environment sanitation	39 (48.1)	14 (17.3)	14 (17.3)	14 (17.3)	0.01
Disinfectant agents and surgical mask supply to all patients while \waiting in waiting room	47 (43.9)	14 (13.1)	21 (19.6)	25 (23.4)	0.50
Use of PPEs (Respirator masks, disposable gowns, double layered gloves, etc.)	39 (44.8)	11 (12.6)	16 (18.4)	21 (24.1)	0.95
<i>P = 0.05 is significant</i>					

Particulars	Frequency of responses (%)				
	University / Medical / Dental teaching college	Private Dental hospital	Government hospital	Private Dental clinic	P- value
Reduction of AGPs	42 (44.7)	12 (12.8)	16 (17.0)	24 (25.5)	0.95
Others	58 (44.3)	15 (11.5)	24 (18.3)	34 (26.0)	0.34
Total					
<i>P = 0.05 is significant</i>					