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E-mail and Web-Based Survey Response Rates: Considerations for Disaster, First Responder and Military Populations

I. General Response Rate Issues

Many issues impact survey response rates. Broadly, these include availability at time of receipt of the survey, inclusion criteria, ability to complete the survey, and willingness to complete the survey. While it is important to account for all of these issues, response rates are typically calculated by simply dividing the number of surveys received by the number of surveys distributed. This approach tacitly assumes that all persons receiving the survey met inclusion criteria, that all surveys reached their destination, and that all potential participants were able to complete the survey.

II. Postal Mail Response Rate

Let's consider each of the issues mentioned above for a typical postal mail survey.

A. Inclusion Criteria: Depending on the nature of the survey, all individuals on a mailing list from a group or organization may not meet inclusion criteria based on the particular aims of the study. As such, a list must be created which is subject to inaccuracies by identifying some as meeting inclusion criteria who ought not have been included, and excluding some who would have met criteria. Therefore, one is often mailing surveys to individuals who will not meet the inclusion criteria. Also, an individual's status regarding inclusion criteria can change between the time of selection to participate in the survey and the time of survey administration. As an example, a survey intended to be completed only by "registered students" may reach some students who recently dropped out, transferred, or graduated. Such students would no longer meet the inclusion criteria to complete the survey. Further, potential participants may not be inclined to state why they fail to meet inclusion criteria on the survey,

B. Accessibility: Accessibility refers to whether the person is available at the time of survey administration. A person's accessibility may change during the course of the survey. For example, when sampling from a military population, one may select a sample to survey at a given installation with "presence at the installation on a particular date when an event occurred" as being a criterion for inclusion. In the ensuing months between the event and survey distribution, military personnel may be deployed or transferred, temporarily relocated for TDY (temporary duty), or even leave the military. Even though all of the persons meet the inclusion criteria, since these persons are not present at the installation to receive a survey, they would no longer be accessible. As another example, individuals who are on a long vacation or business trip or an extended hospital stay due to illness or rehabilitation may not be accessible at the time of the survey.

C. Receipt of Survey: Did the survey reach the intended participant? This is easily discerned when a survey is returned to the sender. However, not all undeliverable mail is returned to the sender. Further, if a family member still lives at the residence, it is likely

that the mail will be delivered to that residence even if the intended recipient no longer resides there.

D. Ability to Complete the Survey: A number of issues could impact this factor. For example, the ability to read and write is typically required for most surveys. If the recipient does not speak the same language used in the survey, then he or she might be unable to complete the survey. Suffering from serious illness can impede one's effort to complete a survey. Clearly, a person in a coma would be unable to complete the survey. For work-related surveys, the amount of time the recipient is available at work can be a factor, especially if his or her job entails extensive travel or off-site field work. In addition, whether or not time is provided during work to complete the survey could be a factor in the individual's ability to complete the survey.

E. Willingness to Complete the Survey: While this is the most straightforward category in terms of definition and classification, there are still issues worth consideration. We may wish to differentiate "true willingness" from issues such as survey overload and burnout.

III. E-mail and Web-based Response Rate Issues

E-mail and web-based surveys tend to yield lower response rates than postal mail surveys. In addition to the items that apply to mail, those items could also pertain to email and web surveys We reconsider the same four issues, now from the perspective of e-mail and web-based surveys, to better understand this trend.

A. Inclusion Criteria: The issues surrounding inclusion may be very similar to those arising with postal surveys. However, what can be different is that it might be even more difficult for a participant to explain the nature of his or her exclusion criteria if an e-mail or web-based survey does not have an allotted space on the electronically-completed form (e.g., only checkboxes) for such explanation. Email recipients are often likely to delete an e-mail rather than reply and provide information as to why they do not meet inclusion criteria.

B. Accessibility: The issues for accessibility are essentially the same as those arising with postal surveys.

C. Receipt of Survey: This issue constitutes the greatest source of deviation from the postal mail survey. E-mail addresses are likely to change more often than postal mail addresses. Since e-mail addresses are usually individually-based, whereas postal mail addresses may be occupied by more than one person, this raises additional issues related to receipt. Due to the increased use of anti-virus and anti-spam protection software and the use of e-mail filters, the number of undeliverable e-mails continues to increase. Recent literature indicates that between 5.3% and 25.5% of all e-mail surveys are undeliverable. Other examples of undeliverable surveys could be due to a person's e-mail inbox may be full. The e-mail service may not be functional for the duration of the survey. Even if a survey actually reaches the intended person's inbox, the recipient may not open the e-mail, due to concerns about spam or viruses, not having available time to complete the survey, not recognizing the sender, or issues of survey overload and burnout. As such, the person may delete the e-mail without ever opening it.

D. Ability to Complete the Survey: The ability to complete an e-mail or web-based survey requires access to the Internet. This is referred to as "noncoverage." For example, older persons and persons with a lower socio-economic status may have limited access to the Internet. Persons with non-office-based jobs may have limited access to their work-provided Internet service and e-mail, and at times, such access may even be blocked. This is also an issue when surveying persons in countries without easy access to the Internet.

E. Willingness to Complete the Survey: This is the most straightforward category. The issues remain similar to those arising in postal surveys.

IV. Military, Disaster, and Public Health Responder Population

Military, disaster and public health responder populations are particularly challenging with respect to response rates for web-based and e-mail surveys. The nature of the pace and duties of this population would have significant impacts. For example, it is very common that persons are deployed, on TDY at a different location, detailed on a specific duty, in addition to usual illness or leave. As such, they are not available to receive the survey and may no longer be eligible to participate (for example, if the survey was to be administered pre-deployment and the person is now deployed). While all organizations experience some level of turnover, the rates may be much higher in these populations, particularly in the military. For example, approximately one-third of the Army leaves the Army every year. Also, this population, due to training, may be extremely wary of spam and viruses and therefore may be less likely to open an "unofficial" e-mail.

Military, disaster and public health responder populations' ability to complete a survey may also be significantly hindered by being at a location or on an assignment that does not allow for e-mail/Internet access. Further, their personal time may be quite limited. Depending on their current assignment they may not have sufficient time to complete a survey. In addition, these populations may have limited personnel, time and resources to cover the duties of individuals attempting to take the survey.

An advantage in surveys with these populations is that their willingness to complete the survey may actually be higher than in other groups due to their commitment to the populations they serve.

V. Calculating Response and Other Rates

According to the American Association of Public Opinion Research (AAPOR), standard response rates include the number of surveys completed (partially completed surveys may be included) divided by the number of surveys completed + the number refusing to complete the survey + the number of non-contacts + the number of persons of unknown eligibility. If an estimate of the percentage of unknown eligibility cases that are eligible is known, this may be used instead.

According to the AAPOR, a cooperation rate includes the number of surveys completed (partially completed surveys may be included) divided by the number of surveys completed + the number refusing to complete the survey even though eligible + the number of other eligible participants who did not complete the survey. In a modified version of this rate, the AAPOR removes those unable to complete an interview from the denominator.

In the *Department of Defense Survey of Health Related Behaviors Among Military Personnel (HRB)*, an accessibility rate is used. The accessibility rate is the percentage of persons selected that were still available to be surveyed at the time of the survey. The response rate is calculated as the number of persons completing the survey divided by the number of accessible persons at the time of the survey.

The cooperation rate, as well as a response rate that accounts for accessibility, may offer a method for calculating a performance rate for e-mail and web-based surveys. This would allow for the calculation of a performance rate that captures those who completed the survey amongst those that were eligible, accessible, received the survey, had the ability to complete it, and consented to do so.

VI. Conclusion

Numerous elements affect the meaning and calculation of response rates, particularly in military, disaster and first responder populations. Only when the response rate is quite high can it be an indicator of representativeness, but even then it is only one index for assessing representativeness.

Response rates represent a group of concepts ranging from accessibility rates to completion rates. Better describing how a calculation is made and what it represents will facilitate its understanding and use, particularly among mail and e-mail surveys.

In order to best describe a response rate, a number of persons may need to be removed from the denominator. Unfortunately, it may not always be feasible for researchers to obtain exact numbers of persons who were unavailable, ineligible, or unable to complete a survey. Researchers may need to estimate some of these numbers based on the available empirical literature or through the use of key informant surveys.

Table 1: Items to Remove from Denominator for E-mail / Web-based Survey Performance Rates

A. Inclusion Criteria

1. Person meeting inclusion is excluded from list
2. Person not meeting criteria is included on list
3. Person's status regarding inclusion criteria changes between time of selection to participate and time of survey administration
4. Person reticent to respond to survey to explain why he or she is ineligible
5. Person cannot explain why he or she is ineligible due to limitation of electronic form.

B. Accessibility

1. Extended absence from work (deployed or transferred, temporarily relocated, or even leave the job/military).
2. Extended absence from home (long vacation or business trip).
3. Illness

C. Receipt of the Survey

1. An undeliverable survey is returned to sender
2. Survey arrives at the correct address, but it is no longer the intended recipient's permanent residence.
3. E-mail survey is undeliverable due to an error in the e-mail address.
4. Anti-virus and anti-spam software prevents delivery of e-mail survey
5. Recipient's e-mail inbox is full
6. E-mail server is not functional for duration of survey
7. Recipient deletes the e-mail survey without opening it.

D. Ability to Complete the Survey

1. Recipient does not understand the language in which the survey is written.
2. Serious illness impedes a recipient's ability to complete the survey.
3. Amount of time the recipient has to complete the survey is severely limited.
4. Recipient has limited access to the Internet.

Table 2: Operational Calculation of Postal/E-mail / Web-based Survey Performance Rates

	Postal Mail	E-mail and Web-Based
Total Number of Surveys Distributed	**$N_{POSTAL\text{-}initial}$**	**$N_{EMAIL\text{-}initial}$**
A. Inclusion Criteria		
1. Does not meet inclusion criteria		
2. No longer meets inclusion criteria due to criterion changes		
Subtotal for Eligibility Criterion	**Subtract** a_1	**Subtract** a_2
B. Accessibility		
1. Absent from work (deployed or transferred, left job).		
2. Absence from home (long vacation or business trip).		
3. Ill		
Subtotal for *Accessibility* Criterion	**Subtract** b_1	**Subtract** b_2
C. Receipt of the Survey		
1. Undeliverable surveys		
2. Incorrect address		
3. Anti-virus and anti-spam software prevents delivery of e-mail survey.		
4. E-mail service is not functioning		
5. Recipient deletes the e-mail survey without opening.		
Subtotal for *Receipt of the Survey* Criterion	**Subtract** c_1	**Subtract** c_2
D. Ability to Complete the Survey		
1. Recipient does not understand the language.		
2. Illness impedes the ability to complete the survey.		
3. Limited amount of time to complete the survey.		
4. Limited access to the Internet or email.		
Subtotal for *Ability to Complete the Survey* Criterion	**Subtract** d_1	**Subtract** d_2
Number of Surveys Used in Denominator of Performance Rate	**$N_{POSTAL\text{-}final}$**	**$N_{EMAIL\text{-}final}$**

$\mathbf{N_{POSTAL\text{-}final}} = N_{POSTAL\text{-}initial} - (a_1 + b_1 + c_1 + d_1)$

$\mathbf{N_{EMAIL\text{-}final}} = N_{EMAIL\text{-}initial} - (a_2 + b_2 + c_2 + d_2)$