Data, Technology, and Public Health

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In those days Caesar Augustus issued a decree that a census should be taken of the entire Roman world. (This was the first census that took place while Quirinius was governor of Syria.)

And everyone went to their own town to register.

Luke 2^{1–3}

As some may know, the beginning of Luke 2^{1–3} is the Christmas story around the birth of Jesus, but it is also about data collection. The census mentioned in this biblical text covered the entirety of the Roman Empire. At that time, its territory extended from the Atlantic in the west, the Euphrates in the east, the Danube and the Rhine in the north, to the deserts of Africa in the south. More than one-third of the world's population lived under Roman jurisdiction, including all its inhabitants, which amounted to about one hundred million souls. Needless to say, this census comprised the collection of a vast volume of data; had they known today's terminology, the Romans might have called it “big” data. This census shares the four Vs that we now consider when characterising big data, which are volume, veracity, velocity, and variety.

Data have always existed and will continue to exist, with ever-evolving mechanisms by which they are collected. It is a symbiotic relationship of sorts given the various purposes data can serve depending on the context: governance, power exertion, knowledge creation, and economics, as well as some combinations thereof.

The ways by which data are acquired and processed vary, and they are influenced both by the questions that

are sought to be answered and by the goals that are pursued with such answers. Data are used for “proofs of concept,” as an analytical basis for decision-making, and these days increasingly as the backbone of business development and strategic direction in the private sector. Relevant examples come from different contexts such as academic study, political polls, financial services, or market research.

Today, there are great expectations that the digital and “big data” revolution may solve the majority of our problems, notably in the health and public health arena. Some sectors may agree that today's need for data – and indeed their influence and our increasing dependency on them – resembles the macro- and microeconomic impact oil had had in the last century: a driver of growth and change in infrastructure, business, politics, and society at large [1]. Whereas the belief in positive effects of big data on business largely seems to be the consensus of opinion, business' use of scientific research is still under debate [2]. There is the fear that big data and their background algorithms “take over” decisions previously made by humans. This fear, and the as yet unresolved question of personal privacy (see the new EU General

Data Protection Regulation [GDPR; www.gdpr.org] on rules for data protection “and in particular [the] right to privacy with respect to the processing of personal data”), are arguments for those who see a deterministic nature of technology (either negative or positive).

There is absolutely no human culture without technology [3], and understanding how technology is designed, produced, and used in our society is fundamental [4]. This is why the relationship between technology and society (humankind) has been a relevant topic of disciplines such as anthropology. The visible and most cited parts of change in the processing and use of information, and subsequent services, are the “GAFAs” (Google, Amazon, Facebook, Apple). Some like to compare the advances in knowledge and technology evoked by the arrival of the Internet to the revolution induced by the Gutenberg Bible. If one analysed this further from that point in time in the 15th century, (religious) information was no longer restricted to some ecclesiastics or people with special access by virtue of their position in society. The Bible became available for public perusal, and the knowledge contained in the texts and scriptures was no longer considered to be some far-fetched mythology. The knowledge and information became real and accessible to a large group of people.

The Internet and its derivatives are using a new technology, in the same manner as the proliferation of printed material at the time of the printing revolution was based on a new technology. It has been postulated that the printing technology and the advent of the Reformation (Luther, Zwingli, Knox, etc.) are linked, meaning that a technology brought about an important transformation in society in its wake. It attacked the Catholic Church and its institutions and led to the creation of a new institution, the Protestant Church (not without the suffering of large parts of the population).

Digital technology has already proven to change the lives of individual citizens via many mechanisms. Turning to health and health care, some have very high expectations of the “digital era,” whereas others claim “only” a gain in time, money, and human resources. With regard to public health, data collection may become different and faster by using these technologies. The implementation of public health measures will be influenced by the technology available and how it is used subsequently, but data collection is only one part. Data analysis depends on the original questions that led to their analysis. Conversely, data interpretation depends even more on the ideology of the ones making the interpretation, and the questions they seek to answer according to their hypotheses. Ana-

lytical processes are always open to manipulation, especially in the presentation of results, and subject to the risk of omission of confounding results.

Health has been essential for the expansion of a country’s GDP and it constitutes a big part of a worldwide industry. It is linked to social and ethical obligations, as it pertains to the values of the respective society. Keeping healthy will either rest on the shoulders of the individual or rely more on society or the state. If health is considered a fundamental human right, then social justice, equity, and diversity are values included in the quest for global health.

The objectives of the GAFAs first and foremost tend toward being business related. The data these institutions collect are a core component of any business initiative. In practical terms, they use technologies, and these technologies are not neutral. The use of technology is embedded in an implicit project of society. Algorithms frame and determine the way users have to act to produce a calculated outcome. In the case of these companies, this is largely based on the privatisation of an enormous collection of data points from individuals. The problem here is that within today’s governance structures, the individual will then typically have no access to the processing of his/her own data, or the conclusions derived from them.

Public health is devoted to the vision of an equal society, without discrimination and based on the value of solidarity. If in health we follow the investment case logic, we follow the economic imperative, and, in doing so, other imperatives such as equity may be pushed aside (Remco van de Pas, Department of Health, Ethics and Society, Maastricht University, pers. commun.).

If public health practitioners and institutions embrace technology – as they do – we have to be aware of the different models of society contained in its use. Let us say we are using data collected by GAFAs; then, several points should be addressed. Augustus – the Roman Emperor in the example used at the beginning of this Editorial – had a clear vision of why he needed to collect the data. GAFAs have data that serve mainly their purposes, which usually have a business angle. Also, there are some kinds of information that will never appear in this process, since they are not essentially accounted for in the proposed algorithms. Therefore, the reality that their big data then portray is skewed by the ways in which they are collected and analysed. Public health has to make sure that the individual’s rights and privileges are preserved and that the usage of data will not be extended to other areas (e.g., military, criminal, etc.). In general, we already know about the accomplishments, limits, and consequences of

using quantitative metrics in public health. Public health scholars and practitioners must evaluate the potential effectiveness and pitfalls of different metrics, and in particular the influence of data derived from GAFA-like businesses.

It will be interesting to see whether the enthusiasm and the hopes resting upon this technology will transform our society or whether we as citizens will become the users of a new tool. For the time being, all public health professionals should be fully aware of the effects and should always consider the pressure that indirectly influences their basic values. It is our responsibility as engaged stakeholders in the realm of public health to take a proactive role and express the views of the society we want. Subsequently, the general public is influenced by the by-products of public health decisions. Therefore, a passive attitude that considers data as a “natural phenomenon” to which we surrender with admiration, allowing “it” to impose its will

on “us,” has become an emerging concept that needs our attention. If we allow this to happen, data will be the entity that shapes our world, and the innovative minds who created the avenue for data to be understood will be left in the void of its shadow. Finally, let us remember our history and consider our transition into the 21st century, for we cannot merely acquiesce and observe the unmitigated evolution of data as a metaphorical beacon of hope. It is a matter of us adhering to our moral values and core principles during this evolution which will serve to preserve our humanity.

Disclosure Statement

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