



# Is the information on infection prevention measures against COVID-19 reaching the target audience? A cross-sectional survey among eating and drinking services in Tokyo, Japan

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## ABSTRACT

**Objectives:** The study aims to evaluate information gathering behaviour (IGB) and its effectiveness in eating and drinking services for infection control during COVID-19.

**Study design:** A cross-sectional survey using anonymous self-administered questionnaires was conducted in October 2021. Participants were asked what IGB they use to obtain infection control measures, to what extent they understand the measures (and, if they do not understand them, what inhibits their comprehension), and which IGBs they do not currently use and why.

**Methods:** The sample included 957 eating and drinking services in Ota City, Tokyo. The response rate was 14.5%. Binomial logistic regression was used to analyse the factors associated with the baseline characteristics using Stata v.17.0.

**Results:** The highest proportion of respondents used television (88.0%); another large proportion (38.9%) used guidelines. Regarding difficulty in understanding the retrieved information, 'difficulty in coming up with specific actions' had the highest ratio for every IGB. Regarding reasons for not currently using IGB, 'it takes too much time to extract the necessary information' showed the highest ratios of all IGBs. Individuals over 60 years had a negative relationship with the use of guidelines and the Internet. Participants also advised that they did not use time-consuming guidelines.

**Conclusion:** Current information dissemination methods for information on COVID-19 infection control may not successfully convey information or reach their target populations. This study indicates the need for specific expressions and layouts to effectively share information on COVID-19. Also, special means of communication must be established to cater to individuals aged 60 and above.

## 1. Introduction

COVID-19 is defined as a disease caused by severe acute respiratory syndrome coronavirus 2 and was first reported in China in December 2019 [1]. On March 11, 2020, the World Health Organization declared it a global pandemic. In Japan, at the end of April 2022, the cumulative number of infected people was 76,683,75 and the number of deaths was 29,309. Similar to other countries experiencing COVID-19, it is likely to have a profound impact on social, economic, and institutional structures in Japan [2,3].

To reduce the infection risk, wearing masks and avoiding the 'three Cs' (crowded places, close-contact settings, and confined and enclosed spaces) were effective [4]. However, restaurants (where it is difficult to

be free of the three Cs) are a high-risk environment for the spread of COVID-19 [5]. Therefore, similar to many other countries, restaurants in Japan have been requested to improve their infection prevention measures, shorten their business hours, and consider closures. To improve infection prevention measures, guidelines have been issued by various industries and information has been posted on government websites [6, 7]. However, our preliminary interview with individuals in-charge of COVID-19 countermeasures in eating and drinking services revealed difficulties in accessing the necessary information, as well as its misunderstanding and misinterpretation. We considered this situation to be an 'infodemic' situation [8]. Regarding health literacy, this situation could be mitigated by providing information in a way that ensures that all individuals, regardless of their abilities, can make use of it to make

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effective decisions [9].

Furthermore, during an epidemic of an emerging infectious disease or a disaster, information management is essential for health risk management, and accurate collection and dissemination is key [10]. It is important for the public health administration to deliver information to the target population in an appropriate manner as soon as possible. For disaster prevention, a society with a high awareness of disaster prevention led by residents can be achieved by the voluntary retrieval of information by residents based on their judgment and by the government's adequate support [11].

The evaluation of information-gathering behaviours (IGB) and their understanding level during epidemics and pandemics, such as COVID-19, among citizens has begun to be reported [12]. However, it has not been sufficiently examined among those who take the lead in implementing countermeasures in eating and drinking services. Since the use of the IGB depends on the users' needs and background [13], it is necessary to find better ways to disseminate information among our study population.

Regarding this background, this study assesses the use of IGB and its effectiveness in distributing information regarding countermeasures against COVID-19 with a focus on eating and drinking services in the target area. Moreover, the study identified issues that should be addressed to improve health literacy about COVID-19 in this population. These findings may be applicable to countermeasures during emerging infectious disease epidemics.

## 2. Methods

### 2.1. Study setting and context

Tokyo is a regional government encompassing 23 special wards, 26 cities, 5 towns and 8 villages. This study was conducted in Ota City, the largest of the 23 special wards in terms of area and the third most populous.

The study was conducted in October 2021, after the 'fifth wave' of COVID-19, which peaked in August 2021 at 25,038 nationwide daily cases [14]. At this time, 64.4% of the vaccine eligible age group (12 years and older) had completed two doses of vaccination [15].

### 2.2. Data collection

A cross-sectional survey using anonymous self-administered questionnaires was conducted from October 1 to October 31, 2021. The target population comprised all the eating and drinking services licenced and registered in Ota City—in total, the target population included 6640 potential participants. The questionnaire was distributed to each service by postal mail and was answered by one staff member responsible for implementing infection prevention measures against COVID-19. Participants could choose between 1) filling out the questionnaire and sending it back by postal mail, or 2) answering the online survey using the code printed on the distributed sheet.

### 2.3. Variables

The questionnaire consisted of 13 closed and semi-closed items (see the Supplementary Appendix for details).

#### 2.3.1. Baseline characteristics of participants and their workplaces

A total of eight variables related to the participants were obtained. The first four were baseline characteristics: age, gender, native language, and employment status. The next four were management entity, organisational affiliation, service type, and the number of seats in the store as a background of their workplaces. Each variable was further divided into two groups of dichotomous variables: age: over or below 60 years and whether eating and drinking are allowed in the store or not (e.g. wholesale store) (based on Japan Standard Industrial Classification

[16]); and number of seats: above or less than 10.

#### 2.3.2. IGB and the comprehension level of obtained information

IGB used to obtain infection prevention measures against COVID-19 (nine items) were identified. The listed items were: television (TV), newspapers, radio, public information magazines, magazines, public bulletin boards, guidelines and instructions distributed directly from the government or upper management (guidelines), Internet (still image) and Internet (movie). Internet (still image) included email and instant messenger (e.g. LINE), delivery services, smartphone applications, websites, and social networking services (Twitter, Facebook, and so on). Internet (movie) included video distribution sites, such as YouTube. These variables have been used in large-scale disasters [17,18]. We added 'guidelines' as a variable in this study, as they must be followed to obtain certification for a store in Tokyo during the COVID-19 pandemic. The comprehension level for each item was scored on a scale from 1 to 4 (1: not at all to 4: very much understood).

#### 2.3.3. Obstacles to comprehend obtained information

Participants who responded with an understanding level of 1 or 2 (could not understand) were asked to select the factors that prevented them from understanding the information. The five factors were understanding technical terms, coming up with specific actions, application to the workplace, how to obtain infection control supplies, and difficulty understanding the Japanese language.

#### 2.3.4. Obstacles to utilizing IGB

The study enquired about participants not using IGB and the corresponding reasons for it. The participants had to select from among the following reasons: too little sound or letters; taking too much time in extraction of necessary information; difficulty in finding the information; and distrust of the informant.

## 2.4. Statistical analyses

### 2.4.1. Use of IGB

We aggregated the IGB used to gather implementing infection prevention measures against COVID-19 between two age groups: those under 60 years and those over 60 years, considering the information gap due to aging.

We conducted binomial logistic regression analysis to assess the factors below. We set the baseline characteristics of participants and their workplaces as the independent variables.

### 2.4.2. Factors related to IGB

We set IGB use as the dependent variable.

### 2.4.3. Factors related to the comprehension level of the information obtained from each IGB

Among the groups using each of the IGB, we selected those with poor comprehension (comprehension scales 1 and 2). Among them, five factors that hindered good comprehension (technical terms used, cannot come up with concrete action; cannot come up with application for their workplace; cannot come up with how to obtain the necessary supplies; and Japanese is not their native language) were used as the dependent variables.

### 2.4.4. Obstacles related to utilizing IGB

A total of five factors (too little sound or letters, taking too much time in extraction of necessary information, difficulty in finding the information, distrust of the informant and distrust of the information) were used as the dependent variables.

We calculated adjusted odds ratios (ORs) with 95% confidence intervals (CIs), adjusted for baseline characteristics of participants and their workplaces. P values of less than 0.05 were considered to indicate statistical significance, and all statistical analyses were done with the

statistical software Stata v.17.0 (Stata Corp., College Station, TX, USA).

### 3. Results

#### 3.1. Study population (Table 1)

A total of 6640 questionnaires were sent to registered addresses and 616 were returned with no address, indicating that the shop had withdrawn. Among the 6024 questionnaires, 961 were answered (response rate of 14.5%). We excluded four from the analysis as two lacked age information and two lacked gender information. Hence, 957 participants were included. A total of 625 (65.3%) were male and 332 (34.7%) were female. The largest age group was 50–59 years (25.2%), followed by 40–49 years (21.7%). Among the respondents, 96.1% could speak and understand Japanese, and 81.9% were non-permanent employees. The largest percentage (58.8%) belonged to sole proprietorship stores and 73.4% of the services allowed eating and drinking in the store. The most common specific type of service group was a pub, which accounted for 15.5%. See Table 1 for details.

#### 3.2. IGB used to obtain infection prevention measures against COVID-19 (Table 2)

TV had the highest usage rate, with more than 85% for both age groups. The second and third most commonly used methods differed between the two age groups. ‘Internet (still image)’ was used by 59.7% of those under 60 years and 21.6% of those over 60 years. ‘Guidelines and instructions’ were used by 42.2% of those under 60 years and 27.9% of those over 60 years.

**Table 1**  
Percentage distribution of key characteristics of samples at baseline.

| Variable   | n   | N=957 |   |
|--|-----|-------|---|
|  |     |       | % |
| Age  |     |       |   |
| 20–29  | 29  | 3.0   |   |
| 30–39  | 85  | 8.9   |   |
| 40–49  | 208 | 21.7  |   |
| 50–59  | 241 | 25.2  |   |
| 60–69  | 172 | 18.0  |   |
| 70–79  | 177 | 18.5  |   |
| 80–89  | 45  | 4.7   |   |
| Gender   |     |       |   |
| Female   | 332 | 34.7  |   |
| Male   | 625 | 65.3  |   |
| Native language                                  |     |       |   |
| Japanese   | 920 | 96.1  |   |
| non-Japanese                                     | 32  | 3.3   |   |
| NA   | 5   | 0.5   |   |
| Employment status                                |     |       |   |
| Full-time  | 90  | 9.4   |   |
| Non-permanent                                    | 784 | 81.9  |   |
| NA   | 83  | 8.7   |   |
| Management entity                                |     |       |   |
| Sole proprietorship                              | 563 | 58.8  |   |
| Others   | 345 | 36.1  |   |
| NA   | 49  | 5.1   |   |
| Organisational affiliation                       |     |       |   |
| Belonging to any                                 | 283 | 29.5  |   |
| Not belonging to any                             | 589 | 61.6  |   |
| NA   | 85  | 8.9   |   |
| Service type                                     |     |       |   |
| Eating and drinking are allowed in the store     | 702 | 73.4  |   |
| Eating and drinking are NOT allowed in the store | 202 | 21.1  |   |
| NA   | 53  | 5.5   |   |
| Number of seats                                  |     |       |   |
| <10 seats  | 280 | 29.3  |   |
| 10 seats ≤                                       | 617 | 64.5  |   |
| NA   | 60  | 6.3   |   |

NA, no answer.

**Table 2**  
IGB used to obtain infection prevention measures against COVID-19.

|                              | Total | %    | <60 years old |         | N = 957        |      |
|------------------------------|-------|------|---------------|---------|----------------|------|
|                              |       |      |               |         | 60 years old ≤ |      |
|                              |       |      | N = 957       | n = 735 | n = 222        |      |
|                              | n     | %    | n             | %       | n              | %    |
| Television                   | 842   | 88.0 | 641           | 87.2    | 201            | 90.5 |
| Newspapers                   | 327   | 34.2 | 205           | 27.9    | 122            | 55.0 |
| Radio                        | 124   | 13.0 | 96            | 13.1    | 28             | 12.6 |
| Public information magazines | 126   | 13.2 | 86            | 11.7    | 40             | 18.0 |
| Magazines                    | 60    | 6.3  | 45            | 6.1     | 15             | 6.8  |
| Public bulletin boards       | 89    | 9.3  | 71            | 9.7     | 18             | 8.1  |
| Guidelines                   | 372   | 38.9 | 310           | 42.2    | 62             | 27.9 |
| Internet (still image)       | 487   | 50.9 | 439           | 59.7    | 48             | 21.6 |
| Internet (movie)             | 200   | 20.9 | 189           | 25.7    | 11             | 5.0  |

IGB, information gathering behaviour; COVID-19, Coronavirus Disease 2019. Guidelines, guidelines and instructions distributed directly from the government or upper management.

#### 3.3. Factors related to the use of IGB (Table 3)

The use of newspapers was positively associated with age ‘60 years and older’ (odds ratio [OR], 3.35; 95% confidence interval [CI], 2.39–4.71). Three variables were significant for and negatively associated with the use of guidelines: age ‘60 years or older’ (OR, 0.58; 95% CI, 0.41–0.83), gender ‘male’ (OR, 0.67; 95% CI, 0.50–0.89), and ‘sole proprietorship’ (OR, 0.60; 95% CI, 0.45–0.81). Two variables were significant for the use of ‘Internet (still image)’ and negatively associated with age ‘60 years or older’ (OR, 0.21; 95% CI, 0.14–0.30) and ‘sole proprietorship’ (OR, 0.71; 95% CI, 0.53–0.96). Two variables were significant for the use of ‘Internet (movie)’ and had a negative association with ‘60 years or older’ (OR, 0.15; 95% CI, 0.02–0.29) and a positive one with ‘male’ (OR, 1.52; 95% CI, 1.06–2.19).

#### 3.4. Factors related to the comprehension level of the information obtained from each IGB (Table 4, S1)

Among each of the IGBs, the group with poor comprehension was selected. In every group, ‘cannot come up with concrete action’ had the highest ratio (39.29%–66.67%). Among the group with poor comprehension level regarding using TV, organisational affiliation ‘belonging to any’ was positively associated with ‘cannot come up with how to obtain the necessary supplies’ (OR, 1.02; 95% CI, 1.00–1.04). Among the group with poor comprehension level regarding using guidelines, ‘full-time employment status’ was positively associated with ‘technical terms used’ (OR, 1.03; 95% CI, 1.00–1.60) and organisational affiliation ‘belonging to any’ was negatively associated with ‘cannot come up with concrete action’ (OR, 0.15; 95% CI, 0.22–0.90).

#### 3.5. Obstacles related to utilizing IGB (Table 5, S2)

Among every IGB, ‘taking too much time in the extraction of necessary information’ and ‘difficulty in finding the information’ were likely to be selected. Moreover, those who chose TV and the Internet (still images and movies) were likely to select ‘distrust of the informant’.

Among those who do not use TV, ‘difficulty in finding the information’ was negatively associated with ‘eating and drinking are allowed in the store’ (OR, 0.22; 95% CI, 0.08–0.60). ‘Distrust of the informant’ negatively associated with age ‘60 years and older’ (OR, 0.31; 95% CI, 0.10–0.90).

Among those who do not use guidelines, ‘letters were too small’ had a positive association with ‘full-time employment status’ (OR, 1.03; 95% CI, 1.01–1.06) and ‘taking too much time in the extraction of necessary information’ had a positive association with ‘eating and drinking are

**Table 3**  
Factors related with the use of IGB.

| independent variables                                   | dependent variables(1: utilizing 0: not utilizing) |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
|---|--|--------------|---------|------------|--------------|---------|-------|--------------|---------|------|--------------|---------|-----------|--------------|---------|
|   | Television   |              |         | Newspapers |              |         | Radio |              |         | PIM  |              |         | Magazines |              |         |
|   | OR   | 95%CI        | P value | OR         | 95%CI        | P value | OR    | 95%CI        | P value | OR   | 95%CI        | P value | OR        | 95%CI        | P value |
| Age (base: <60)   |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| 60 ≤  | 1.44   | 0.83 to 2.48 | 0.19    | 3.35       | 2.39 to 4.71 | 0.00    | 0.90  | 0.56 to 1.45 | 0.67    | 1.51 | 0.97 to 2.36 | 0.07    | 1.04      | 0.53 to 2.04 | 0.90    |
| Gender (base: female)                                   |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Male  | 0.85   | 0.55 to 1.30 | 0.45    | 1.24       | 0.91 to 1.68 | 0.17    | 2.15  | 1.36 to 3.42 | 0.00    | 0.75 | 0.50 to 1.12 | 0.16    | 1.08      | 0.60 to 1.94 | 0.79    |
| Language (base: non-Japanese)                           |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Japanese  | 0.25   | 0.46 to 3.35 | 0.66    | 1.00       | 0.99 to 1.03 | 0.25    | 1.01  | 0.99 to 1.03 | 0.43    | 1.01 | 0.99 to 1.04 | 0.26    | 1.02      | 0.99 to 1.04 | 0.17    |
| Employment status (base: others)                        |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Full-time   | 1.00   | 0.99 to 1.00 | 0.39    | 0.99       | 0.99 to 1.00 | 0.35    | 1.00  | 0.99 to 1.01 | 0.93    | 0.99 | 0.99 to 1.00 | 0.14    | 1.00      | 0.10 to 1.01 | 0.44    |
| Management entity (base: others)                        |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Sole proprietorship                                     | 1.12   | 0.73 to 1.73 | 0.61    | 0.95       | 0.69 to 1.30 | 0.73    | 1.67  | 1.07 to 2.60 | 0.02    | 1.61 | 1.02 to 2.53 | 0.04    | 1.05      | 0.57 to 1.95 | 0.87    |
| Organizational affiliation (base: not belonging to any) |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Belonging to any  | 0.99   | 0.98 to 1.00 | 0.06    | 0.99       | 0.99 to 1.00 | 0.16    | 1.00  | 0.99 to 1.01 | 0.88    | 1.00 | 0.99 to 1.01 | 0.95    | 0.99      | 0.97 to 1.01 | 0.36    |
| Eating and drinking (base: not allowed)                 |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| Allowed in the store                                    | 1.37   | 0.86 to 2.19 | 0.19    | 1.07       | 0.75 to 1.52 | 0.73    | 0.91  | 0.56 to 1.48 | 0.71    | 0.87 | 0.54 to 1.40 | 0.56    | 0.95      | 0.47 to 1.94 | 0.89    |
| Number of seats (base: <10)                             |  |              |         |            |              |         |       |              |         |      |              |         |           |              |         |
| 10 ≤  | 1.01   | 0.99 to 1.03 | 0.50    | 1.00       | 0.99 to 1.02 | 0.50    | 1.00  | 0.99 to 1.02 | 0.84    | 0.99 | 0.97 to 1.02 | 0.59    | 0.88      | 0.52 to 1.50 | 0.65    |

| independent variables                                   | dependent variables(1: utilizing 0: not utilizing) |              |         |            |              |         |               |              |         |               |              |         |
|---|--|--------------|---------|------------|--------------|---------|---------------|--------------|---------|---------------|--------------|---------|
|   | PBB  |              |         | Guidelines |              |         | Internet (SI) |              |         | Internet (MV) |              |         |
|   | OR   | 95%CI        | P value | OR         | 95%CI        | P value | OR            | 95%CI        | P value | OR            | 95%CI        | P value |
| Age (base: <60)   |  |              |         |            |              |         |               |              |         |               |              |         |
| 60 ≤  | 1.02   | 0.56 to 1.83 | 0.96    | 0.58       | 0.41 to 0.83 | 0.00    | 0.21          | 0.14 to 0.30 | 0.00    | 0.15          | 0.02 to 0.29 | 0.00    |
| Gender (base: female)                                   |  |              |         |            |              |         |               |              |         |               |              |         |
| Male  | 1.30   | 0.79 to 2.15 | 0.30    | 0.67       | 0.50 to 0.89 | 0.01    | 1.03          | 0.76 to 1.38 | 0.87    | 1.52          | 1.06 to 2.19 | 0.02    |
| Language (base: non-Japanese)                           |  |              |         |            |              |         |               |              |         |               |              |         |
| Japanese  | 1.01   | 0.98 to 1.03 | 0.52    | 0.99       | 0.97 to 1.02 | 0.55    | 1.01          | 0.98 to 1.03 | 0.57    | 1.01          | 0.99 to 1.03 | 0.32    |
| Employment status (base: others)                        |  |              |         |            |              |         |               |              |         |               |              |         |
| Full-time   | 1.00   | 0.10 to 1.01 | 0.48    | 1.00       | 0.99 to 1.00 | 0.61    | 1.00          | 0.10 to 1.01 | 0.19    | 1.00          | 0.10 to 1.01 | 0.35    |
| Management entity (base: others)                        |  |              |         |            |              |         |               |              |         |               |              |         |
| Sole proprietorship                                     | 0.61   | 0.37 to 1.01 | 0.05    | 0.60       | 0.45 to 0.81 | 0.00    | 0.71          | 0.53 to 0.96 | 0.03    | 1.22          | 0.86 to 1.74 | 0.26    |
| Organizational affiliation (base: not belonging to any) |  |              |         |            |              |         |               |              |         |               |              |         |
| Belonging to any  | 1.00   | 0.99 to 1.01 | 0.41    | 0.99       | 0.99 to 1.00 | 0.13    | 0.99          | 0.99 to 1.00 | 0.08    | 1.00          | 0.99 to 1.01 | 0.70    |
| Eating and drinking (base: not allowed)                 |  |              |         |            |              |         |               |              |         |               |              |         |
| Allowed in the store                                    | 0.78   | 0.45 to 1.36 | 0.38    | 1.01       | 0.72 to 1.42 | 0.94    | 1.10          | 0.48 to 1.55 | 0.58    | 1.08          | 0.72 to 1.62 | 0.73    |
| Number of seats (base: <10)                             |  |              |         |            |              |         |               |              |         |               |              |         |
| 10 ≤  | 0.89   | 0.57 to 1.37 | 0.58    | 0.99       | 0.68 to 1.01 | 0.22    | 1.00          | 0.98 to 1.01 | 0.58    | 0.99          | 0.97 to 1.01 | 0.40    |

IGB, information gathering behavior; PIM, public information magazines; PBB, public bulletin board, Guidelines, guidelines and instructions distributed directly from the government or upper management.

SI, still image; MV, movie.

**Table 4**  
Factors related to the comprehension level of the information obtained from each IGB.

|                              | Total (N = 957) |       | Technical terms used |       | Cannot come up with |       |                                |       |                           |       | Not in native language |      |
|------------------------------|-----------------|-------|----------------------|-------|---------------------|-------|--------------------------------|-------|---------------------------|-------|------------------------|------|
|                              | n               | %     | n                    | %     | Concrete action     |       | Application to their workplace |       | Where to earn necessities |       | n                      | %    |
|                              |                 |       |                      |       | n                   | %     | n                              | %     | n                         | %     |                        |      |
| Television                   | 123             | 12.85 | 29                   | 23.58 | 67                  | 54.47 | 27                             | 21.95 | 38                        | 30.89 | 4                      | 3.25 |
| Newspapers                   | 51              | 5.33  | 11                   | 21.57 | 23                  | 45.10 | 13                             | 25.49 | 12                        | 23.53 | 1                      | 1.96 |
| Radio                        | 24              | 2.51  | 1                    | 4.17  | 15                  | 62.50 | 9                              | 37.50 | 6                         | 25.00 | 0                      | 0.00 |
| Public information magazines | 28              | 2.93  | 4                    | 14.29 | 11                  | 39.29 | 6                              | 21.43 | 9                         | 32.14 | 0                      | 0.00 |
| Magazines                    | 24              | 2.51  | 0                    | 0.00  | 14                  | 58.33 | 6                              | 25.00 | 8                         | 33.33 | 0                      | 0.00 |
| Public bulletin boards       | 30              | 3.13  | 3                    | 10.00 | 20                  | 66.67 | 6                              | 20.00 | 5                         | 16.67 | 0                      | 0.00 |
| Guidelines                   | 57              | 5.96  | 18                   | 31.58 | 29                  | 50.88 | 6                              | 10.53 | 16                        | 28.07 | 1                      | 1.75 |
| Internet                     |                 |       |                      |       |                     |       |                                |       |                           |       |                        |      |
| (still image)                | 55              | 5.75  | 11                   | 20.00 | 32                  | 58.18 | 11                             | 20.00 | 13                        | 23.64 | 0                      | 0.00 |
| Internet (movie)             | 32              | 3.34  | 8                    | 25.00 | 18                  | 56.25 | 4                              | 12.50 | 7                         | 21.88 | 0                      | 0.00 |

IGB, information gathering behaviour; Guidelines, guidelines and instructions distributed directly from the government or upper management.

**Table 5**  
Obstacles related to utilizing IGB.

|                              | Total (N = 957) |       | Too little sound or letters |       | Taking too much time |       | Difficulty in finding the information |       | Distrust of the informant |       | Distrust of the information |       |
|------------------------------|-----------------|-------|-----------------------------|-------|----------------------|-------|---------------------------------------|-------|---------------------------|-------|-----------------------------|-------|
|                              | n               | %     | n                           | %     | n                    | %     | n                                     | %     | n                         | %     | n                           | %     |
| Television                   | 136             | 14.21 | 0                           | 0.00  | 43                   | 31.62 | 32                                    | 23.53 | 54                        | 39.71 | 44                          | 32.35 |
| Newspapers                   | 125             | 13.06 | 36                          | 28.80 | 60                   | 48.00 | 20                                    | 16.00 | 11                        | 8.80  | 9                           | 7.20  |
| Radio                        | 86              | 8.99  | 3                           | 3.49  | 32                   | 37.21 | 43                                    | 50.00 | 10                        | 11.63 | 5                           | 5.81  |
| Public information magazines | 115             | 12.02 | 17                          | 14.78 | 51                   | 44.35 | 45                                    | 39.13 | 16                        | 13.91 | 7                           | 6.09  |
| Magazines                    | 70              | 7.31  | 8                           | 11.43 | 26                   | 37.14 | 17                                    | 24.29 | 17                        | 24.29 | 16                          | 22.86 |
| Public bulletin board        | 78              | 8.15  | 10                          | 12.82 | 23                   | 29.49 | 45                                    | 57.69 | 7                         | 8.97  | 6                           | 7.69  |
| Guidelines                   | 154             | 16.09 | 18                          | 11.69 | 83                   | 53.90 | 69                                    | 44.81 | 9                         | 5.84  | 10                          | 6.49  |
| Internet (still image)       | 118             | 12.33 | 21                          | 17.80 | 44                   | 37.29 | 41                                    | 34.75 | 44                        | 37.29 | 22                          | 18.64 |
| Internet (movie)             | 144             | 15.05 | 5                           | 3.47  | 54                   | 37.50 | 44                                    | 30.56 | 48                        | 33.33 | 27                          | 18.75 |

IGB, information gathering behaviour; Guidelines, guidelines and instructions distributed directly from the government or upper management.

allowed in the store' (OR, 2.12; 95% CI, 1.01–4.43).

Among those who do not use the Internet (movie), 'taking too much time in the extraction of necessary information' had a negative association with manage entity 'sole proprietorship' (OR, 0.40; 95% CI, 0.17–0.97).

#### 4. Discussion

This study aims to assess the use and effectiveness of IGB among people engaging in eating and drinking services in Tokyo. The assessment intends to understand the IGB type used for disseminating countermeasures against COVID-19 and what IGB is evaded by the individuals.

##### 4.1. Implications for improving COVID-19 literacy from the perspective of IGB

It is clear that TV use is the primary source of information on COVID-19 prevention measures, regardless of the respondents' age. A similar trend was reported in a nationwide survey conducted in 2012, wherein TV had the highest usage rate among all age groups for obtaining disaster information [19]. A cross-sectional survey conducted among European and American respondents also reported wide use of TV as an information source during the first wave of COVID-19 [12]. Thus, governments and upper-level agencies that disseminate information need to keep in mind that respondents could refer to TV more often than other sources to obtain information.

Next, we would like to consider the need for different approaches for individuals over and under 60 years. The survey solidifies the belief that ageing is positively correlated with newspaper usage, a result consistent with past reports in Japan [20]. Therefore, it may be useful for them to publish such information and emphasize it for the elderly. In contrast, a negative correlation was found between age and Internet usage. Therefore, there is a possibility that information distributed through the Internet will not reach people in their 60s or older. It has been reported that the Internet usage rate itself, by age group of individuals, is over 90% for each age group from 13 to 69 years; 74.2% in the 70s and 57.5% in the 80s in 2019, Japan [21]. This may suggest that those under 60s can use the Internet for exploratory behaviour to obtain information, while those over 60s have difficulty in doing so. Indeed, Shimada et al. reported that the elderly in Japan may face difficulty obtaining necessary health information and assessing the need for it [22].

The finding that use of distributed guidelines had a negative correlation with individuals '60 years or older', 'male', and 'sole proprietorship' questions the current approach for this population. Deepening the ageing aspect, older individuals have better subjective control over their emotions and more positive emotional experiences, but they may choose to access information that positively supports their emotions [23,24]. During COVID-19, it has been pointed out that they may be systematically less responsive regarding self-isolation and adherence to

precautions [25]. Hence, information disseminators need to devise ways to better accommodate their counterparts, considering these psychological background issues with normal ageing.

##### 4.2. Relationship between IGB, background, and comprehension level of the obtained information

Difficulty in coming up with specific actions was the biggest challenge experienced by all the information-gathering groups. Moreover, full-time employees (responsible for communicating information effectively) at restaurants reported that the language of the guidelines was difficult to understand. These obstacles suggest that we need to rethink the methods used to communicate information to our target population. In the review of the effectiveness of health literacy interventions, Visscher et al. stated that interventions must be tailored to the needs of the objective, functional, and not difficult [26].

In contrast, respondents belonging to any organisational affiliation using guidelines may find less difficulty in coming up with specific actions. This may be because personal communication with members of their organisation may have been helpful, based on reports of disasters which suggests that vulnerability due to information gaps could be eliminated by strengthening social support [18].

##### 4.3. Obstacles related to using IGB

Regarding TV, distrust of information providers and information was cited most frequently among non-TV users. The negative correlation between age '60 and older' and 'distrust of information providers' is consistent with previous reports that middle-aged and older individuals are more trusting of TV programmes than younger people [27]. Moreover, younger individuals may have difficulty assessing the reliability of the information [22]. To be useful for all age groups, TV programmes need to present more specific information about citations and references to increase trust and reliability.

Regarding guidelines, it became clear that respondents may find it time-consuming to retrieve information. This suggests that articles should consider the layout and the need for better indexing. In particular, among stores where the government places the most importance on disseminating COVID-19 prevention measure information, the user experience of the guidelines needs to be improved. It could be restructured so that a glance can retrieve the necessary information.

The finding that respondents may also find it time-consuming to retrieve information using the Internet (movie) indicates that distributors must devise a way to shorten content or ensure appropriate indexing of content to allow viewers to directly view it.

##### 4.4. Limitations

In this survey, the questionnaire collection rate was 14.5%. Moreover, 96% of the respondents were native Japanese speakers, which may



be attributed to the fact that Japanese was the language used in the questionnaire; that is, respondents who were not native Japanese speakers may have been reluctant to answer the survey. These factors may have caused biases in the characteristics of the respondents.

## 5. Conclusion

To improve infection prevention measures against COVID-19 among eating and drinking services, various information has been distributed via IGBs. However, our study results indicate that current information dissemination methods may not effectively convey information of reach their target populations. To improve user understanding, it is necessary to use specific expressions and layouts that are easy to see and understand. Moreover, when presenting information that users must comply with, such as guidelines, it is necessary to use means that consider the target age group; specifically, adults 60 years of age and older tended to use guidelines and the Internet significantly less than the control group. The better approach could be a blended intervention with a combination of web- and paper-based tools to cover all age groups.

We must continue to think of better ways to improve literacy related to COVID-19 as this experience may be applicable to improving literacy for any pandemic.

## Contributors

AS and SO designed the study and all authors contributed to questionnaire development. AS prepared the dataset for analysis, and AS and OS undertook data analyses. AS wrote the manuscript with contributions from OS, YI, and KT. All authors reviewed the study findings and read and approved the final version before submission. AS is responsible for the overall content as guarantor. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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## Ethics approval

The survey was conducted anonymously. The instructions clearly stated the purpose, method, voluntary character of participation, and advantages and disadvantages. The instructions also advised that personal information would be protected and that if the participant did not agree to the survey, there was no need to answer or return the questionnaire. It was also stated on the cover page that by returning the completed questionnaire form, the participant agreed to participate. This survey was conducted with the approval of the Ethics Committee of the Faculty of Medicine, Toho University (approval date: August 10, 2021; approval number: A21023) and following the Declaration of Helsinki.

## Data availability statement

Data are available on reasonable request.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhip.2023.100357>.

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