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Research article

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Evaluation of the Total Design Method in a survey of Japanese dentists

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Abstract

Background: This study assessed the application of the Total Design Method (TDM) in a mail survey of Japanese dentists. The TDM was chosen because survey response rates in Japan are unacceptably low and the TDM had previously been used in a general population survey.

Methods: Four hundred and seventy eight dentist members of the Okayama Medical and Dental Practitioner's Association were surveyed. The nine-page, 27-item questionnaire covered dentist job satisfaction, physical practice, and dentist and patient characteristics. Respondents to the first mailing or the one-week follow-up postcard were defined as early responders; others who responded were late responders. Responder bias was assessed by examining age, gender and training.

Results: The overall response rate was 46.7% (223/478). The response rates by follow-up mailing were, 18% after the first mailing, 35.4% after the follow-up postcard, 42.3% after the second mailing, and 46.7% after the third mailing. Respondents did not differ from non-respondents in age or gender, nor were there differences between early and late responders.

Conclusion: The application of TDM in this survey of Japanese dentists produced lower rates of response than expected from previous Japanese and US studies.

Background

Mail survey questionnaires of dentists as well as the general public have been used widely in the U.S. and response rates are generally high. In contrast the use of mail surveys in Japan has been less successful. Japanese textbooks on social science research techniques report return rates of no more than 20–40% [1-3]. A mail survey conducted by one of the local Japanese dental associations had a response

rate of 10% (unpublished data). Mail surveys reported in the Japanese medical literature had response rates ranging from 49 to 90% [4-8]. Research subjects in the various studies were the physicians and residents working at two private University hospitals (Response rate 49.1%) [4], the institutions belonging to an oncology group (Response rate 90.2%) [5], the council members of the Japanese society of child neurology (Response rate

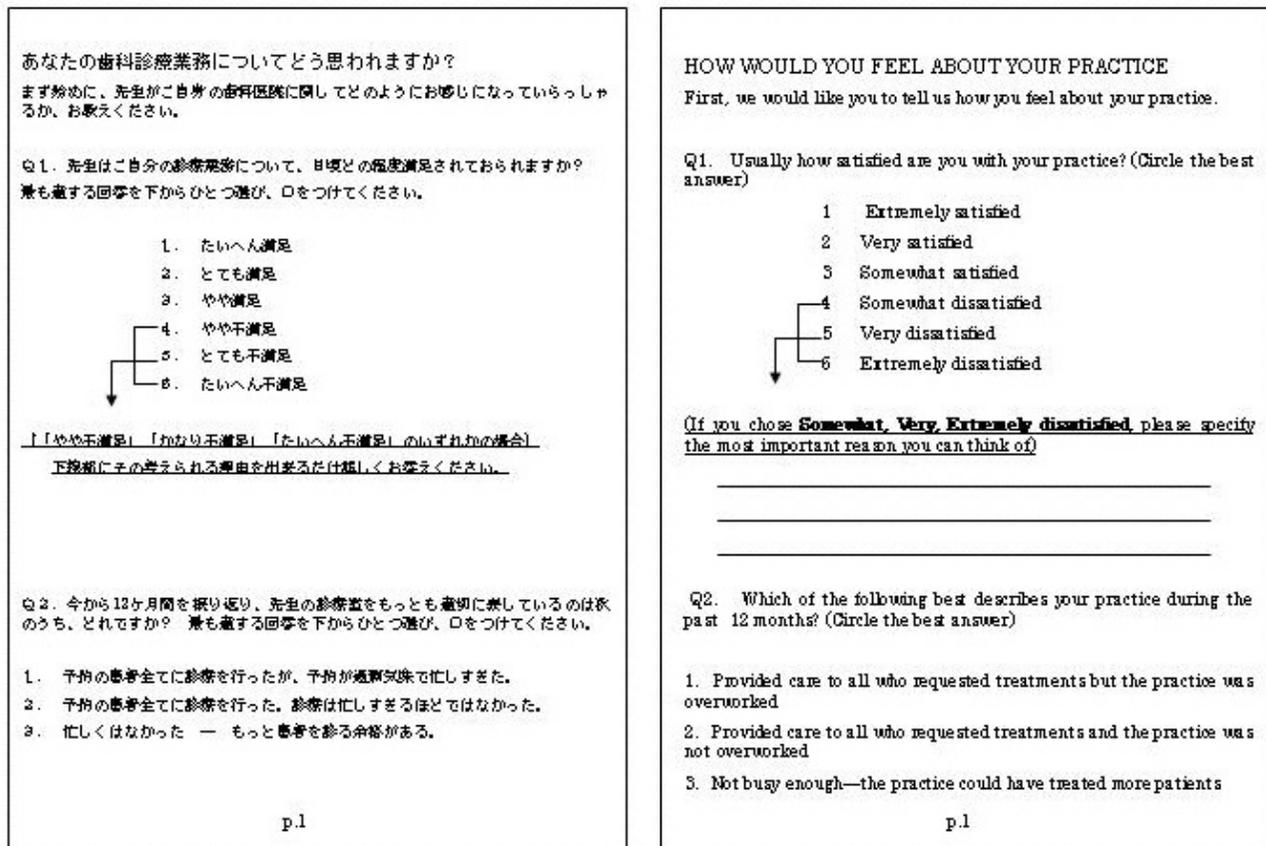


Figure 1
 The first page of the questionnaire and its English translation.

72.8%) [6], ophthalmologists in hospitals and clinics (Response rate 73%) [7], and psychologists (Response rate not given) [8]. However, the publications lack methodological detail. Only two of the five, for example, provide the source of the mailing lists. In two of the surveys, questionnaires were sent to a representative at each hospital or institution rather than to individuals directly [4,5]. None of the five papers indicated whether the studies were sponsored by a professional association, or university or other group. One of five publications indicated that an advance letter was sent before the questionnaire [7]. Only one paper specified whether participants were told how the data would be used [7]. None of the papers explained whether an incentive was included in the mailing of the questionnaire. Other details generally missing were the length of the questionnaire (missing in 2/5) [4,6,8], telephone contacts for more information (missing in all 5) or assurance of confidentiality (missing in all 5).

The Total Design Method (TDM), which was developed by Dillman and includes personalization of the cover letter and repeated follow-ups, was designed to achieve high response rates and minimize the potential influence of systemic nonresponse bias [9]. The response rate generally is lower in surveys of the general public and higher in surveys of professionals although this varies by group and subject. Locker and colleagues reported a 71.6% response rate when an oral health questionnaire using the TDM was used to survey the general population from voters' lists [10]. Fiset and colleagues mailed questionnaires concerning dental malpractice claims to dentists using the TDM, and reported a 69.6% response rate [11].

In the only application of the TDM in Japan to date, Jus-saume and colleagues reported a 55.6% response rate for a survey of the general population on the subject of 748 when those surveyed were selected from telephone list-ings [12].

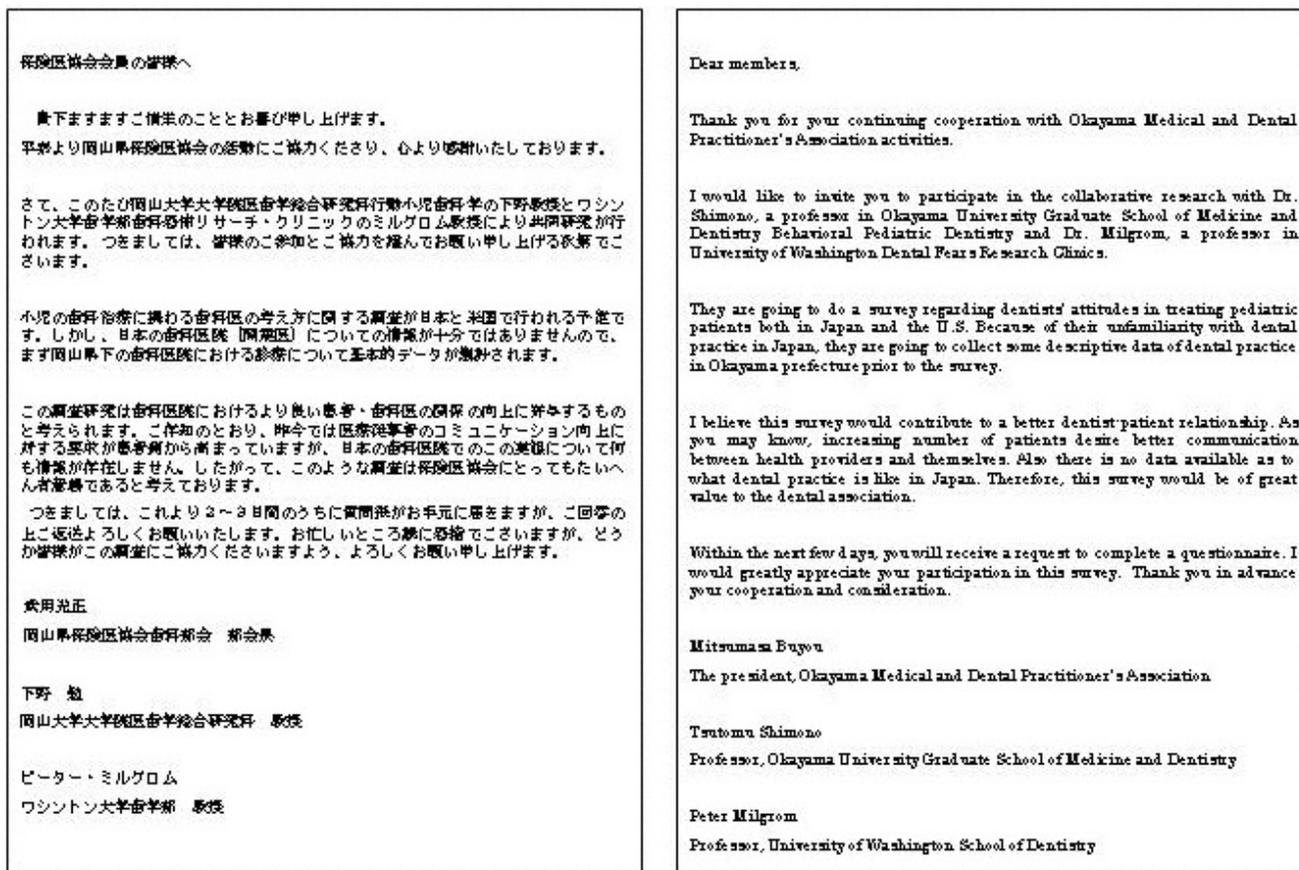


Figure 2
Advance letter.

No work has been done on adapting the TDM to Japanese dental populations. The aim of this study was to assess the application of the TDM in a mail survey of Japanese dentists.

Methods

Subjects

The questionnaire was mailed to all 482 dentist members on Okayama Medical and Dental Practitioner's Association list. Out of 482 questionnaires sent out, four dentists were excluded because they had closed their office due to sickness or had shared replying survey with a spouse dentist. The final survey population was 478 dentists. Potential subjects were informed in the cover letter that participation in the study was voluntary and that individual responses would be confidential.

Questionnaire development

A nine-page, 27- item questionnaire was designed in English using questions derived from earlier surveys. It covered four categories: 1) dentist job satisfaction, 2) physical practice, 3) dentist and 4) patient characteristics. Instrumentation was translated from English to Japanese by a native speaker, and then back-translated by another native speaker to ensure comparability to the original English form (see Figure 1). The questionnaire booklet was organized so that easier and less personal questions were asked initially and more difficult or personal questions were asked at the end of the questionnaire. The questionnaire was pretested among the alumni practicing out of Okayama prefecture before use. The questionnaire was formatted into a 182 × 257 mm booklet style to make it appear easier and less time-consuming to complete.

〇〇 先生

この調査は岡山県下の歯科医師に関するものです。

ご存知のとおり、昨今では医療従事者のコミュニケーション向上に対する強い要求が患者側から高まっています。しかしながら、我が国の歯科医師での差額に関する報告はまったく存在しません。それゆえ、この調査研究が患者・歯科医のより良い関係の向上に寄与できるような有意義なものにしたいと考えております。

先生のお名前は岡山県歯科医師会会員名簿から選出させていただきました。先生のご回答は岡山県下の歯科医師を代表するものであり、それゆえたいへん重要であります。

質問紙に対する先生のご回答は、完全に守秘的に取り扱われ、将来我々の論文に掲載されるのは、総合的な結果のみであることをお約束いたします。単に郵送目的のため、質問紙には「ロ番号」をつけております。これにより、先生がこちらに返送された折に郵送リストでチェックできるようにしております。先生がお名前は質問紙上に掲載されることは決してございません。

質問紙はさほど難しくありません。20分ほどかかります。

お忙しいところ誠に恐縮でございますが、どうか質問紙にご回答くださり、封筒に入れてお返送ください。

もしこの調査に関するご質問がございましたら、お手紙かお電話【086-2356715あるいは086-2356717（下野、神井まで）】でお気軽にお問い合わせください。

それではよろしくお願いたします。

下野 勉
岡山大学大学院歯学総合研究科 教授

ピーター・ミルグロム
ワシントン大学歯学部 教授

神井 智彦
岡山大学大学院歯学総合研究科 助手

Dear Dr. 〇〇,

This survey is regarding dental practice in Okayama prefecture.

As you may know, increasing number of patients desire better communication between health care providers and patients. However, there is nothing published about dental practice in Japan. This survey, therefore, would contribute to a more positive relationship between dental practitioners and patients.

You were drawn from a list of registered dentists in Okayama Medical and Dental Practitioner's Association. Your response would represent the dentists in Okayama prefecture, therefore, your participation is of great importance.

We will make sure that your response will be treated confidentially, and only composite result will be in our paper. The identification number in the questionnaire will be only for mailing purposes. We may check your name off from the mailing list when we receive your response. Please be assured that your name will never be placed on the questionnaire.

The questionnaire is not difficult. It should take less than 20 minutes.

We would truly appreciate your taking time to complete the questionnaire out of your busy schedule and returning it in the envelope provided.

We would be very happy to answer any questions you may have about this research. Please feel free to write or call us at 086-2356715 or 086-2356717.

Thank you in advance for your assistance.

Sincerely,

Trutomu Shimono
Professor, Okayama University Graduate School of Medicine and Dentistry

Peter Milgrom
Professor, University of Washington School of Dentistry

Yukie Nakai
Assistant Professor, Okayama University Graduate School of Medicine and Dentistry

Figure 3
Initial letter sent in the first mailing.

Procedures

The Okayama Medical and Dental Practitioner's Association agreed to participate and endorse the study.

The procedures followed were generally those recommended by Jussaume and Yamada [12] who had previously adapted the TDM to Japan. In designing the letters, a strong emphasis was placed on three essential features of the TDM. First, respondents were told how their names were selected, that their responses would represent those of many other Japanese dentists, and that their participation was invaluable. Second, the confidentiality of the survey was emphasized and participants were promised that their names would never be placed on the questionnaire. Finally, as an incentive for participation, a decision was made with the Association that respondents would be offered a report of the results of this study. No personal incentive was included in the survey because Japanese cul-

ture values service to the group rather than the individual [12].

Approximately one week before the first mailing of the questionnaire, an advance letter including the Association endorsement was sent to all the dentists introducing the researchers and explaining the importance of the study (see Figure 2). The letters were not personalized and not individually signed. The letter noted that the participant would receive the questionnaire in a couple of days. The envelopes were personally addressed and stamped. In the first questionnaire mailing, the participants received a letter again explaining the importance of the study and assuring confidentiality (see Figure 3), the questionnaire booklet, and a stamped self addressed return envelope. Identification number markers were used on questionnaires so that respondents could be checked off the mailing list. A follow-up postcard (see Figure 4), encouraging

〇〇 先生へ

先生が歯科医療に平素からどのようにご尽力なされておられるかを調査する質問紙を先週郵送いたしました。先生のお名前は、岡山県保険医協会名簿から選出させていただきました。

もし本状と行き違いに、すでに質問紙にご回答のうえご返送されていらっしゃる場合は、何卒ご返放くださり、私どもの深い感謝の意をお受け取りください。もしまだでしたら、どうか本日ご回答のうえ、ご返送ください。私どもは先生のご回答から得られる情報を共有することにより、患者-歯科医のより良い関係にきっと寄与するであろうと願っております。どうかご協力くださいますよう、改めてお願い申し上げます。

もし質問紙がお手元に届いてない、あるいは新たに質問紙をご大用でしたら、私どもにご連絡ください（電話番号：086-235-6715、6717 仲井まで）。本日また新たにお送りいたします。

それではよろしくお願いたします。

下野 勉
岡山大学大学院医学総合研究科 教授

仲井雪絵
岡山大学大学院医学総合研究科 助手

Dear Dr. 〇〇,

Last week, a questionnaire exploring how you are making an effort to deliver dental service was mailed to you. You were drawn from a list of registered dentists in Okayama Medical and Dental Practitioner's Association.

If you have already completed the questionnaire and returned it to us, please excuse us and accept our sincere gratitude. If you have not, please do so today. We surely believe your effort to share your information about your practice would contribute to a more positive relationship between practitioners and patients.

If the questionnaire was not mailed to you or you need another copy, please feel free to call us at 086-235-6715 or 086-235-6717. We will mail another one to you.

Thank you for your assistance.

Sincerely,

Tsutomu Shimono
Professor, Okayama University Graduate School of Medicine and Dentistry

Yukie Nakai
Assistant Professor, Okayama University Graduate School of Medicine and Dentistry

Figure 4
Follow-up card.

participation, was sent about one week later. Three weeks after the first mailing, a replacement questionnaire, a stamped return envelope and a cover letter (see Figure 5) were sent to any dentists who had not responded. Dentists who did not respond within six weeks after the original mailing received a cover letter (see Figure 6), a second replacement questionnaire, and a stamped self addressed return envelope.

Japanese standard number 3 size (235 × 120 mm) envelopes of an light yellow green color were used. Addresses were written on envelopes from left to right in the manner of most Japanese business correspondence.

Data handling and analysis

The data from questionnaires received within four months of the first mailing were entered into a database in Excel 2000 (Microsoft), and were checked for accuracy. Data management and analyses were conducted using SPSS version 11.5.

A two-pronged strategy was used to assess bias. First, age and gender of respondents and non-respondents, provided by the association list, were compared. Second, we compared study variables for early and late respondents. Respondents to the first mailing or the one-week follow-up postcard were defined as early responders; others who responded were late responders. Study variables included age, gender, years in practice, practice satisfaction, practice status, practice location, patient number seen per day, having postgraduate training, total hours of continuing dental education taken for the past 12 months, employment status (owner vs. non-owner), number of practice locations, yearly gross income before any expenses or taxes. T-tests, Fisher's exact test and Chi-square analyses were used to compare differences between the groups to assess respondent representativeness.

□ □ 先生

およそ3週間前、先生が歯科医様に平塚からどのようにご尽力なされておられるかを調査する質問紙を郵送いたしました。今現在、回答がお済みの質問紙がまだこちらに届いておりません。大変お忙しいところ、そのために貴重なお時間をいただくのは心苦しいのですが、どうかご回答、ご返渡くださることを心よりお願い申し上げます。

この調査研究の進捗により、先生が将来の歯科医業に何らかの影響をおおえくださる可能性がございます。ご回答くださる先生各々からのご返答が私どもの元に届かなければ、この調査が盲算あるものになりえません。先生のお名前は岡山県保健医療協会から選出させていただきました。

質問紙に対する先生のご回答は、完全に守秘的に取り扱われ、将来各々の論文に掲載されるのは、総合的な結果のみであることをお約束いたします。単に郵送目的のため、質問紙には「□」番号をつけております。これにより、先生が返送された折に郵送リストに受け取ったかどうかをチェックできるようになっております。先生のお名前は質問紙上に表記されることは付してございません。この調査から得られた情報が真に活用するに足るものとなるために、今回お願いする先生方からご回答をいただくことは大変重要なのです。

もし誤った場所に郵送してしまった場合のために、代わりに質問紙を同封いたしております。もしこの調査についてご質問がございましたら、私どもに手紙あるいはお電話でご連絡ください【電話番号：086-2356715, 6716, 6717 柳井まで】。

お忙しいところ誠に恐縮でございますが、何卒よろしくお願いたします。

下野 勉
岡山大学大学院歯学系歯学部歯学総合研究科 教授

柳井 智彦
岡山大学大学院歯学系歯学部歯学総合研究科 助手

Dear Dr. □ □,

A questionnaire exploring how you are making an effort to deliver dental service was mailed to you about three weeks ago. As of today we have not received your completed questionnaire. We realize you may not have enough time to work on the questionnaire, but we would be truly grateful if you take a moment to complete the questionnaire out of your busy schedule and return it to us.

This study is being conducted so that your response has an influence on the dentist's future. Our study would not be valuable unless you complete the questionnaire and return it to us. You were drawn from a list of registered dentists in Okayama Medical and Dental Practitioner's Association.

We will make sure that your responses will be treated confidentially, and only composite result will be in our paper. The identification number in the questionnaire will be only for mailing purpose. We may check your name off from the mailing list when we receive your response. Please be assured that your name will never be placed on the questionnaire. In order that the information from our study would be truly representative, it is greatly important each respondent participate in this study.

We have enclosed another questionnaire just in case that the questionnaire was not mailed to you or was misplaced. We would be very happy to answer any questions you may have about this research. Please feel free to write or call us at 086-2356715 or 086-2356717.

Thank you in advance for your assistance.

Sincerely,

Tsutomu Shimono
Professor, Okayama University Graduate School of Medicine and Dentistry

Yukie Nakai
Assistant Professor, Okayama University Graduate School of Medicine and Dentistry

Figure 5
Second letter sent in the second mailing.

Results

Response rate

The overall response rate was 46.7% (223/478). The cumulative response rates by each follow-up mailing are shown in Table 1. Ten dentists declined to participate. The primary reason given for refusal was that the dentist was not comfortable in answering personal questions.

Respondent representativeness

Respondents did not differ from non-respondents for the gender and age, nor were there differences between early and late responders for any of the 12 of variables that were compared except that the late responders have taken less hours of continuing dental education during the past 12 months (17.5 vs. 29.2 hours; $t = 1.95, p = 0.05$) (Table 2). There was a trend for late responders to be more likely to have received postgraduate training (27.3% vs. 16.3%; Fisher's exact test, $p = 0.08$)

Discussion

The TDM, as generally adapted by Jussaume and Yamada [12], was used in a survey of Japanese dentists. Previously Jussaume and Yamada obtained nearly identical response rates when they surveyed the general public in Japan (55.6%) and the U.S. (57.5%) using this method. The application of the TDM in this survey of dental practice produced a lower response rate (46.6%) than expected but with little response bias. The results of a low response rate (43%) without non-response bias was previously reported in the US dentist population [13] although other studies using this method have produced higher response rates. Dentists can be considered to have sufficiently similar education, income, and interest to be considered a homogeneous group. If there is little difference between the respondents and non-respondents, a smaller percentage of return might be acceptable. Parashos and colleagues, who reported a dentist survey in Australia and New Zealand also using the TDM, found significant differences between early and late respondents in responses to

□ □ 先生

およそ週間前、先生が歯科医に平常からどのようにご尽力なされておられるかを調査する質問紙を郵送いたしました。今現在、回答がお済みの質問紙がまだこちらに届いておりません。大変お忙しいところ、そのために貴重なお時間をいただくのは心苦しいのですが、どうかご回答・ご返信くださることを心よりお願い申し上げます。

もし本状と行き違いに、すでに質問紙にご回答のうえご返送されていらっしゃる場合は何卒ご容赦くださり、紙どもの深い感謝の意をお受け取りください。もしまだでしたら、どうか本日ご回答のうえ、ご返送ください。ご回答くださる先生各々からのご返答が紙どもの元に届かなければ、この調査が盲点あるものになりえません。また、先生が歯科医の未来に何らかの福音をおみえくださる可能性がございます。

質問紙に対する先生のご回答は、完全に守秘的に取り扱われ、将来我々の論文に掲載されるのは、総合的な結果のみであることをお約束いたします。単に郵送目的のため、質問紙には「□」番号をつけております。これにより、先生が返された折に郵送リストに受け取ったかどうかをチェックできるようにしております。先生のお名前は質問紙上に秘匿されることは決してございません。この調査から得られた情報が真に活用するに足るものとなるために、今回お願いする先生方からご回答をいただくのは大変重要なのです。

もし誤った場所に郵送してしまった場合のために、残りの質問紙を同封いたしておきます。もしこの調査についてご質問がございましたら、紙どもに手紙あるいはお電話でご連絡ください【電話番号：086-2356715,6717 押井まで】。

お忙しいところ誠に恐縮でございますが、何卒よろしくお願いたします。

下野 勉
岡山大学大学院歯学総合研究科 教授

押井 智彦
岡山大学大学院歯学総合研究科 助手

Dear Dr. □ □,

About six weeks ago, a questionnaire exploring how you are making an effort to deliver dental service was mailed to you. As of today we have not received your completed questionnaire. We would be truly grateful of you take a moment to complete the questionnaire out of your busy schedule and return it to us.

If you have already completed the questionnaire and returned it to us, please excuse us and accept our sincere gratitude. If you have not, please do so today. Our study would not be valuable unless you complete the questionnaire and return it to us. This study heavily depends on each respondent's response. We believe that your response will contribute to positive improvement of our dentist's future.

We will make sure that your response will be treated confidentially, and only composite result will be in our paper. The identification number in the questionnaire will be only for mailing purpose. We may check your name off from the mailing list when we received your responses. Please be assured that your name will never be placed on the questionnaire. In order that the information from our study would be truly representative, it is greatly important each respondent participate in this study.

We have enclosed another questionnaire just in case that the questionnaire was not mailed to you or was misplaced. We would be very happy to answer any questions you may have about this research. Please feel free to write or call us at 086-2356715 or 086-2356717.

Thank you in advance for your cooperation.

Sincerely,

Tsutomu Shimono
Professor, Okayama University Graduate School of Medicine and Dentistry

Yukie Nakai
Assistant Professor, Okayama University Graduate School of Medicine and Dentistry

Figure 6
Third letter sent in the third mailing.

Table 1: Cumulative response rate to Japanese dental questionnaire using the TDM

	1st Mailing	Follow-up Card	2nd Mailing	3rd Mailing
Response rate	18.0 % (86/478)	21.2% (83/392)	10.7% (33/309)	7.6% (21/276)
Cumulative response rate		35.4% (169/478)	42.3% (202/478)	46.7% (223/478)

a specific survey question of topical interest despite the absence of differences in the demographic data [14]. They emphasize the importance of using methods to achieve a high response rate to overcome such bias.

The lower than anticipated response rate of this study may have resulted from our failure to follow all aspects of the TDM fully. One of the differences found in procedures between Jussaume's [12] and this study was that neither

Inkan (personal seal) nor signature was used to the letter in this study. Jussaume said that it could convey to the respondent the importance which researchers placed on the project. The other difference was that the letter was not written in longhand in this study. Japanese respondents are hypothesized to react more positively to a survey seeing the effort taken to write out their names in longhand. Japanese dentists may also be more reluctant to answer the questions that they feel too personal. Ten dentists had

Table 2: Responses on study variable for early/late responders

Variables	N	Early responders	Late Responders	p
Mean age (SD)	223	45.6 (9.8)	45.6 (10.9)	NS
% female	223	9.5	7.4	NS
Mean months in practice (SD)	220	163 (117)	172 (129)	NS
Practice satisfaction (% dissatisfied)	215	24.7	22.6	NS
Busyness (%not busy enough)	220	28.7	30.2	NS
Practice location (% patients from rural areas)	212	28.7	29.2	NS
Patient visits/day (mean, SD)	212	34.5 (25.6)	32.2 (26.2)	NS
Postgraduate training (%no)	215	25.5	15.1	0.08
Total hrs CDE/12 mos (Mean, SD)	197	29.2 (58.7)	17.5 (24.9)	0.05
Employment status (% non owner)	219	15.7	13.2	NS
>1 practice location	214	4.9	7.8	NS
Annual gross income before expense/taxes (% less than ¥30,000,000)	194	23.0	34.8	NS
Year of graduation (mean, SD)	212	1981 (10.7)	1981 (11.7)	NS

refused to participate in this study due to such reasons. One of the authors asked the primary reasons why they didn't participate to another five dentists. Two of these five dentists said the questions were too personal and that there were too many questions to answer. One dentist said that he didn't want his practice to be compared with others. Two said that topic was not interesting enough to make them want to participate.

The response rate was, however, much greater than that of another unpublished survey of Japanese dentists that achieved a 10 % response rate. The follow-up contact and repeated mailing to non-respondents increased our sample size by more than a quarter (28.7%). Before using the postcard reminder, the response rate was one-third of the final rate, suggesting that follow-up contact is critical to bolstering mail survey response rates. This is consistent with research indicating that follow-up contact has the most positive effect on return rates [11,15-17].

Our results are encouraging, and demonstrate the feasibility of using TDM to study a population of Japanese dentists.

Conclusion

The application of TDM in this survey of Japanese dentists produced lower rates of response than expected from previous Japanese and US studies with little response bias.

List of abbreviations

TDM Total Design Method

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

YN participated in the design of the study, made the instruments (translated English version to Japanese), negotiated with Okayama Medical and Dental Practitioner's Association to be given endorsement, collected the data, performed the statistical analyses, and drafted the manuscript. PM participated in the design of the study and in writing the manuscript. TY participated in the design of the study and developed the English version of the instruments for this paper. CI collected the data and performed the statistical analyses. TS participated in the design of the study. All authors read and approved the final manuscript.

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