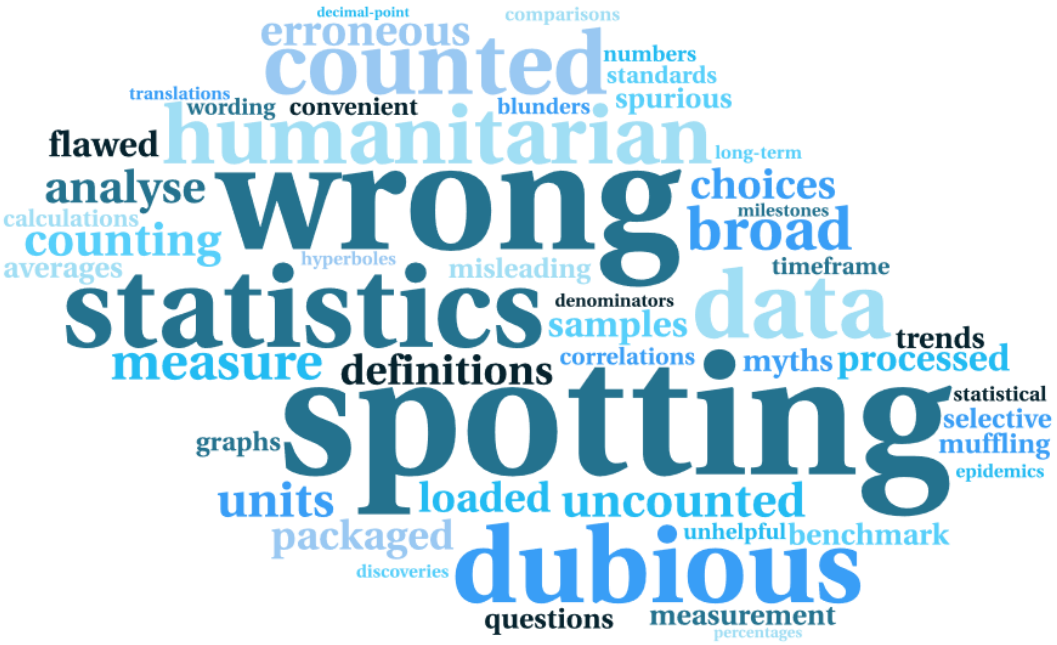
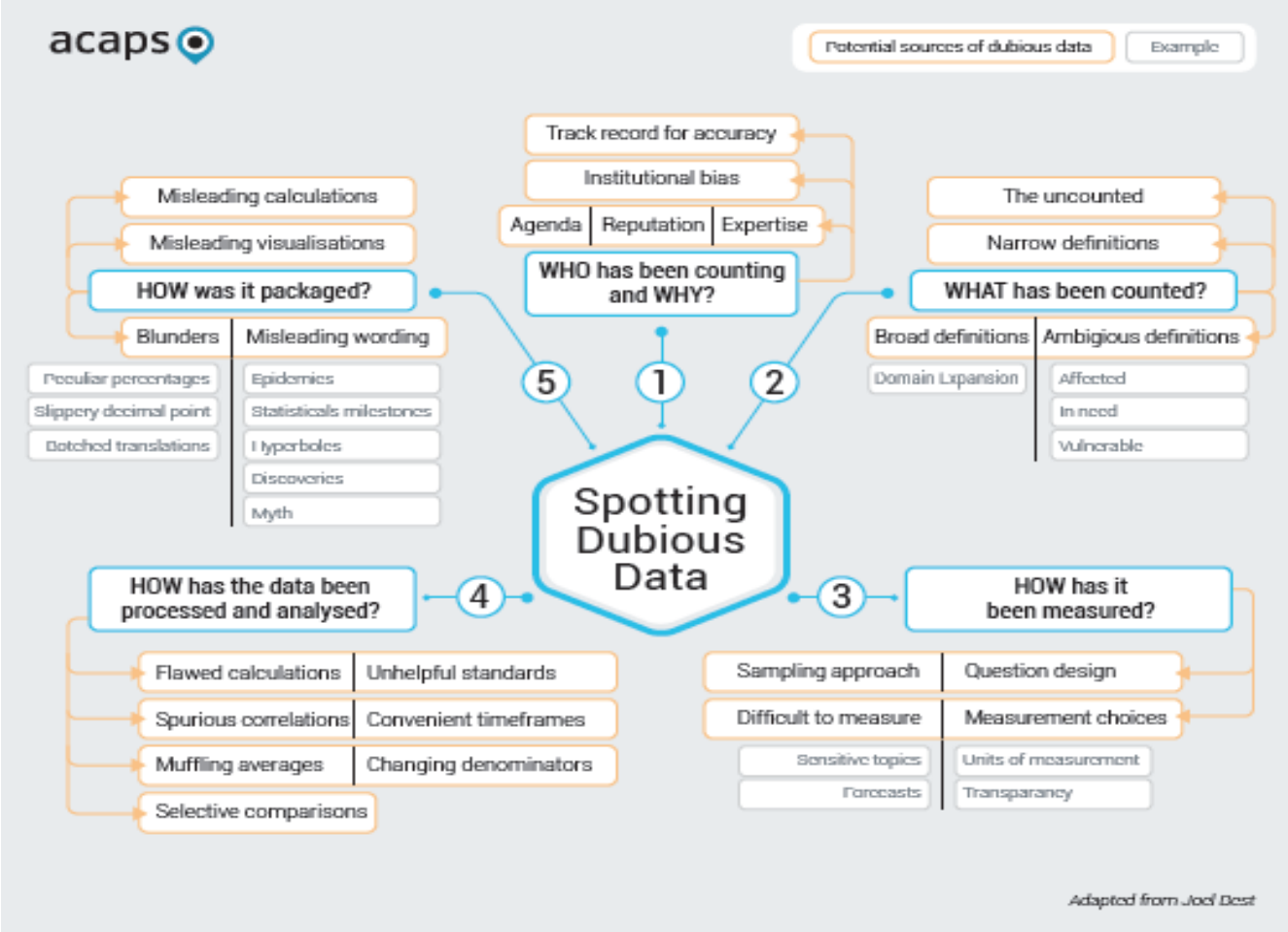
SPOTTING DUBIOUS DATA



November 2015

SUMMARY–SPOTTING DUBIOUS DATA. Amid the volumes of information available on humanitarian crises, there are only few statistics worth remembering and using. Look out for the following sources of errors, scrutinize the data and spot the difference between solid stats and dubious data (Adapted from Joel Best).



1. WHO HAS BEEN COUNTING AND WHY ?

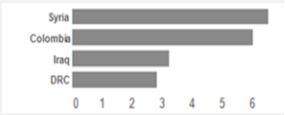
Example: *Headline 14 September 2015, The Daily Mail: Two in every 100 Syrian migrants are IS fighters, according to the Lebanese Minister of Education.*
Why is it dubious: It is unlikely that the Lebanese Minister of Education has the expertise speak to the ratio of IS fighters to individuals fleeing Syria. It is likely that the Daily Mail, by some described as a 'sensationalist' newspaper, did not check this fact before publication.

Keep in mind

- Why was the data collected? What is the agenda of the source? Could it be biased?
- What is the expertise of those who have collected, reproduced and disseminated the data?
- Are they sufficiently knowledgeable to research the matter?
- Is there a strong track record of producing accurate information?

2. WHAT HAS BEEN COUNTED ?

Example: *Colombia has the second highest number of IDPs in the world, after Syria.*



Why is it dubious: The concept of an IDP in Colombia is very broadly defined - displacement figures for Colombia commonly count all people who were internally displaced since the 1990s.

Keep in mind

- Look out for concepts that are widely used within the humanitarian community, but lack a common definition such as *affected, in need, vulnerable, household, urban*.
- Consider whether the concepts used could have been defined too narrowly or too broadly. Has something been excluded?
- Have definitions remained the same at the different points in time? Has there been domain expansion? (Definitions that have been broadened over time?).

3. HOW WAS IT COUNTED ?

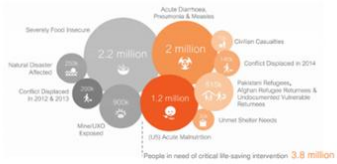
Example: *6.5 million people have been internally displaced in Syria as of October 2015.* Why is it dubious: Data gathering in Syria is severely hampered by the active conflict and lack of access to parts of the country. (IDMC 07/2015) Statistics regarding the Syria conflict are therefore broad guesstimates, computed in a politically charged context.

Keep in mind:

- Does the data consist of numbers that seem hard to produce—how could anyone calculate that? Closely scrutinise information on sensitive topics, such as SGBV or informal activities.
- Numbers presented without sufficient information about measurement choices or assessment tools?
- Unusual units of analysis (e.g. extended families instead of households) that might affect the resulting statistic?
- Criticisms of measurement choices by others
- Particular caution is required when reviewing forecasts or estimates about future trends

4. HOW WAS IT PROCESSED AND ANALYSED ?

Example: *7.4 million people are in need in Afghanistan.* Why is it dubious: Double-counting the number of people in need is common and this example is illustrative of the underlying thinking-error. The number of people in need per sector has been combined to total 7.4 million. However, the units of analysis are not mutually exclusive categories - some people who are severely food insecure, will have been affected by natural disasters too, etc.



Example: *Water shortages for refugees in camps in Jordan have reached emergency levels; the supply is as low as 30 liters per person per day — one-tenth of what the average American uses.* Why is it dubious: A crisis situation is often compared to the reference standards of those that organizations want to provide funding. The United States is one of the countries with the highest per capita water use in the world and is therefore not an appropriate comparison group. Sphere standards put total basic water needs per person per day at 7.5 to 15 liters a day.

Keep in mind:

- Could the calculations be flawed?
- Are there any misleading comparisons, timeframes, comparison groups or standards used?
- Are there any stated relationships between two variables (look out for reports that claim to identify the key cause of complex problems, it is impossible determine causality through experimental design)
- Calculations that highlight or muffle outliers?

5. HOW WAS IT PACKAGED ?

Example: *Of the more than 80 million people estimated to have been in need of humanitarian assistance in 2014, over 75% were women and children.* Why is it dubious: 75% of all people in high fertility countries are women and children – it is unclear how this was calculated and it is most likely only included for shock purposes.

Example: *UNHCR says most of the Syrians arriving in Greece are students.* Why is it dubious: The results of the survey indicate that 'student' was the most frequently mentioned occupation, indicated by 16% of respondents.

Example: *Before the outbreak of violence in Burundi following mass-protest, under 5 global acute malnutrition rates were already at 41%.* Why is it dubious: Global Acute Malnutrition (GAM) rates above 15% are considered critical, the most severe level of the WHO scale. One of the highest levels of GAM recently recorded was in South Sudan, at 22.7% (Generation Nutrition 2014)

Keep in mind:

- Dramatic statements that take the form of statistical claims, such as hyperboles, 'the best', the most', 'myth', 'new discovery'?
- Words that imply causation (such as leads to, attributable to, caused by etc.). It is highly difficult to determine causality, particularly in an emergency setting.
- Unhelpful denominators (*x per hour*) used for shock purpose?

- Have results been misinterpreted? Are visual representation accurate or misleading?
- Blunders (numbers that seem surprisingly large or small)?
- Are the figures in line with what I know and expect or surprisingly different? Have decimal points been misplaced?

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Introduction

"27% of statistics are false" People often assume that all numbers are hard facts: if it is reported, someone must have calculated and checked the figures. Some available figures are indeed accurately reported findings of sound research. Others are based on flawed research, or intended to mislead the user. Bad numbers often take on a life of their own: they continue being repeated, even after they have been thoroughly debunked. This is particularly true in the Internet age, when it is so easy to circulate information.

The figure itself will not give away its true character - a 9 million looks like a 9 million even if it is used to present dubious data. The context is needed to understand if numbers reflect an accurate statistic, a wild guesstimate or anything in between. This chapter provides practical guidance on how to interpret the context. It provides a list of common problems found in the numbers appearing in humanitarian reports and illustrates these problems with examples.

This note is adapted from *Stat-Spotting: A Field Guide to Identifying Dubious Data* by Joel Best (2013).

Benchmarks

Knowledge of some basic statistical benchmarks is the most effective method to spot dubious data and recognise questionable statistics. **Always be aware of the following statistics for the relevant country:**

- The total pre-crisis population in affected areas
- The demographic profile of the population
- Estimated number of people affected or displaced
- Humanitarian profile of similar crises
- Sector specific pre-crisis facts, such as the price of staple foods, school attendance rates, etc.

Example: By the end of 2013, the UN estimated that 6.5 million people had been displaced in Syria as a result of the civil war. The conflict, which had been ongoing for over two years at that point, had resulted in a widespread shortage of staff, damage to infrastructure, and a lack of inputs such a medicines and water purification tablets. As a result, the health and WASH cluster estimated that 21 million people were in need of humanitarian assistance.

It is generally agreed that an unprecedented number of people in Syria were (and still are) in need of support. However, a quick look at the total population in Syria shows us that the 21 million people in need is most likely an exaggeration. Estimates on the pre-crisis population range from 21 to 24 million people. By the end of 2013, over 2 million Syrians had already registered as refugees in neighbouring countries, with a significant additional number of Syrians estimated to be unregistered. This means that the reported WASH and Health people in need (PIN) numbers actually total at least the whole population in the country. By November 2015, the estimation on the number of people in need of WASH and health support had decreased to around 12 million – still an unprecedented high number, but more likely to be a reflection of the situation than the previously used 21 million. (SHARP 12/2013, SHARP 10/2015)

Keep in mind that the most dramatic situations are relatively rare, whereas the most common situations are not especially dramatic. This point is important because media coverage and fundraising campaigns often include extreme examples that are presented to illustrate a humanitarian crisis. These examples are usually atypical.

Example: Most humanitarian crises display this pattern: there are lots of less serious cases, and relatively few very serious ones:

- Number of people dying of starvation < number of people borderline food insecure
- Number of people killed < number of people displaced
- Number of children trafficked < number of children unable to attend school every day

As a 'rule of thumb', subject every statistic to the following **5 questions**:

- Who is counting and why?
- What has been counted?
- How was it counted?
- How was it calculated and analysed?
- How has it been packaged?

Who Is Counting and Why?

"There are three kinds of lies: lies, damned lies, and statistics" (Disraeli)

Always scrutinise the original source of the information and the entity that has (re)produced the 'fact'. Start with considering the expertise of the individual or organisation that has collected and disseminated the data. Specific expertise is an asset as well as a handicap. It provides the skills and knowledge to count and analyse complex matters. At the same time, subject matter experts are vulnerable to confirmation bias, seeking only information that is consistent with their worldview. In humanitarian settings, individual agency biases and agendas are a well-known risk to accurate reporting.

Example: Interpreting data in a way that supports a belief: How people interpret scientific reports related to climate change is influenced by their political preferences. A research in 2013 showed that 70% of US Democratic voters saw evidence of man-made climate change in recent weather patterns, whereas only 19% of Republican voters did when reviewing the same set of data. (Economist 28/11/2015)

Therefore, closely review the **agenda, interests and motive for bias** of the source. Why has this data been collected or quoted? **Look out for studies initiated or funded by groups supporting a specific idea or cause.**

Example: Deaths in the war in Iraq. During the 2003 Iraq intervention, critics used civilian deaths to prove that the intervention was a mistake, while the Bush administration insisted that the numbers were exaggerated. Suspicions that the administration's death toll was too low led to new methodologies for counting civilian deaths, notably incident-based reporting and mortality surveys. Wide variations between their estimations shows that counting conflict casualties is fraught with difficulties, even without competing interest influencing the results.

What Has Been Counted?

Counting requires the person who does the counting to set up categories that determine cut-off points. Definitions shape the result of a statistic and every statistic involves some sort of definition. Because definitions mark what gets counted, they can lead to dubious data: **Look out for concepts that are widely used within the humanitarian community but lack a common definition, including: *affected*, *in need*, *vulnerable*, *household*, *recently displaced, casualties*, *injured,* etc.**

BROAD DEFINITIONS. **Be aware of definitions that are too broad**. When advocating on social problems, it often seems preferable to have broad definitions. Broad definitions entail larger numbers, and can therefore generate more attention to a problem.

Example: Displacement figures for Colombia commonly count all people who were internally displaced (IDPs) since the 1990s. The figure stood at 5.7 million IDPs by June 2014. If this number is compared with other displacement crises, the figure looks enormous, surpassed only by displacement in Syria. However, the cumulative count of IDPs in Colombia includes people who have since returned to their place of origin; who have been displaced only for a very short period of time; who have since died, etc. This method includes too many cases to be used for comparison or to give an accurate representation of the current situation. For 2015, the number of IDPs in Colombia is cited as 224,000 by OCHA. (HDX 03/2015; UNHCR 2015)

Given the advantages of defining problems broadly, definitions might be broadened over time, a phenomenon called *domain expansion*. The obvious consequence of a broader definition is that statistical estimates for the problem's size will expand. Bigger numbers generate more attention to the problem.

Example: The death toll for the Syrian civil war has been controversial and hard to verify, with differing estimates given by a number of different actors. The Syrian Observatory for Human Rights, whose data is widely reported in international media, changed their definition of civilian casualties in early 2014. Previously, opposition forces and civilian deaths had been listed separately. This was changed to include both armed opposition and civilians in the category "civilian deaths". Under the new definition the number of reported civilian casualties increased from around 50,000 to 75,000. (Council on Foreign Relations, Washington Post 10/02/104, SOHR)

THE UNCOUNTED. Conversely, narrow definitions can mean a problem might be underreported. Definitions delineate what is and what is not counted. **It is often useful to reconsider a problem in its broader context – what has been left out?**

Example: Assessment of progress towards development goals is increasingly based on household surveys. However, a significant part of the poorest are not counted within these surveys. The surveys omit population groups by design: the homeless, mobile, nomadic, or pastoralist populations. In practice, household surveys typically underrepresent those in fragile, disjointed households; slum populations and areas posing security risks. Following research into the topic, Carr-Hill estimates that between 300 million to 350 million people could be missing from world population counts. (Carr-Hill 2013)

CHANGING DEFINITIONS. **Watch out for changing definitions of terms over time.** Completely altering a definition between two measurements can produce misleading results.

Example: Measuring the middle upper arm circumference (MUAC) is used to define malnutrition in children under five years of age. Up until 2009, a circumference of 110mm and below defined a child as malnourished. This was changed to 115mm, with the World Health Organization (WHO) and UNICEF arguing that children with a MUAC of less than 115mm have a highly elevated risk of death. A study done to reassess the problem's size found that the caseload of severely malnourished children under five grew from 1.49% to 3.27%. (WHO &UNICEF; Fernandez, Delchevalerie, van Herp: Pediatrics Journal 2010)

How Was It Counted?

"If we knew what we were doing, it wouldn't be research" (Albert Einstein)

After defining **what** has been counted, the focus shifts to **how** has it been counted. To answer that question, knowledge on the methodology and measurement choices is required. Unfortunately, authors often do not provide detail on how the data was gathered. An ACAPS review of 105 Multi-Sector Coordinated Needs Assessment reports showed that more than half did not include information on the sampling strategy. **Be wary of figures presented without sufficient information about the methodology adopted.**

DIFFICULT TO MEASURE. Humanitarian reports are full of stats that make one wonder "how could this have been measured?"

Example: 4.9 million people are in need of life-saving and livelihoods support in Somalia and 1.1 million remain internally displaced (OCHA 25/11/2015). Afghan women face increasing physical and sexual abuse (Al Jazeera 26/02/2014). The 2008 financial crisis will push up to 100 million people in developing countries into absolute poverty (UN 2008).

Keep in mind that some information is very difficult to collect in a crisis setting. The number of people in need, killed, injured or affected is subject to constant change and often difficult to assess. **Scrutiny is particularly important when a statistic claims to measure activities that people might prefer to keep secret** (i.e., undocumented workers, drug use, or illegal activities). Due to the sensitivity of the topics, it is notoriously difficult to collect detailed information on protection concerns, particularly on sexual and gender based violence. Most numbers on the matter are likely to be underestimated, based on underreporting of incidents, or rough estimates.

This does not mean that available numbers should be discarded. In the absence of comprehensive data, educated estimates remain essential for understanding and responding to a crisis, provided the limitations on the accuracy are taken into account and clearly communicated.

Example: A 2015 ODI research paper outlined 10 basic facts which underpin global policy making although the existing data is highly unreliable or missing:

- How many people live in cities
- The volume of global assets held offshore, undeclared to tax authorities
- How many girls are married before the age of 18
- The ethnicity of most Europeans
- The percentage of the world's poor that are women
- Basic educational outcomes at primary level in sub-Saharan Africa, South-East Asia, Latin America
- The number of street children worldwide
- How many people in the world are hungry
- The size of sub-Saharan Africa's economy
- How many people work in the informal economy

This list is illustrative of the major gaps in information that remain, even after decades of data collection, and the level of suspicion required should

a stat claim to address one of the major gaps. (ODI 04/2015)

Particular caution is required when reviewing forecasts or estimates about future trends. Predictions depend heavily on the specific assumptions and measurement choices that have been made. Different measurement choices might yield significantly different numbers. As predictions go farther into the future, their confidence interval widens

ERRONOUS MEASUREMENT CHOICES. Every statistic is the result of specific measurement choices. Different choices produce different results. With limited time and resources, studies in humanitarian settings often make blunders or crucial mistakes during the assessment design stage. **Review in detail the appropriateness of the methodology used.**

Example: A specific study in Kenya claimed to use "cluster sampling" as a qualitative focus for group discussions. This doesn't make sense because cluster sampling is a specific method for quantitative household surveys. While the focus groups may have been "clustered" around a particular group and geographic area, "cluster sampling" is a very specific methodology and the term was not used appropriately in this case. (ACF International, "Conducting KAP surveys" 15/01/2013)

MISLEADING SAMPLES. Many statistics involve generalizations based on samples. The essential step for any reader is to **consider to what extent the sample is representative of the whole population**.

Example: A review of KAP surveys by ACF highlighted common sample problems: "In a survey conducted in Malualkon, South Sudan, it was not clear which (if any) methodology was followed for the sampling design. There are no sampling methods in which a sample size of N=78 households will give any significant conclusions for a large population. Alternatively, an example shared from Indonesia had the opposite problem: 4,000 household questionnaires were administered. This is a case of oversampling to the point of wasting time and money for no added value." (ACF International, "Conducting KAP surveys" 15/01/2013)

UNITS OF MEASUREMENT. **Look for unusual units of analysis that might affect the resulting statistic**. Most humanitarian assessment reports use households as the unit of analysis. Sometimes they refer to a particular group of people (i.e., children, poor, etc.). However, it is possible to select other units of analysis such as extended families, individuals or communities, which impacts data collection and analysis.

Example: A Lakh (or lac) is a unit in the Indian Numbering System equal to one hundred thousand (100,000). In the Indian Numbering System, it is written as 1,00,000. Although Lakhs are a very popular measurement unit in India, it is confusing to use it for a wider audience.

LOADED QUESTIONS. The way a survey question is phrased can, intentionally or unintentionally, influence how respondents answer the questions. **Look out for the results of questions that are loaded.** Examples of loaded words include democratic, regime, opposition, free, healthy, natural, regular, modern, etc.

How Was It Processed and Analysed?

"Statistics are like political prisoners, if you torture them long enough, they will confess to anything" (Adapted from Coase, 1960)

There are a multitude of perverse incentives for researchers to make survey results more striking. In a 2005 article named 'Why most published research findings are false', the author describes how research teams manipulate the data until findings are significant. (Ionnidis, 2005) This is not limited to academic research. Humanitarian organisations have an interest in producing assessment findings that are sufficiently dramatic and compelling to galvanise donor and public support.

CONVENIENT TIMEFRAMES. Short time frames will not always capture all the changes. When data for longer periods are available, check if the findings pertaining to the short timeframe remain relevant.

Example: Food security data that focus only on one period, the lean season or the food secure period, will always present some bias. There are countries, particularly in the Sahel belt, that experience chronic food insecurity periods. An assessment that includes only the lean season – also known as the "hungry period", will always present more severe

results, with a higher number of food insecure people, than one covering a longer time frame.

SPURIOUS CORRELATIONS. Remember that correlation is not causation. Finding a relationship between two variables is not enough to define cause and effect. Correlation does not prove causality.

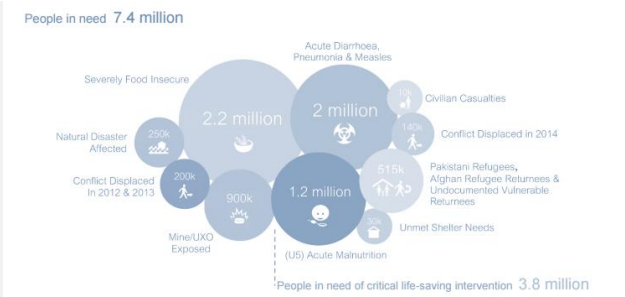
Example: If the dataset is large enough, correlations can be found for anything. The website 'Spurious Correlations' identified 40,000 correlations that can be made by putting together data from several databases, including the US Census and CDC. The site for instance shows the correlation between the number of people who drowned by falling into a pool with films Nicholas Cage appeared in (r = 0.666). The age of Miss America correlates with murders by steam, hot vapors and hot objects at r = 0.870.

In social sciences, it is impossible to determine causality through experimental design, as it is not possible to control for all factors in people's lives to isolate the effect of some specific cause. Further, there are many competing explanations for social problems. **Look out for reports that claim to identify the key cause of complex problems.**

Example: There are a plethora of theories on the key causes of the uprising in Syria in March 2011. Depending on the source, the start of the demonstrations is attributed to anything from the uneven economy, the 2003 Iraq war, and climate change. Most agree however that the there was a complex combination of factors at play and that highlighting only one key cause is misleading. (The Atlantic 29/10/2015, MiddleEast 25/11/2014, IamSyria 09/10/2015)

FLAWED CALCULATIONS. Many statistics are the result of strings of calculations. Numbers — sometimes from different sources — are added, multiplied, or otherwise manipulated until a new result emerges. It is easy to make a mistake during those calculations, but not so easy to spot this error. Often only the final number is reported and there is no easy way of retracing the steps that led to it. When a number is based on a calculation of different sources, try to figure out how the number was brought into being.

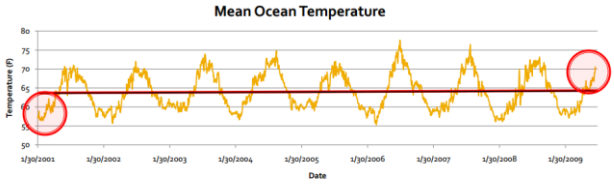
Example: Within the 2015 Afghanistan HNO, 7.4 million people are reportedly in need. However, a quick look at how this number was computed shows the figure is likely inflated, because the different groups are not mutually exclusive:



It is for instance likely that some of the severely food insecure have been displaced by the conflict and have unmet shelter needs. **Beware that double counting is a common flaw of figures on people in need or displaced.**

MUFFLING AVERAGES. See if the mean or median was used to calculate the average and how the other method of calculation might affect the result. The mean is calculated by adding the scores of each of the cases and then dividing by the number of cases. But if there are extreme scores, this method is less useful and can actually hide large variations. The median involves listing cases from lowest to highest value and then identifying the middle score.

Example: How aggregation can hide large variations:



SELECTIVE COMPARISONS. Judge whether the appropriate comparison groups have been used. The comparison group can change the statistic and put it in perspective.

Example: A crisis situation is often compared to the reference standards of those that organisations hope to persuade to provide funding. For instance, a recent report stated that in some informal sites in Lebanon, Jordan and Iraq, the water supply is as low as 30 litres per person per day — one-tenth of what the average American uses.

However, the United States is one of the countries with the highest per capita water use in the world. Water requirements for a general American family can hardly be compared to a Syrian refugee family in Jordan. It would have been more appropriate to compare the situation within camps to groups outside of camps, the general population or water availability in Syria before the outbreak of the conflict. (Mercy Corps 07/10/2015)

UNHELPFUL STANDARDS. Carefully review standards used. Compare results to standards only if those standards are appropriate and relevant.

Example: The World Bank defines countries with a per capita of USD 2.86 a day as middle income countries as opposed to low income countries. Several groups oppose this classification, which impacts a country's access to loans and aid, stating that the bar is too low.

CHANGING DENOMINATORS. When looking at comparisons over time, carefully scrutinise the denominator.

Example: The number of mothers dying during childbirth in a specific country could for instance be 10 per day in 1990, compared to 12 people a day currently. At first sight, this reflects an increase in maternal mortality. However, this absolute increase might simply reflect the growing population. The actual rate at which the problem is occurring might be unchanged—or even declining.

How Is It Packaged?

"I have a great subject [statistics] to write upon, but feel keenly my literary incapacity to make it easily intelligible without sacrificing accuracy and thoroughness" (Sir Francis Galton)

There is a lot of information out there, and most of it goes unnoticed, so there are several commonly used methods to make findings stand out. However, these methods often clash with the accuracy of reporting. If a number is particularly salient or stands out, consider the following traps.

MISLEADING WORDING. **Look out for eye-catching statistics that are easy to remember but trick the readers:**

Hyperboles: 'the greatest', 'the largest' 'the most', 'record setting'. Superlatives imply comparison, suggesting that someone has measured two or more phenomena and determined which one is most significant. However, just as often, this qualification is not based on a comparison of similar examples.

Myths: Watch out when something is called a 'myth', which signals a contentious issue, that people disagree about what is true and false. The evidence supporting all parties should be reviewed.

Discoveries: The media often cover scientific developments by packaging them as dramatic discoveries and universal truths rather than a single research finding. Subsequent reports that nuance or challenge the discovery often receive less attention.

Reversal of long-term trends: Watch out for arguments that long-term trends are about to be reversed. This is very rare and deserves careful examination.

Example: In April 2014, Nigeria's estimated GDP was revised from 42.4 trillion naira (USD 269 billion) to 80.2 trillion naira (USD 510 billion), a 90% increase. Several media outlets made statements such as "Nigeria has turned into the richest African country overnight". However, Nigerians are no richer than they were before the GDP figures were revised, nor was the economy any different. The sudden increase was a result of a change in measurement choices, a change in baseline year. Nigeria's old GDP data relied on a hopelessly dated snapshot of its economy in 1990. The new figures, using 2010 as the base year, gave due weight to fast-growing industries such as mobile telecoms and filmmaking that have sprung up since then. (Economist 14/04/2015)

Statistical milestones: Be wary of the significance of statistical milestones. Reports that some statistical threshold has been reached are popular, but most of the time meaningless as they only underlie the ongoing trend.

Example: International media reported with alarm and fear that the threshold of 10,000 Ebola cases was reached on 25 October 2014. However, taking into account the trend of the previous weeks, it was obvious this figure would be reached sooner or later. In addition, 10,000 only included reported cases while, at that time, almost 50% of cases were unreported, meaning that this milestone must have been reached long before WHO reported it.

Epidemics: Be wary of announcements of a new "epidemic". These often involves comparisons between old numbers (when no one was paying close attention) and new figures (collected by people keeping much closer tabs on things).

MISLEADING CALCULATIONS. Every 3.6 seconds one person dies of starvation. Every minute 28 girls younger than 18 are married off. Every hour, more than 10,000 sharks are killed by humans.

Social problems are often presented as occurring every X minutes to increase the shock factor. People who package statistics choose the mathematical format that will make the most powerful impression.

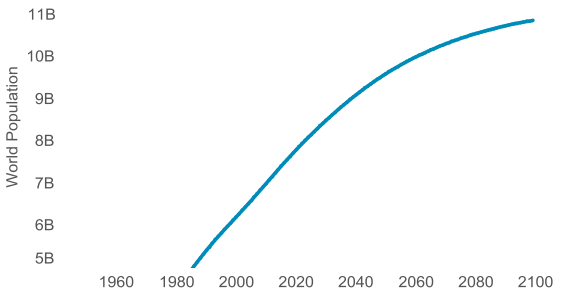
Quantities can be expressed in different ways: percentages, proportions, absolute numbers and still refer to the same amount mathematically. The choice of format used to present the statistic can influence the reader's perception of the reality.

Example: "Every two hours a woman dies from an unsafe abortion in India." This statistic is striking and memorable. However, if the absolute number is presented, 4,380, it is just another figure that will be forgotten as soon as it is read. (The HINDU. Unsafe abortions killing a woman every two hours, 2013)

Big round numbers: Big numbers make big impressions. However, big round numbers are often just estimates. These guesstimates are likely to err on the side of exaggeration.

MISLEADING GRAPHS. Look out for graphs that are hard to decipher and graphs in which the image does not seem to fit the data. The computer revolution has made it vastly easier to create graphs and to produce jazzy, eye-catching displays of data. However, a beautiful graph is not necessarily correct. A graph is no better than the thinking that went into its design. Always carefully review the axis, as playing around with these is a common method to influence the interpretation of data.

Compare:



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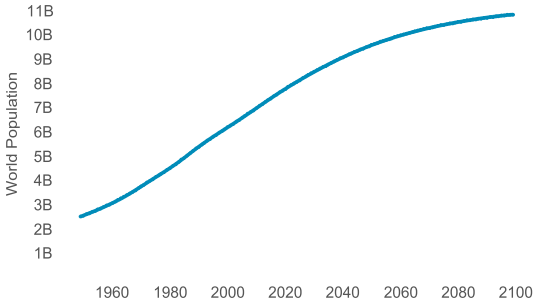

REPORTING BLUNDERS. Not all dubious reporting is intentional. Innumeracy (the mathematical equivalent of illiteracy) affects most of us to one degree or another, including those who produce figures, others who repeat them, and the audience that hears them. Common blunders include the misplacement of a decimal point, confusion about the denominator, misleading graphs and erroneous calculation. Be aware of possible mistakes that could have slipped into the reporting on otherwise accurate statistics:

Peculiar Percentages: Look for surprisingly large or small percentages.

Example: In Burundi, the National Red Cross reported a chronic malnutrition rate of 58% in February 2015, but without providing any source, explanation or methodology. It is probable that they were quoting the demographic and health survey from 2010. However, the last SMART survey from 2013 showed a 31.5% chronic malnutrition rate among children under 59 months. (Red Cross 2015, DHS 2010, WFP 2014)

The slippery decimal point: Beware of misplaced decimal points. Misplacing a decimal point is an easy mistake to make. If the decimal point is moved just one place to the right, there is ten times as many of whatever you were counting. Move it just one digit to the left and only a tenth as many remain.

A set of statistical benchmarks can lead us to suspect that some number is improbably large (or small), but errors can be harder to spot if one cannot get a good sense of the correct number in the first place.

Botched translations: Look for explanations that convert statistics into simpler language with surprising implications. It is not uncommon for people to repeat a statistic they do not actually understand. Then, when they try to explain what this number means, they get it wrong, so that their innumeracy suddenly becomes visible. Or, at least it would be apparent if someone understood the blunder and pointed it out.

Sources and Background Readings

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