Statistical Literacy in an Age of Misinformation

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Abstract

The new digital age has brought about a wide range of information that is readily available to the masses. Providing the public with reliable statistical information can empower them to make informed decisions in their everyday lives. On the other hand, misunderstanding or misinterpreting the statistics provided can also bring about poor decision making and lead to the proliferation of fake news.

Statistical literacy, known as the ability to understand and interpret statistics, is increasingly important in this new digital age. Statistics should also be supplemented with sufficient contextual information and be made simple to understand, otherwise there is a risk of misinterpretation regardless of the level of statistical literacy.

As statistical information becomes more widespread, a lack of statistical literacy among different users and stakeholders can be problematic on various fronts. Firstly, policymakers are relying more on data for evidence-based policy development in recent years. A lack of statistical literacy among policymakers could be detrimental to the quality and efficacy of policies implemented in a country.

Secondly, institutions are responsible for the dissemination of information to the public, and when unsubstantiated and misleading statistics is circulated in the public domain, it undermines trust and confidence within the larger community.

Thirdly, individuals misinterpreting statistical information can have a viral effect, where the wrong information gets spread through different channels and eventually reaches the masses.

To improve statistical literacy within society and to prevent the spread of misinformation, the Singapore Ministry of Manpower has put in place a quality framework, consisting of (i) verification, (ii) regulation, and (iii) education. For the framework to be effective, a comprehensive series of checks and procedures has to be implemented by the various stakeholders. Individuals, institutions and governments all have a role to play in being vigilant when consuming and disseminating information. Only when there is trust in official statistics, can there be a conducive exchange of ideas, and a platform for effective policies to be developed.

The paper discusses the challenges of a lack of statistical literacy within society, how it can be overcome, and the initiatives that Singapore has implemented to improve statistical literacy and the way statistics is disseminated.

Keywords: statistical literacy, misinformation

1. Introduction

We live in a world where data permeates our daily lives. Data has many uses and applications that can enable individuals, companies and governments make informed decisions. It can be used as a tool or a weapon, hence it is important to use data effectively and constructively. This is where statistical literacy comes in useful. Statistical literacy is generally known as the ability to understand and interpret statistics. As statistics are the results of interpreting data, we will also focus on the use of statistics in this paper.

With large amounts of information being widely available, it is inevitable that some of it may be false or inaccurate. It is also important to distinguish between misinformation and disinformation. Misinformation is false information that is being created or spread, regardless of the intention to deceive. Disinformation is false information that is deliberately created or spread, with the intention to deceive. Although there is plenty of misinformation out there, not all are created with the intention to deceive. Instead, we should raise the level of statistical literacy so that people can assess and make judgements for themselves.

The general level of statistical literacy differs from country to country. It can be argued that developed countries tend to have a higher level of statistical literacy than developing countries, due to a higher level of education and a more skilled workforce. Nevertheless, continuously trying to increase the level of statistical literacy in a population should be a common goal, given the amount of misinformation that is being transmitted in online and offline spaces. Individuals need to understand the importance of interpreting statistics correctly so that they are well-informed of the happenings around the world and not be misled.

2. Challenges

With the spread of misinformation and disinformation in the public domain, a lack of statistical literacy may pose a few challenges to society. The magnitude of the challenges may differ across countries, and the impact on societies may not always be homogenous. In this section, we look at the different groups within society that may be affected due to the spread of misinformation and a general lack of statistical literacy. The groups, while not exhaustive, can be categorized into governments, institutions and individuals.

i)   Governments

With the advancement of technology, governments around the world are utilizing data for evidence-based policy development. As the policies implemented have a substantial impact on the population, it is crucial that the policies reflect accurately the current situation on the ground. As such, governments often require large amounts of timely, reliable data from a variety of sources to achieve their goals. The next step is to utilize the data accurately and effectively. Government officials and policymakers have to be well equipped with sufficient statistical knowledge to be able to interpret the different statistics available. With the knowledge, relevant policies can be developed for the benefit of the country. Conversely, a lack of statistical literacy may affect the government's policymaking.

Governments should also seek to raise the statistical literacy of its general population. Failure to do so might cause its population to be susceptible to misinformation. This would lead to an air of mistrust between the population and the government, where misinformation is prevalent everywhere and people are misled into false narratives and news.

ii)   Institutions

In this paper, institutions refer to organizations that provide goods and services to the population. They can comprise of profit and non-profit organizations. These institutions often disseminate information to the public, as a means to advertise or to inform. Due to the amount of outreach that they have, institutions have a responsibility to provide information that is credible that do not mislead or misinform their target audience.

There is a risk that organizations may prioritize their own interests such as profit-making and disseminate information that pushes their own agenda. For example, they may put forth statistics that inflate or obfuscate their sales numbers so as to give an illusion of popularity of their products and services. They may also publish selective statistics to give consumers an impression that their products are more effective that it really is. In these cases, consumers should have adequate statistical literacy to understand that the statistics may not be reflective of the actual situation.

iii)   Individuals

Individuals are able to receive news and information from an increasing number of sources these days. On the same note, it is also more likely for individuals to be exposed to

misinformation, making statistical literacy more crucial than ever. If individuals spread or share the misinformation further, it could lead to a viral effect where exponentially more and more people consume this information. It would be difficult to reverse the damaging effects of the spread of misinformation, even after the information has been corrected.

In the past, the problem was less pronounced as traditional forms of media such as television, radio and newspapers tend to be more regulated by local governments. With the rise in digital technology, it is increasingly common for individuals to consume information from the internet and social media, where content is less regulated. Individuals are generally able to post information freely on the internet, and often hidden behind anonymity. Therefore, in the absence of any moderation or regulation, there is a risk of misinformation or disinformation being spread freely online.

3.   Solutions

There are several ways where the spread of misinformation and a lack of statistical literacy can be dealt with. Every group in society has a part to play in this endeavor. In this section, we will focus on three main areas – (i) verification, (ii) regulation and (iii) education. We will also look at some ways where Singapore is able to overcome these challenges.

i)   Verification

Before any information is made available to the public, it should be verified for accuracy. Facts and statistics also need to be explained in context so that they do not mislead or confuse the public. It is important to create a culture whereby public and private organizations are made accountable for the information that they publish and any misinformation has to be corrected as soon as possible. Verification is not always foolproof and some information may contain errors or be taken out of context due to inadequate explanation. The premise is for organizations and individuals to be self-aware such that they understand the consequences of spreading misinformation and the harm on society it may bring.

In the current digital age, the speed at which information is spread can be a double-edged sword. While many people can be exposed to the misinformation in a short period of time, this can also reach the government authorities or other righteous groups just as quickly. They can then reach out to the original poster of the information for clarification. If the misinformation

was just an oversight without any intention to deceive, the original poster of the information can correct or clarify on the information posted. If this does not work out, the government or the public can exert pressure on the original poster to correct the information or risk its reputation being damaged.

Individuals can develop a habit to verify and cross-check what they read, especially if the news source or its contents seem doubtful. They can verify with official news sources or more reputable news outlets. With the viral effect of social media, they can also warn others of the possibility of fake news.

In Singapore, organizations generally have a strong inclination to ensure that the information published are verified to be accurate, whether it is due to their strong corporate responsibility, the need to protect their reputation or to adhere to regulations. The public also acts as effective whistleblowers such that any misinformation can be detected quickly and reported to the relevant authorities. This is due to most Singaporeans being savvy enough to know how to identify and verify any misinformation online. Organizations are then able to correct any misinformation that they have published within a short period of time, whether it is online or offline. It is beneficial to have a platform or system that facilitates any correction to be made and further context to be provided. For offline modes such as print media, it may take a longer time to be corrected.

ii)   Regulation

Having laws and regulations can act as a deterrent to prevent the spread of misinformation and disinformation within society. It acts as an additional layer of protection against individuals or organizations who may have ulterior motives in deliberately spreading misinformation. There has a be a right balance between having harsher penalties and punishment and encouraging free flow of information. Having too strict regulations may limit journalistic freedoms and lead to a closed society. However, without any regulation, society may become divided and people having distrust among themselves.

In Singapore, there are laws put in place to prevent and minimize the spread of fake news. The Protection from Online Falsehoods and Manipulation Act (POFMA) is an act that helps protect the Singapore public against online harm by countering the proliferation of online falsehoods. It was passed by Parliament and came into effect in 2019. POFMA's primary tools to correct falsehoods are correction directions which require recipients to insert a notice against

the original post, with a link to the government's clarification. The clarification sets out the falsehoods and facts for the public to examine, without the original post being removed.

There have been several instances when POFMA has been invoked. During COVID-19, the government has issued correction directions to individuals who spread falsehoods about the virus. Another instance where POFMA has been used is when people spread falsehoods that exploit racial and religious fault lines which may end up dividing the public.

Spreading misinformation may also come from foreign sources. As an open, highly digitally connected, and diverse society, Singapore is vulnerable to the evolving threat of foreign interference. Foreign interference may take the form of foreign actors seeking to manipulate domestic politics, including through covert and deceptive means, to undermine Singapore's political sovereignty or harm its social cohesion. To tackle this, there is the Foreign Interference (Countermeasures) Act, which allows the government to remove or block access to online content when suspected foreign interference may be involved.

### iii)	Education

To minimize the effects of the spread of misinformation, a more effective, long-term approach would be to educate society in order to raise the statistical literacy and awareness of its population. When people are able to assess and verify effectively the information that they read, they would be able to form their own judgements and not be misled by the misinformation.

Education on statistical literacy should start from a young age, such as in high schools and middle schools. Students can be taught to verify the information they read, especially if it comes from unreliable sources. They can also seek clarifications from their teachers and mentors. As they progress to tertiary institutions, basic statistical concepts or "Statistics 101" can be made mandatory for students to learn. This will enable them to understand and interpret statistics better, leading to more informed decision-making and opinions.

To educate the general population, a wide range of learning content can be made available on government websites and the mass media. These can be easily accessed by anyone at any time. Additional contextual information can also be accompanied with each statistical release to help individuals understand the information better, and the underlying reasons behind each statistic.

In Singapore, a targeted approach is adopted for each stakeholder. As the level of statistical literacy differs among users, informal polls are conducted to understand users' knowledge of

statistical information and concepts. We then tailor the type of statistical information that we provide to the various stakeholders.

Firstly, we collaborate with tertiary institutions to conduct sharing sessions with students at their school premises. Some of the younger statisticians are sent to various institutions to conduct lectures and engage with the student audience. For example, we share the latest statistics on the labour market and how to interpret them so that students can make informed decisions on their job search when they graduate. Their knowledge on statistical concepts is also strengthened which will put them in good stead when they step into the working world.

Secondly, media sessions are organized for media personnel such as journalists, editors and reporters. Through these sessions, they are taught how to best interpret and utilize official statistics so that they can do their reporting more effectively. Common misconceptions are also cleared as they may not be immediately intuitive for the layman.

Thirdly, we have incorporated interactive tools on our online platforms to make statistics more vibrant and interesting for users. Videos and animations on statistical concepts are created to help users understand different statistical concepts. A detailed explanation on each statistical concept, together with common misconceptions and pitfalls is also included. Short quizzes are also available to users to test their understanding of statistical concepts.

Lastly, our statistical releases come with additional contextual information in order to augment the public's understanding of the statistics. Infographics and blog posts are published to make the information digestible for the layman. Statistical reports and news coverage provide comprehensive analysis and reasoning behind the numbers. Different professionals, ranging from economists to HR practitioners are also invited to give their takes on the statistics and the situation on the ground. Overall, these initiatives provide a good foundation for statistical literacy among the population.

4. Conclusion

Countries and societies face different challenges due to the spread of misinformation, which is further exacerbated by the lack of statistical literacy. Through identifying and acknowledging the problems, countries can tailor their own initiatives and solutions in order to combat the adverse effects of misinformation.

Apart from implementing rules and regulations to curb the spread of misinformation, it is important to raise the level of statistical literacy of the population. This acts as an additional layer to shield the population from the harmful effects of misinformation and can be a longer-term solution to an ever-increasing problem.

Beyond the national level, international agencies and organizations can take the lead in promoting statistical literacy across countries. With the wide reach of the internet, they can develop tools that provide statistical learning opportunities to the global masses. The international community can emphasize to each other the importance of verifying information that is being published online. This also includes debunking specific myths and untruths and overall making the internet a safer space for people to get information from.

While it remains a work in progress, we can take encouragement that statistical literacy is an area that more people are conscious of and governments around the world are starting to place greater importance on it and its role in this current age of misinformation.