Estimating the students' behavior toward their potential marital tendencies

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Abstract

The purpose of doing research with a survey is to collect data from a statistically significant subset of the population using a predetermined set of questions. Some people may be wary of participating in sample research because of the personal information that participants may divulge. People's tendency to conform to societal standards while answering surveys can affect response rates. The RRT has resulted in an ever-expanding corpus of work on other approaches to acquiring sufficient RR patterns to represent a population subset. Standard random, to simplify the way respondents reply to sensitive questions and estimate the proportion of people who have a specific responding trait, surveys commonly use binary replies. On the other side, there have been investigations into situations where sensitive question answers provide quantitative variables. Warner's contributions have sparked significant interest and research in this area. These methods have found applications in many other places, and much literature exists on them. However, these approaches have problems and limits, so new indirect strategies have emerged. Regarding sensitive traits like cheating, the Mangat Singh UB randomized response methodology yields more accurate findings than RRT techniques.

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1 Introduction

Research methods that ask a predetermined set of questions to a larger population are known as surveys (Aityan, & Aityan, 2022; Shearer, 2021). Complex or individual respondent characteristics are often the center of attention in sample survey studies. Our goal is to use the Randomized Response Technique (RRT) to determine the extent to which dishonesty, which is generally considered illegal, is present (Krumpal, & Voss, 2020; Chaudhuri, 2011). We hope that using this strategy will get these pupils to give us honest and accurate answers. Respondents will feel more comfortable providing honest responses since their identities remain secret. It was first proposed (1965) that the randomized approach be used. As part of this method, interviewers asked participants to choose between two options using a randomized device. To determine how many people in a population have a sensitive nature trait without revealing that information, Warner (1965) proposed the RRT methodology. Initially, participants were guaranteed anonymity by responding to sensitive questions using a randomization mechanism, such as a standard deck of cards or dice, where only they could see the results. This constraint has been the focus of attempts to address and overcome it, considering the expressed concern.

Participants in the studies conducted by Greenberg (1969) and Abul-Ela et al. (1967) chose between two statements. While one comment deals with delicate subject matter, the other is completely irrelevant and acts as a secure inquiry or control. In addition, a more effective randomized approach was developed by Magnet (1994). Their method is inconvenient as it requires two randomizer devices for the interview. In addition, a more effective randomized approach was developed by Magnet (1994). Their method is inconvenient as it requires two randomizer devices for the interview (Höppner et al., 2022). Using a coin toss or other randomization device and the interviewer's decision to ignore the result is a prevalent strategy in developing and studying the randomized response method (Blair et al., 2015; Mbala, 2020). In their study, Schroter et al. (2016) compared two randomized answer models: the Cheater Detection Model and the Unrelated Question Model (Reiber et al., 2022). We use the Unrelated Question Model (UQM) and the Cheater Detection Model (CDM) for this. They used a generalized likelihood-ratio test to determine whether or not the estimations were statistically significant. Regardless, Chong et al. (2019) conducted practical research. Using the randomized response as its primary method, this study aims to determine what causes the inappropriate and illegal disposal of sensitive data. Also, according to Oladele et al. (2020), randomized response approaches have shown improved efficacy by including an unrelated design, which has led to less responder mistrust and greater efficiency. Irrespective, Rueda et al. (2020) suggest that applying the Randomized Response Technique (RRT) may enhance the accuracy of self-reporting (Rueda et al., 2020) for judging improper behavior among university students. Ibbett et al. (2021) state that people act based on their existing body of information. To address concerns about bias in randomized response question designs, it is recommended that the response rate be raised and measures to enhance anonymity storage be used. The use of randomized response designs to study self-protective reactions within a survey performed during the COVID-19 pandemic was investigated by Reiber et al. (2022) in their research into intimate relationship violence. Combining proportional odds models with missing variable accounting, Hsieh, et al. (2022) two-stage multilevel randomized response technique is being studied.

2 Limitation

Some people could benefit from the following restrictions.

1. Assessing the reliability of RRT is challenging since it replaces direct questioning. This option becomes significant when questioning individuals directly, as it will likely elicit more

politically acceptable replies than honest ones.

2. RRT surveys might be more time-consuming and costlier than other survey approaches.

3. RRT surveys often incur higher time and financial costs when contrasted with other survey approaches.

4. Since RRT provides an alternative to direct inquiry in cases where the latter could provide socially acceptable instead of genuine answers, assessing its validity is not simple. The RR method was developed in surveys that probe delicate topics to lessen the impact of response and non-response bias.

3 Methodology

The following section outlines the methodological technique used to conduct the research. It will include the explanation and rationale behind the chosen research design and the strategy implemented to complete it effectively.

The questionnaire now includes both sensitive and non-sensitive questions. Asking non-sensitive questions can determine the likelihood of receiving a positive answer. When the interviewers are uninformed about the subject, the respondent offers a candid answer. It is based on the following stages:
1. Assessing the feasibility of including inquiries about delicate subjects.
2. Analyzing the ratio of positive responses to non-sensitive questions to quantify it.
3. Determining the total number of participants who responded positively to sensitive and non-sensitive inquiries.

A section of the opening questions in the survey focuses on sensitive behaviors, such as asking about preferences for love marriage and past involvement with boys (Jeong et al., 2023). We used a system devised by Mangat Singh UB. This design is much more appropriate and less intricate than prior iterations of the Randomized Response Technique (RRT). They implemented "randomizers" using the "coin flipper." The decision was to use the randomization tool. The program is intuitive, with the user just needing to click to activate the "Randomize" function. In our research, students would provide their responses to the sensitive question when the coin exhibited a "head" and to the non-sensitive question when it showed a "tail" after activating the button to reveal the coin's outcome.

In the Mangat-Singh paradigm, the individual being sampled is presented with a choice between two sets of cards. In the first box, a specified fraction t, where $0 < t < 1$, of the cards is labeled as "True," and the rest are labeled as "RR." A card must be selected, examined, and returned to the box. If the card that is selected is labeled as "True," If the responder falls into the sensitive group, they should reply "Yes"; otherwise, they should reply "No." If the selected card is labeled as "RR", then the person answering must use the second container and choose a card from it. The second box includes a percentage p, where $0 < p < 1$ and p is not equal to 0.5, of cards designated A. The other cards are marked Ac. If the card selected from the second box corresponds to the individual's situation in relation to the stigmatizing attribute, they are required to answer "Yes"; otherwise, they should answer "No". The answer obtained from an individual labeled "i" is believed to be randomized.

$$= \begin{cases} y_i & \text{If a card labeled "True" is selected from the initial box} \\ I_i & \text{If a card labeled "RR" is selected} \end{cases}$$

$$= \begin{cases} 1 & \text{If a "card type" is either A or Ac and it corresponds to the authentic characteristic A or Ac} \\ 0 & \text{If a "inconsistancy" is detected} \end{cases}$$

The variable has been altered

$$r_i = \frac{z_i - (1-t)(1-p)}{t + (1-t)(2p-1)}$$

The computed variance is

$$\hat{V}_R(r_i) = r_i(r_i - 1)$$

3.1 An R package for randomized response techniques in complex surveys

The RRTCS programmed is specifically developed to estimate linear parameters utilizing complicated survey data obtained via diverse sampling strategies. The software has the capability to accommodate various sampling strategies, such as stratification, clustering, and combinations. The package comprises 20 datasets obtained by randomized response techniques, including both actual and simulated populations. The research focused on university students and their participation in academic dishonesty and malevolent intentions towards others. It employed a survey questionnaire, including two distinct sets of questions. We created a dataset named "MyData123" by collecting information from a sample of 100 students. We picked the sample using a method called simple random sampling without replacement. We used the Mangat Singh UB model to estimate the percentage of students exhibiting the stated features in the dataset.

3.2 Design for a Mangat Singh UB Model

The following are the available methodologies for conducting a questionnaire:
- A portion of the respondents offers inaccurate answers.
- The interviewers could persuade respondents to answer their questions.

The survey is:

Head	Do you want to do love marriage?	YES	NO
Tail	Were you born in July?	YES	NO
Head	Have you had any affair with a boy?	YES	NO
Tail	Were you born in Multan?	YES	NO

This data collection contains the results of a university-wide survey that used a randomized response approach to examine student involvement in love marriages and affairs with males. The sample was chosen using cluster sampling, which included grouping, and stratified sampling, which involved categorizing by professor. The study used the Mangat Singh UB model (2013) with p = 0.2, 0.3, 0.4, and 0.5 parameter values for the randomized response analysis. Are you from Multan? Were you born in the month of July, correct?

3.3 Mangat Singh UB technique description

A coin toss was used to determine the answer to the question.
- Step 1: The participant tosses a coin and responds.
- Step 2: Determine the questions you must answer in each phase, depending on the side of the coin.

Respondents must provide a response when presented with the head outcome and answer the head question if the head is present. Every inquiry requires the implementation of a distinct set of procedures. Before depositing the survey sheet into a turn, the participant was only required to verify the replies they intended to record on it.

Table 1. Results (Mangat Singh UB-estimation)

Questions	Mangat Singh UB Estimation.	Mangat Singh UB Variance.	Mangat Singh UB Lower bound.	Mangat Singh UB Upper bound.
QNO1	1.153358	0.04320883	0.7459454	1.56077
QNO2	0.93998	0.03901701	0.5528337	1.327126

Table 1 displays the estimated value of Q1 by Mangat Singh UB, which is 1.1533. The variance of Mangat Singh UB is 0.0432. The lower limit is 74%, and the upper bound is 15%. The data

indicates that 74% of individuals choose a love marriage. In Q2, the estimated UB for Mangat Singh is 0.939, with a variance of 0.03901. The lower bound is 55%, and the upper limit is 13%. The outcome indicates that 55% of individuals engaged in a romantic relationship with a male.

The histogram shows the Mangat Singh UB mean estimator, variance and its upper and lower bounds.

4 Conclusion

Wealthy nations often adopt targeted strategies that result in consequences, whereas poor countries have obstacles arising from limited educational opportunities, limited exposure to new technology, and distinctive demographic characteristics (Mhlanga, 2021). Currently, the population has been segregated into two distinct categories: one for men and the other for females. Among the 100 pupils in the sample, 52.8% were of the female gender. The prevalence of academic dishonesty, particularly in the context of romantic relationships and extramarital affairs, is unquestionably increasing inside our institution. This shows the emerging need to explore this topic in more detail so that the reasons for this outcome may be discovered. Our study only gives the number of such types of relationships. The widespread use of mobile phones and computers has fueled the rise in technologically advanced fraud, which may be the cause of this growth (Alenezi et al., 2020; Ibrahim, 2022). In contrast, our classroom standards regarding cheating and copying are similarly permissive.

Using the RRT without first teaching interviewees the interviewer's language is highly discouraged. Training participants in the RRT method requires careful planning and execution. Since RT could provide inaccurate results when used in public, it is best to use it in a private environment (Zhang, 2022). Conducting the survey is easy if the respondent is positioned outside the house, as we can easily recognize them. It is expected that the interview will be completed within the allotted time. Respondents in underdeveloped countries have been skeptical and believed a trick was used in certain study situations due to the usage of the RRT (Thomas, & Kureshi, 2020). Our research not only attracted the attention of other respondents, but we also attained the greatest degree of compliance. But there was a problem with a little question in our

research. An extra irrelevant question might be added to the research to make it more legitimate. For those with less education, nevertheless, this method could be difficult. Gathering a group of interviewers, giving them instructions on how to protect interviewees' privacy, and making sure everyone is knowledgeable about RRT methods are all ways to increase the method's validity. The efficacy of RRT outcomes across different populations should be evaluated, taking both educated and less-educated respondents into account (Jones et al., 2023). In order to encourage respondents to work together, a number of randomization schemes have used the concept of tampering with the values of the sensitive variable using jumbled distributions. Several sources state that RR gives a more accurate picture of the incidence of illegal conduct than just talking about a delicate subject. The results of direct inquiry are more reliable than those of randomized response approaches, according to multiple scientific studies.

One major issue with randomized answer approaches is that they are less effective and produce more sample variation compared to estimated surveys. However, resampling a complex survey design to a random response survey may be able to solve issues with biased variance estimates. In instances involving multistage sampling, the Jackknife variance estimator has shown its efficacy. In addition, to handle complex survey designs like clustering and stratification, we suggest expanding the classic Jackknife variance estimator.

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