

## Scientific Research Report

The Presence of Women in the Dental Profession:  
A Global Survey

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## ARTICLE INFO

## Article history:

Received 3 April 2023

Received in revised form

18 July 2023

Accepted 20 July 2023

Available online 24 September 2023

## Key words:

Dentistry

Difference

Female dentist

Gender

Global oral health

Women dentists

## ABSTRACT

**Objectives:** The aim of this research was to acquire knowledge about the female dental workforce, identifying factors to pursue specialty training and career choices and working in dental institutions/associations.

**Methods:** An original online questionnaire was developed, validated (n = 22), and sent to 189 member associations in 133 countries of the Women Dentists Worldwide section of the FDI World Dental Federation.

**Results:** In all, 3232 female dentists from 81 countries participated. Results were divided into 5 geographic areas by continent. Difference in proportion amongst questionnaire items was evaluated with  $\chi^2$  test or Fisher exact test. Ordinal multinomial linear regression analysis was performed to evaluate the association of questionnaire items with total work experience in dentistry (in years), motivation to study dentistry, type of specialisation, working hours per week, perception of female dentists about working hours, sex-based inequalities, job security after maternity leaves, as well as involvement in political organisations within their country of residence and their role in dental associations. A majority of participating female dentists are self-employed (57.7%), and 60.0% have 10 to 30 years of experience. The most popular form of practice is the single private practice (29.7%), followed by the group private practice (28.8%). Further, 44.8% work 31 to 40 h/wk, 29.1% part-time up to 30 h/wk, and 26.0% more than 40 h/wk.

**Conclusions:** Women are still poorly represented in professional organisations, and few are officers in representative assemblies, members of the board, or president. Family life with children influences perceptions and has an impact on professional life, especially in academia and political/professional associations, so that taking on leadership positions poses additional challenges.

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<https://doi.org/10.1016/j.identj.2023.07.010>

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## Introduction

As in several health care professions, dentistry has been dominated by male representatives; recently, this trend has changed due to an increasing number of women being admitted to dental schools.<sup>1,2</sup>

The treatment of oral and other noncommunicable diseases places an enormous economic burden on health care systems worldwide.<sup>3-6</sup> In Europe, for example, 5 different health care systems can be distinguished.<sup>4</sup> In most countries, the dental health system is on a private basis; however, even in the European union with 27 countries oral health care is organised independently and subsidiarily by nation-states.<sup>4</sup> Currently, women make up between 48% and 75% of the dentist workforce<sup>7</sup>; proportions of male and female graduates are near the same in several world areas (ie, North America, Europe), whilst in other areas the gender gap has narrowed but is still present (ie, Oceania, Asia, Africa).<sup>7,8</sup> However, the number of females in leading positions is significantly lower than male representatives; for example, in the US, women hold only as little as 18% of dental school dean positions and are 14% of division chiefs and department chairs.<sup>9</sup>

Female general dental practitioners are significantly less likely to have their own practice and/or become a partner in one as well as to be consultants in hospital dental settings.<sup>10</sup> Female dentists are less likely to pursue postgraduate qualifications, and the average annual income of full-time self-employed women was 37% lower than the income of full-time self-employed men, which demonstrates the persistence of the gender-based wage gap.<sup>11</sup> Usually, women take on additional responsibilities in the family, and male dentists take higher positions in academic institutions and dental organisations.<sup>12</sup> Discrepancies of rights and policy statements in pregnancy, maternity leave, continued payment of wages, taxes, and pensions exist not only between employees and the self-employed, but also in international comparisons of nation-states.<sup>13</sup> Worldwide differences in maternity leave and a lack of uniformity in parental leave policies are present, and negative effects of parenthood on well-being and work are more prevalent amongst female dentists than amongst male dentists.<sup>14,15</sup> The FDI Section Women Dentists Worldwide (WDW)<sup>16</sup> of the FDI World Dental Federation is responsible for coordinating the activities of national member associations, gathering information about women dentists and their practices, and promoting them. The Section is also committed to reaching out and facilitating contacts between women dentists worldwide to eliminate existing inequalities and to promote the full participation of women in all aspects of the dental profession.<sup>16</sup>

To try to bridge the gap on the presence of women in the dental profession, an international survey in collaboration with the FDI WDW Section on the presence of women in the profession was designed. The goals were to (1) gain knowledge about the female dental workforce and (2) establish information about specialty training, working in dental institutions, members and leaders of dental associations, general assemblies, and dental faculties.

## Material and methods

### Working group and questionnaire building-up

A working group was formed to generate information on the role of women in dentistry globally. This group consisted of female dentists from the FDI Section WDW of the FDI World Dental Federation<sup>17</sup> and researchers from the University of Bern (Switzerland). The structured closed cross-sectional survey was developed with a modified Delphi-method based on similar questionnaires from the literature<sup>18-21</sup> and experience of former congresses and knowledge and experience of the expert group, following the Stehr-Green scale.<sup>22</sup> The survey was carried out by administering an online self-administered questionnaire in the English language only. The online form contained a brief leaflet stating the aims of the survey and was accessible via a link; the different national dental associations of the member states of FDI World Dental Federation contacted the participants by email. All participants must read and accept an informed consent before completing the survey. The survey consisted of 55 items in a single screen. A completeness check, nonresponse options such as "not applicable," and a back button before completion of the survey were available. The link with the questionnaire could be answered directly on a PC, notebook, mobile phone, or other devices. All information was provided voluntarily, anonymously, and without compensation from all study participants. The Research Electronic Data Capture (REDCap) survey link was available online from December 22, 2020, to May 18, 2021. All procedures were in accordance with the ethical standards of the local research committee and with the 1964 Helsinki declaration and its later amendments. According to Swiss law on human research (810.30 Humanforschungsgesetz, HFG), ethics committee approval to collect and analyse anonymous data is not required.

The questionnaire was structured into three domains: (1) personal data: age, country of residence, country of graduation, and area of living and working; (2) working status: total work experience in dentistry (in years), motivation to study dentistry, type of specialisation, and working hours per week; (3) perception of the role of women in dentistry: working hours, sex inequalities, job security after maternity leaves as well as involvement in political organisations within their country of residence and their role in national dental associations. The study follows the CHERRIES guidelines<sup>23</sup> (Supplementary file 1).

### Data collection

Data were gathered and managed using REDCap tools hosted at the University of Bern.<sup>24,25</sup> REDCap is a secure, web-based software platform designed to support data capture for research studies, to providing an intuitive interface, audit trails for tracking data manipulation, and automated export procedures for seamless data downloads to common statistical packages.

## Data analysis

Data were exported to an Excel (Microsoft Corporation) spreadsheet, quality-checked to ensure accuracy, and then transferred to STATA17.0™ (StataCorp LLC) for statistical analysis. Absolute and relative frequencies were calculated for each item. Difference in proportion was evaluated with the  $\chi^2$  test or the Fisher exact test if one cell had a value of less than 5. Multiple testing for post hoc estimation was calculated, such as the number of observed frequencies, expected frequencies, percentage, and contribution to the Chi-square. Some items were constructed using a Likert scale. A multinomial logistic regression model was run, using as dependent variables country of residence, country of graduation, total work experience in dentistry (in years), motivation to study dentistry, type of specialisation, and working hours per week. Questionnaires with fewer than 5 answered questions were removed from the dataset and not used for the survey. The significance level was set at  $P < .05$ .

## Compliance with ethical standards

The study on human participants was in accordance with local legislation and institutional requirements. For this type of study, there is no need for requiring a formal approval by the local ethics committee because the collection and processing of participants' data for the study were under irreversibly anonymised conditions. This procedure agrees with the Swiss Human Research Act (810.30 Federal Law on Research Involving Human Subjects, Human Research Act). This study has been proceeded in accordance with the 1964 Declaration of Helsinki and its subsequent amendments and the ethical standards of the local research commission.

## Informed consent

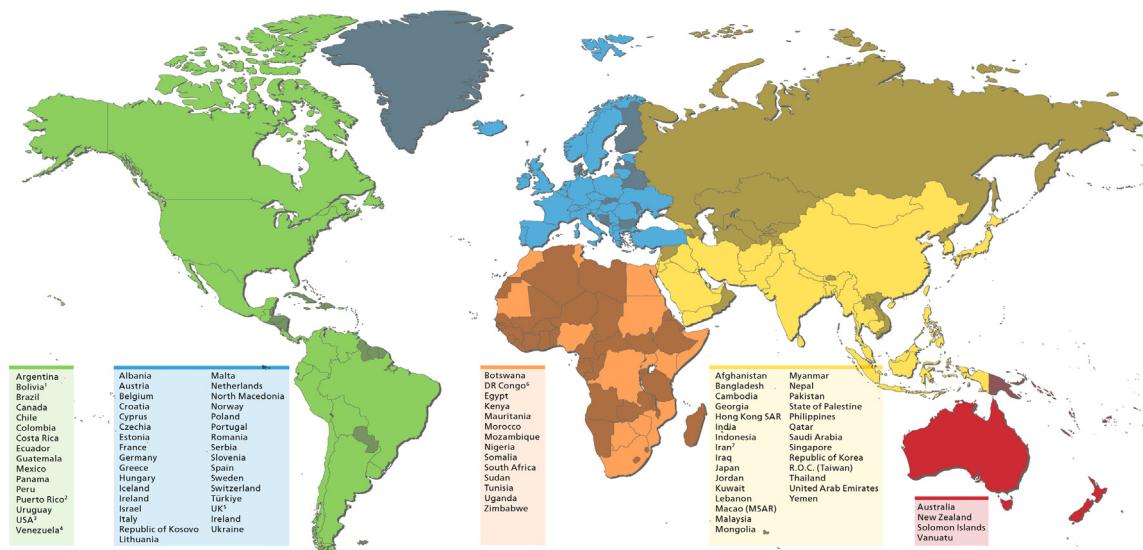
All participants were adults and an informed consent for the processing of their data was obtained by accessing the online survey.

## Results

A total of 3339 questionnaires were filled out; 107 (3.2%) questionnaires with fewer than 5 answered questions were discharged, and 3232 questionnaires were evaluated from 96 countries. The participant's origin was indicated by geographic areas according to the continents is displayed in the Figure. The distribution of the sample across country of graduation was statistically significantly different according to nationality ( $\chi^2_{(10)} = 20.8$ ;  $P < .01$ ).

The relationship between country of residence and years of experience was statistically significant ( $P < .01$ ). In Europe as well as African countries and in North and South America and Oceania, most respondents had between 10 and 20 years of work experience. Participants from Asia reported between 20 and 30 years of work experience. Most respondents (44.6%) on all continents had no specialisation and worked as general dentists. The distribution of different specialisations was higher on the European and African continents. The proportion of specialised dentists was much lower in the Americas and Asia (Table 1).

The percentage of employed female dentists was 42.7%, whilst the percentage of self-employed female dentists was 57.7%. This shows that the majority of the participating female dentists run their own practice. Most of the respondents worked in a private solo practice (14.34%) or a group



**Fig – World map with the information on participating countries.**

The countries of Bolivia, Puerto Rico, USA, Venezuela, UK, and DR Congo have been abbreviated on the map due to lack of space. The correct designation according to the United Nations, where available, is: Bolivia (Plurinational State), Commonwealth of Puerto Rico, United States of America, United Kingdom of Great Britain and Northern Ireland, and Democratic Republic of Congo.

practice (13.9%). The African and Asian continents had a higher percentage of female dentists working in tertiary care than Europe and the Americas. Working hours were evenly distributed across all continents, with 44.5% working an average of between 30 and 40 h/wk. Only 21.8% of female dentists worked fewer than 30 h/wk, and 26.0% reported working more than 40 h/wk. Most participants live in large cities or larger urban areas, 23% live in small towns, and only less than 7% of female dentists reported living in a rural area/village (Table 2).

The participation of female dentists in national dental associations was generally low. Only 3.9% of female dentists are presidents of a national dental association, and only 10% of respondents on all continents are board members. One-fifth of participants are committee members, and 22.8% held other positions. More than 50% of the sample (56.1%) did not respond whether they participated in a political organisation in their country. Further, 23.3% of respondents participated in political organisations at the local level and 10.2% at the national level; 13.73% did not participate in political organisations (Table 3).

In the private sector, the percentage of women who felt confident about returning to work and those who did not was almost identical (51.6% and 48.8%, respectively). In the public sector, female dentists experienced considerably more security about resuming work after maternity leave (82.8%) than those who did not (17.2%; data not shown). Female dentist perception of working hours distribution by sex in their countries was that 19.1% do not think that male colleagues work less than women and 23.1% think that male and female dentists work the same amount of time. In their dental practice, almost half of the female participants think that male dentist work less, 24.5% the same number of hours, and only 14.1% think that female colleagues work more than their male counterparts (data not shown).

## Discussion

As the number of female dentists is increasing, this survey was created to assess knowledge about the female dental workforce worldwide by focusing on various characteristics and challenges to gain information on female dentists in different dental institutions (professional associations and dental organisations), participants and/or leaders of dental congresses, associations, as well as members of dental faculties. To acquire this information, a global online survey was designed and carried out.

More than half of participants have between 10 and 30 years of professional experience, and three-quarters have at least 10 years of professional experience. Participants in the Americas reported the most treatment focus (about two-thirds), with the fewest in Asia at one-quarter. No treatment focus (ie, no specialisation in individual disciplines; general dental practitioner) is indicated across all continents by slightly more than one-third of the participants. Self-employment is the preferred form of practice, except amongst African participants. The most common form of practice is individual private practice and/or group practice; the public sector and university/educational institutions are popular,

with just less than one-fifth each. Nearly half of all participants work between 31 and 40 hours per week, and a quarter each work more than 30 h/wk or between 16 and 30 h/wk. Most participants live in large urban areas. Few study participants are presidents of dental societies or board members, whilst nearly one-third are committee members. One-fifth are involved in local political associations, fewer at the national level. Whilst half of all study participants in the private sector feel confident about returning after maternity leave, more than three-quarters in the public sector do.

The number of dentists worldwide is increasing and unevenly distributed, with most of the approximately 1.6 million dentists working in Europe and the Americas and only 1% working in Africa.<sup>26,27</sup> The demographic change is observable in recent decades: Nowadays dental school admissions are predominantly female<sup>2,15,28,29</sup> as well as the gender distribution as in the FDI-ERO region.<sup>30</sup> Although few female dentists are active as presidents or board members or even in political organisations, participation in working groups as members or in leadership positions is also observable in academia, which would have been unthinkable a few decades ago.<sup>31</sup> However, women are underrepresented in dental science and research at 30% to 40% in Europe, Oceania, Asia, and Africa.<sup>7</sup>

Reasons for the underrepresentation of women in management positions in dentistry include societal and family pressures, lack of mentoring and leadership training opportunities, limited access to research funding, and gender inequalities.<sup>7</sup> Further advancement of interested and capable women should therefore continue to be supported to challenge as well as shape the future of dentistry in the various disciplines, in education, the profession, as well as health care.<sup>31</sup> The majority of female dentists do not choose a treatment focus (specialisation) and prefer to work as general dental practitioners, and a large number of female dentists usually opt for a specialisation in paediatric dentistry or orthodontics, whereas male dentists prefer oral and maxillofacial surgery. This gender-specific preference with regard to specialisation could already be determined during dental school.<sup>32</sup>

Inevitable changes in the practice of dentistry, such as a shift from a predominantly technical approach to communication- and understanding-oriented dentistry, prevention, and aesthetics, as well as an increase in the proportion of part-time employees due to the large number of working women with family responsibilities, would have to be considered when planning dental care in the future.<sup>33</sup> This supports the finding of the present study that whilst just under half of the study participants work 30 to 40 h/wk, confirming data from 2002 in England,<sup>34</sup> approximately 30% also work fewer than 30 h/wk, which is somewhat higher compared to the 29.1 hours per week reported by female dentists in New Zealand.<sup>35</sup> Whilst no direct gender comparison has been made, the literature indicates that the working hours of female and male dentists would not differ significantly if they do not have children.<sup>36</sup> The working hours of female dentists decrease significantly, or career breaks are also taken occasionally once a family is established, which is justified by the fact that child-rearing and family responsibilities have a great impact on women's working lives.<sup>35-37</sup> The gender of the dentist and the presence or even the age of children, in addition

**Table 1 – Distribution of sample according to years of experience in the profession/postgraduation specialisation and geographic areas of living.**

## (A) Years of experience in the profession

	<5 y No. (%)	5–9 y No. (%)	10–19 y No. (%)	20–29 y No. (%)	>30 y No. (%)	Total No. (%)
Europe	139 (13.4)	182 (17.6)	301 (29.0)	262 (25.3)	153 (14.7)	1037 (100.0)
Africa	25 (19.8)	30 (23.8)	46 (36.5)	14 (11.1)	11 (8.8)	126 (100.0)
Americas	117 (12.0)	158 (16.2)	283 (29.1)	202 (20.7)	214 (22.0)	974 (100.0)
Asia/Oceania	95 (10.0)	95 (10.0)	217 (22.8)	287 (30.2)	258 (28.0)	952 (100.0)
Total	376 (12.2)	465 (15.0)	852 (27.5)	765 (24.7)	637 (20.6)	3095 (100.0)

Nonresponders, n = 204 (6.2%),  $\chi^2 = 150.21$ ; P < .01.

## (B) Postgraduation specialisation

	Oral/MF surgeon No. (%)	Periodontist No. (%)	Paediatric No. (%)	Prosthodontist No. (%)	Endodontist No. (%)	Orthodontist No. (%)	Public health No. (%)	Other No. (%)	None No. (%)
Europe	80 (6.0)	126 (9.4)	161 (12.0)	113 (8.5)	150 (11.2)	166 (12.4)	42 (3.1)	94 (7.0)	405 (30.3)
Africa	13 (7.6)	12 (7.0)	12 (7.0)	15 (8.7)	19 (11.1)	25 (14.5)	14 (8.1)	11 (6.4)	51 (29.7)
Americas	11 (1.1)	45 (4.5)	118 (11.9)	26 (2.6)	23 (2.3)	42 (4.2)	37 (3.7)	44 (4.4)	645 (65.1)
Asia	66 (5.6)	73 (6.2)	129 (10.9)	69 (5.8)	79 (6.7)	264 (22.2)	101 (8.5)	114 (9.6)	292 (24.6)
Total	170 (4.6)	256 (6.2)	421 (11.4)	223 (6.0)	271 (7.4)	497 (13.5)	194 (5.3)	264 (7.2)	1393 (37.8)
P value	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

Nonresponders, n = 507 (15.4%).

Data are expressed as number and percentage per geographic areas. Differences were evaluated by Chi-square test.

MF, maxillofacial.

**Table 2 – Working status (employed/self-employed) and employment categories by area of living.**

## Working status (employed/self-employed)

	Employed No. (%)	Self-employed No. (%)	No answer No. (%)			
Europe	405 (37.6)	646 (60.0)	26 (2.4)			
Africa	68 (55.7)	51 (41.8)	3 (2.5)			
Americas	437 (42.3)	568 (54.9)	29 (2.8)			
Asia/Oceania	423 (42.6)	531 (53.5)	39 (3.9)			
Total	1333 (41.3)	1796 (55.7)	97 (3.0)			
P value	<.01	<.01	.36			

Employment categories						
	Single private practice No. (%)	Group private No. (%)	Public health No. (%)	University/education No. (%)	Research No. (%)	No answer No. (%)
Europe	176 (37.4)	143 (30.7)	65 (13.8)	69 (14.6)	15 (3.2)	3 (0.6)
Africa	22 (29.3)	6 (8.0)	23 (30.7)	22 (29.3)	2 (2.7)	0 (0.0)
Americas	145 (29.0)	179 (35.8)	94 (18.8)	64 (12.8)	16 (3.2)	2 (0.4)
Asia	105 (22.6)	107 (23.0)	108 (23.2)	126 (27.1)	14 (3.0)	5 (1.1)
Total	448 (29.6)	435 (28.8)	290 (19.2)	281 (18.6)	47 (3.1)	10 (0.7)
P value	<.01	<.01	<.01	<.01	.91	.07

Data are expressed as number and percentage per geographical areas. Differences were evaluated by Chi-square test.

to family-related and sociocultural challenges, can have a significant impact on the work patterns of dentists.<sup>38-40</sup> Self-employment is also the more popular form of dental practice amongst women, although reasons such as women working

part-time with children may lead to being employed in a practice more often than men.<sup>35</sup>

Whilst women perceive it as difficult to return to dentistry after a career break,<sup>34</sup> the present study found that women

**Table 3 – Working hours per week, working location, and involvement in dental political organisations association, by area of living.**

## Working hours per week

	≤15 hours No. (%)	16–30 hours No. (%)	31–40 hours No. (%)	>40 hours No. (%)
Europe	41 (3.95)	253 (24.37)	476 (45.86)	268 (25.82)
Africa	7 (5.60)	35 (28.00)	54 (43.20)	29 (23.20)
Americas	50 (5.15)	179 (18.45)	536 (55.26)	205 (21.13)
Asia/Oceania	128 (13.53)	203 (21.46)	315 (33.30)	300 (31.71)
Total	226 (7.34)	671 (21.79)	1381 (44.84)	802 (26.04)

Nonresponders, n = 213 (6.47%),  $\chi^2 = 155.82$ ; P < .01.

## Working location

	Country-side/village No. (%)	Small town No. (%)	Bigger town No. (%)	Large town No. (%)
Europe	135 (12.3)	388 (35.3)	352 (32.0)	224 (20.4)
Africa	5 (3.2)	16 (12.8)	28 (22.4)	77 (61.7)
Americas	21 (2.1)	175 (17.9)	448 (45.8)	334 (34.2)
Asia	58 (6.0)	156 (16.2)	286 (29.8)	461 (48.0)
Total	218 (6.9)	735 (23.2)	1114 (35.2)	1096 (35.7)

Nonresponders, n = 129 (3.9%),  $\chi^2 = 375.63$ , P < .01.

## Position in a dental political organisation/association

	President No. (%)	Board member No. (%)	Committee member No. (%)	Other No. (%)
Europe	22 (6.4)	61 (17.9)	80 (23.5)	178 (52.2)
Africa	5 (8.0)	7 (14.0)	17 (34.0)	22 (44.0)
Americas	53 (9.0)	139 (23.6)	168 (28.8)	230 (39.0)
Asia	43 (7.0)	111 (17.9)	184 (29.7)	281 (45.4)
Total	122 (7.6)	318 (19.9)	449 (28.1)	711 (44.4)

Nonresponders, n = 1601 (51.4%),  $\chi^2 = 22.02$ , P < .01.

Data are expressed as number and percentage per geographical areas. Differences were evaluated by Chi-square test.

feel more secure after maternity leave in the public sector than in the private sector, which is certainly related to the challenges of self-employment such as entrepreneurial responsibility, financial security, as well as fixed working and free time.<sup>41</sup> Although employed physicians cite a better work–life balance as the most important factor, the most common reasons for setting up in business are many opportunities to shape one's own life, not being bound by directives, and a good income situation or financial and personal freedom.<sup>15,30,41,42</sup> The fact that women in leadership positions do not yet reflect the gender distribution of the collective, with continued lack of women in high-level positions in dentistry, can be confirmed.<sup>5</sup>

A weakness of this study is the lack of a control group or comparison to male dentists,<sup>38,43,44</sup> compared to the total number of dentists in the respective country, which clearly complicates the conclusions on gender comparison. The limitations of a cross-sectional study are obvious, such as the inability to draw causal conclusions, but most importantly, the study should be considered in the temporal context of the COVID-19 pandemic. A more frequent study of this type would be desirable by dental policymakers to provide further evidence based on cohort trends. The distribution of respondents by nationality in this study is uneven, with the highest percentage of country participants in continental Europe and Asia and the Middle East, likely due to inadequate survey distribution by national organisations and contacts. Various data such as study participants having between 10 and 30 years of experience are due to the sample size distribution and uneven distribution of age groups, which makes statements about different generations of female dentists impossible. Despite this limitation, the sample size and number of countries in which female dentists live is relatively large compared with other studies.<sup>15,26,41</sup> However, this is an anonymous questionnaire in English that has not been translated or validated in the local language. Due to its anonymity, it could well have been filled out more than once by a single participant. Also, the relatively long period of data collection did not lead to significantly more responses, although due to the pandemic, dentists' concerns tended to be in other areas. The survey was conducted whilst the COVID-19 pandemic was still ongoing, which may limit the generalisation of the results, an aspect that should be taken into account in future studies, as economic impacts on dental practices and health impacts were also observed, which should be further studied in the medium and long term.<sup>30</sup>

Although the study provides some general information, such as the lack of women in leadership positions in dentistry and the fact that female dentists, like their male counterparts, work largely independently in solo and group practices and full-time, as has been controversially reported for years,<sup>45–47</sup> further investigations into influencing factors and backgrounds are necessary to examine differences to male colleagues and other professional groups. Similar gender-specific differences can also be observed in other professional groups such as medicine or midwifery regarding part-time work or specialisation in medical disciplines but also information on attitudes, beliefs, and values such as professionalism, feminism, protection, and diversification in midwifery.<sup>48,49</sup> Future aspects should be investigated such as the cost-effectiveness of existing and future

interventions to increase the attractiveness of the profession for all genders and to counteract a possible oversupply not only in urban areas but also in rural areas.<sup>4,48,49</sup> It remains to be seen how the distribution, perception, and the wishes of the profession will develop in the future. Further research and action are needed to examine the role and influence of women in dentistry.

## Conclusions

Within the limitations of the current global cross-sectional study in individuals, the following findings were observed:

- Female dentists are predominantly self-employed across all continents.
- Almost half of study participants work between 31 and 40 hours per week, and a quarter work more or less than that, respectively.
- Few female dentists are active on the boards or as presidents of a dental society; one-fifth are involved in political associations locally and only few nationally.
- Female dentists feel more secure after maternity leave in the public than in the private sector.

## Conflict of interest

None disclosed.

## Acknowledgements

The authors thank all participants of the study. This study was conducted through the initiative of Women Dentists Worldwide section of the FDI World Dental Federation (Geneva, Switzerland). Bernadette Rawyler (University of Bern, Switzerland) is acknowledged for her kind support with preparing the figure and Alain Reimann for his kind support with programming the REDCap software (University of Bern, Switzerland). The authors thank the FDI World Dental Federation and the contact persons of all national dental member organisations. Where possible, the names of the countries were taken from the official designation of the United Nations ([www.un.org](http://www.un.org)). The use of the names or designations of the states is used neutrally as indicated by the participants of the study; it therefore does not represent a political evaluation but objectivity.

## Author contributions

Guglielmo Campus: writing–review and editing, conceptualisation, statistical analysis, visualisation, project administration. Anastasia MacLennan: writing–review and editing, visualisation. Juliane von Hoyningen-Huene: writing–review and editing, conceptualisation, project administration. Thomas G. Wolf: writing–review and editing, conceptualisation, project administration, visualisation, supervision. FDI Section WDW collaboration group: creating, testing, and sending out the questionnaire.

## Funding

This research received no external funding.

## Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.identj.2023.07.010.

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