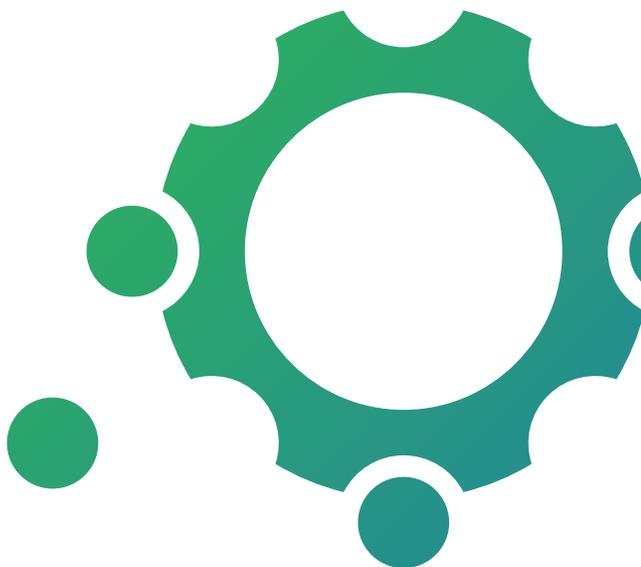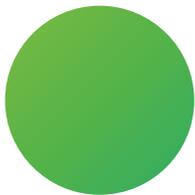# The Deadly Data Gap:
Gender & Data

WOMEN AT THE TABLE

Women At the Table is global civil society organization based in Geneva. It's the first organization to focus on systems change by helping feminists gain influence in sectors that have key structural impact: economy, democracy and governance, technology and sustainability.

Further information about Women At the Table can be found at **www.womenatthetable.net**

Authors: Caitlin Kraft-Buchman and Renée Arian

< 1 >

Introduction

All data tells a story.
And like all stories, its power and purpose depend on the protagonist and their point of view.

If 'history', as Churchill famously said, 'is written by the victors', who and what and which data is telling our modern (and our historical) data story? Data's narrative, like history, is as much dependent on what has been omitted, as it is dependent on what has been committed, to record. And our data story begins with the consistent omission of women.

Data is everywhere and influences almost everything we do, often without our recognizing its influence. When it comes to data about people, unfortunately most of the data we are using tells only half the story because most of the data isn't gender balanced, if it even includes women at all. What more could we learn, how much more could we earn, how much better could we serve, how much more of a contribution could we make if we knew the whole story? Or more startling still, how much harm could we prevent?

This is an urgent story because lives are at stake. As is our efficiency and productivity. Great opportunity and creativity – drivers of innovation – have been and continue to be lost.

< 3 >

This is because women have traditionally been left out of the data story. 20th century drug trials, the design of safety features in cars, medical treatments, the work equipment we wear, to name a few examples, are based on data that uses the default of a "standardized male", a default of flawed systems and cultural standards that currently form the physical framework and infrastructure of how we live and work. These defaults are so normalized we don't even notice them, yet they have proven to harm and lead to deadly consequences.

Concurrently, the digital world is exploding with new and ever growing technologies that are leading and have led to an exponential increase in the volume of data available, even in the least developed and most isolated places in the world. With the creation of unprecedented possibilities for informing and transforming society we are seeing innovation and experimentation thrive. Whether data is the 'new oil', the 'new gold', a 'new currency', or a 'strategic resource', data is our new future.

In the anatomy of storytelling we are at the inciting incident – where change is inspired by something happening to disrupt the setting - a data revolution compounded by Artificial Intelligence (AI) and Automated Decision-Making (ADM) systems that will lead to a crisis unless we choose a different path.

If data is incomplete because it is missing half or much more than half of the population, (if we are to take into account that the Global South has been left out of most or many massive datasets and research), the entire arc of the data story lacks more and more precision and safety.

 It becomes more and more biased as the data story perpetuates and retells the incomplete story. Incomplete data becomes complete bias as it is interwoven in the data story that is retold over and over. With the advent of AI and ADM systems, entrenched biases that are so engrained that they are unconscious are not only being passed onto the next generation, but they are becoming intractable as machines begin to learn from one another and make bias in its many forms explicit.

The lifeblood of our world's decision-making is data. And therefore we are at a critical turning point – we must create new norms and write a new data story. We must make the data revolution a gender data revolution grounded

< 4 >

in human rights. We need data that accurately reflects and represents the lives and diversity of women. Gender data must be available, accessible and analysed – then everyone can thrive[1].

In order to advance the values of equality societies have long embraced we are advocating to take action to correct the data for the numbers of women proportionate to the population.

This paper follows on from Women at the Table's paper *"We Shape Our Tools, and Therefore Our Tools Shape Us": Affirmative Action for Algorithms, Artificial Intelligence, Automated Decision-Making and Gender*[2]. And here once again, we mean all intersections of women and girls when we speak of women and girls. However women and girls can also serve as a proxy for all or any groups traditionally invisible and 'other' to the system – those traditionally left behind[3].

---

1 This paper refers to gender data as the same definition of gender statistics used by the UN Statistics Division. That is: gender statistics are defined by the sum of the following characteristics: data are collected and presented by sex as a primary and overall classification; data reflect gender issues; data are based on concepts and definitions that adequately reflect the diversity of women and men and capture all aspects of their lives; data collection methods take into account stereotypes and social and cultural factors that may induce gender bias in the data. The definition closely follows the Beijing Platform for Action, which was adopted at the Fourth World Conference on Women, held in Beijing in 1995 – it is recognised that this definition must be furthered developed to represent individuals of all gender identities and ultimately promote and respect the human rights of all individuals.

UN Stats. (2015). *What are gender statistics - Gender Statistics Wiki.* [online] Available at: https://unstats.un.org/unsd/GenderStatManual/What-are-gender-stats.ashx [Accessed 7 Nov. 2019].

2 From hereon in this report will be referred to as "We Shape Our Tools, and Thereafter Our Tools Shape Us"

3 The Global Research Council defines intersectionality as the interconnected nature of social categorisations such as race, class, and gender as they apply to a given individual or group, regarded as creating overlapping and interdependent systems of discrimination or disadvantage. Global Research Council (2019). *Supporting Women in Research. Policies, Programs and Initiatives Undertaken by Public Research Funding Agencies.* [online] Available at: https://anr.fr/fileadmin/documents/2019/GRC_GWG_Case_studies_final.pdf [Accessed 1 Jul. 2019].

< 5 >

We begin below by outlining the landscape of the current gender data problem highlighting the landscape of the deadly data gap, and then continue in three sections: Accountability; Inclusion; and Cooperation. We end with a short set of practical recommendations that can immediately be implemented and that offer a real opportunity to rescript our data story and create a proactive agenda – because small changes have the power to ignite the process.

We must establish new norms for lasting institutional and cultural systems change for both women and men, now. Then everyone can thrive. In our data story no one should be invisible. No one should be systematically uncounted, missing, or marked as 'incomplete'.

If we accomplish this, we may perhaps be on the road to a resolution where we leave no one behind.

< 6 >

The Landscape – the deadly data gap

Men are more likely to be involved in a car crash but when a woman is involved in a car crash, she is 47% more likely to be seriously injured than a man, 71% more likely to be moderately injured and 17% more likely to die[4]. The reason for this alarming figure has to do with how the car is designed and for whom – the default male. Women tend to sit further forward than men when driving, which is not the "standard" seating position and makes women "out of position drivers". They sit further forward because on average they are shorter. This ultimately puts women at greater risk of internal injury and frontal collisions[5].

For rear-end collisions Swedish research shows that car manufacturers use male crash test dummies to develop car safety features. As a result today's car seats are too firm to protect women against whiplash injuries caused by collisions from the rear-end[6]. A 2018 paper found that while

4 D., Segui-Gomez, ScD, M. and Crandall, J. (2011). *Vulnerability of Female Drivers Involved in Motor Vehicle Crashes: An Analysis of US Population at Risk. American Journal of Public Health*, [online] 101(12), pp.2368-2373. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3222446/ [Accessed 10 Nov. 2019].

J Kahane, C. (2013). *Injury Vulnerability and Effectiveness of Occupant Protection Technologies for Older Occupants and Women.* [online] Washington DC: National Highway Traffic Safety Administration. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811766 [Accessed 10 Nov. 2019].

5 Schiebinger, L. and Klinge, I. (2013). *Gendered Innovations | Stanford University*. [online] Genderedinnovations.stanford.edu. Available at: http://genderedinnovations.stanford.edu/case-studies/crash.html#tabs-2 [Accessed 10 Nov. 2019].

6 Science Nordic. (2013). *Gender equality for crash test dummies, too.* [online] Available at: https://sciencenordic.com/cars-and-traffic-crash-test-dummies-forskningno/gender-equality-for-crash-test-dummies-too/1381623 [Accessed 10 Nov. 2019].

< 7 >

worldwide there are several local differences, regulatory tests are still using the features of the crash test dummies that were introduced in the 1950s. That is, the crash test dummy of the 15th percentile male – 1.77m tall weighing 76kg (significantly taller and heavier than an average woman) with male muscle mass proportions and a male spinal cord. Researchers asked for the 15th percentile of women to be included in tests in the 1980's – this was ignored[7]. There is no great incentive for car manufacturers, authorities or others to develop test methods and female crash test dummies primarily because of the lack of data standards or legal provisions to do so[8].

Medical studies and research have also continuously excluded women. Historically, in drug trials in the US the "norm" study population was composed of Caucasian males[9]. Women were viewed as confounding and more expensive test subjects due to their fluctuating hormone levels[10]. Pregnant women, considered as a "vulnerable population" due to concerns of potentially adverse reproductive effects, were excluded from research and women of child-bearing potential were restricted to enroll in trials[11]. The

---

7 The one EU tests that requires the 15th percentile female dummy still contains data gaps . For example, the dummy is tested in the passenger seat, there is no data on how a female driver would be affected. Linder, A. and Svedberg, W. (2019). *Review of average sized male and female occupant models in European regulatory safety assessment tests and European laws: Gaps and bridging suggestions*. Accident Analysis & Prevention, [online] 127, pp.156-162. Available at: https://www.sciencedirect.com/science/article/pii/S0001457519303483 [Accessed 12 Nov. 2019].

8 In the EU there are five tests a car must pass before being allowed on the market – no test requires a female crash test dummy. Linder, A. and Svedberg, W. (2019).

9 Wizemann TM, P. (2001). *Exploring the Biological Contributions to Human Health: Does sex matter?*. Washington DC: National Academies Press (US).
Pinn, V. (2003). *Sex and Gender Factors in Medical Studies.* JAMA, [online] 289(4), p.397. Available at: http://biblioteca.asmn.re.it/allegati/sexandgenderfactorsinmedicalstudies_120615110056.pdf [Accessed 11 Nov. 2019].

10 Liu, K. and DiPietro Mager, N. (2016). *Women's involvement in clinical trials: historical perspective and future implications.* Pharmacy Practice, [online] 14(1), pp.708-708. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4800017/ [Accessed 11 Nov. 2019].

11 Wizemann TM, P. (2001). Parekh, A., Fadiran, E., Uhl, K. and Throckmorton, D. (2011). *Adverse effects in women: implications for drug development and regulatory policies.* Expert Review of Clinical Pharmacology, [online] 4(4), pp.453-466. Available at: https://www.fda.

< 8 >

reasoning was that men represented a reduced risk because they constantly reproduce their sperm and that since women are born with all the eggs they will ever produce, they should be excluded from drug trials in case a drug proves toxic and impedes their ability to reproduce in the future. The result of this is that women have been excluded from the trials regardless of their age, gender status, sexual orientation or desire or ability to bear children[12]. The then innovative data research had assumed what worked for men worked for women and that there would be equality in outcomes.

Therefore, in the US most medical research on cardiovascular disease was conducted on men. This occurred even though since 1984 more women than men are likely to die from cardiovascular disease, and since 1989 the leading cause of mortality in US women is cardiovascular disease[13].

Despite research evidence that demonstrates integrating gender analysis into research processes can lead to innovation, women continue to be

gov/files/science%20%26%20research/published/Adverse-effects-in-women--Implications-for-drug-development-and-regulatory-policies.pdf [Accessed 11 Nov. 2019].
National Institutes of Health (2003). *Recruitment and Retention of Women in Clinical Studies, and the Critical Role of Relevance.* [online] NIH. Available at: https://repository.library.georgetown.edu/bitstream/handle/10822/547438/SMR_Final.pdf?sequence=1 [Accessed 11 Nov. 2019].

12 Wizemann TM, P. (2001). Parekh, A., Fadiran, E., Uhl, K. and Throckmorton, D. (2011). Jackson, G. (2019). *The female problem: how male bias in medical trials ruined women's health.* The Guardian. [online] Available at: https://www.theguardian.com/lifeandstyle/2019/nov/13/the-female-problem-male-bias-in-medical-trials [Accessed 15 Nov. 2019].

13 Liu, K. and DiPietro Mager, N. (2016) and Mehta, L., Beckie, T., DeVon, H., Grines, C., Krumholz, H., Johnson, M., Lindley, K., Vaccarino, V., Wang, T., Watson, K. and Wenger, N. (2016). J Benjamin, E., Muntner, P., S Bittencourt, M., W Callaway, C., P Carson, A., M Chamberlain, A., R Chang, A., Cheng, S., R Das, S., N Delling, F., S V Elkind, M., Fornage, M., S Khan, S., M Kissela, B., L Knutson, K., W Kwan, T., T Lackland, D., T Lewis, T., H Lichtman, J., T Longenecker, C., Shane Loop, M., L Lutsey, P., S Martin, S., Matsushita, K., E Moran, A., E Mussolino, M., O'Flaherty, M., Pandey, A., M Perak, A., D Rosamond, W., A Roth, G., K A Sampson, U., M Satou, G., B Schroeder, E., H Shah, S., L Spartano, N., Stokes, A., L Tirschwell, D., W Tsao, C., P Turakhia, M., B VanWagner, L., T Wilkins, J., S Wong, S. and S Virani, S. (2019). *Heart Disease and Stroke Statistics—2019 Update: A Report From the American Heart Association.* [online] American Heart Association. Available at: https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000659 [Accessed 12 Nov. 2019].

< 9 >

underrepresented or excluded, which means that innovation has suffered[14].

For example, the rates of breast cancer, have significantly risen over the past 50 years[15]. There is significant scientific evidence about the known and suspected causes of breast cancer, but there is little research to identify and eliminate occupational and environmental risks - that means there is no data to understand why there has been such a significant increase in breast cancer[16]. However, there is extensive research about the health implications for men in traditionally male dominated occupations such as mining and construction. In most female dominated industries studies have not been undertaken or completed at all[17].

_____

14 For example, researchers have found that combining a common colon cancer screening test with optical technologies allows doctors to more accurately detect the presence of colon cancer, particularly in women. Science News (2010). *Bridging the gender gap: Combined technologies offer promise for detecting colon cancer in women.* [online] Available at: https://www.sciencedaily.com/releases/2010/07/100719163241.htm [Accessed 15 Nov. 2019].

15 Breast cancer is 100 times more common in women than men, impacts 2.1 million women each year, is the most frequent cancer among women and also causes the greatest number of cancer-related deaths among women. World Health Organization. (2019). *Breast cancer.* [online] Available at: https://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/ [Accessed 15 Nov. 2019]. Conrad Ströppler, M. (2019). *Why Is Breast Cancer More Common in Females than Males?.* [online] MedicineNet. Available at: https://www.medicinenet.com/breast_cancer_in_males_and_females/ask.htm [Accessed 18 Nov. 2019].

16 American Public Health Association. (2014). *Breast Cancer and Occupation: The Need for Action.* [online] Available at: https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/01/07/14/55/breast-cancer-and-occupation. [Accessed 12 Nov. 2019].

17 The data gender gap even exists in basic animal studies. A 2011 review of 10 cardiovascular journals found that when sex was specified 69% of cell studies reported using only male cells. In 2014, another study found that 22% of animal studies did not specify sex and of those that did, 80% included only males. Alarmingly, animal studies on female prevalent diseases do not include females. For example, animal studies on brain disorders are five times more likely to be done on male animals even though women are 70% more likely to suffer depression than men. Taylor, K., Vallejo-Giraldo, C., Schaible, N., Zakeri, R. and Miller, V. (2011). *Reporting of sex as a variable in cardiovascular studies using cultured cells. Biology of Sex Differences,* [online] 2(1), p.11. Available at: https://bsd.biomedcentral.com/articles/10.1186/2042-6410-2-11 [Accessed 11 Nov. 2019].

< 10 >

We continue to rely on data from studies done on men as if they apply to women. As an example, the levels of radiation used for cancer treatments that were conceived to be safe for the "Reference Man" - a Caucasian male aged 25 – 30 weighing 70 kg - are not safe for women[18]. In fact, women are at significantly greater risk of suffering and dying from radiation-induced cancer than a man who gets the same dose of ionizing radiation[19]. Men and women biologically different have different immune systems and hormones that play a role in how chemicals are absorbed in their bodies. Women tend to have a lower tolerance threshold to the level of toxins they can be safely exposed to because they tend to be smaller than men and have thinner skin[20]. This is compounded by women's higher percentage of body fat in which some chemicals can accumulate.

Gender neutral does not mean gender equal. In the UK employers are legally required to provide well maintained Personal Protective Equipment (PPE) to workers free of charge. Most PPE is based on the sizes and characteristics of male populations from certain countries across Europe and the US.

Unsurprisingly in a 2016 survey by the UK Trade Union Congress (TUC) the percentage of women who said their PPE hampered their work was a

---

Yoon, D., Mansukhani, N., Stubbs, V., Helenowski, I., Woodruff, T. and Kibbe, M. (2014). Sex bias exists in basic science and translational surgical research. Surgery, [online] 156(3), pp.508-516. Available at: https://www.surgjournal.com/article/S0039-6060(14)00425-5/fulltext [Accessed 12 Nov. 2019].Raymond, L. (2016). *Scientists Avoid Studying Women's Bodies Because They Get Periods*. [online] Thinkprogress.org. Available at: https://thinkprogress.org/scientists-avoid-studying-womens-bodies-because-they-get-periods-3fe9d6c39268/ [Accessed 8 Jun. 2016] and World Health Organization. (2019).Conrad Ströppler, M. (2019). Perez, C. (2019). *Invisible women: Exposing Data Bias in a World Designed for Men*. London: Vintage Books.

18 Later, W., Bosy-Westphal, A., Kossel, E., Glüer, C., Heller, M. and Müller, M. (2010). *Is the 1975 Reference Man still a suitable reference?*. European Journal of Clinical Nutrition, [online] 64(10), pp.1035-1042. Available at: https://www.nature.com/articles/ejcn2010125 [Accessed 16 Nov. 2019].

19 Olson, M. (2019). *Atomic radiation is more harmful to women* | Wise International. [online] Wiseinternational.org. Available at: https://www.wiseinternational.org/nuclear-monitor/736/atomic-radiation-more-harmful-women [Accessed 16 Nov. 2019].

< 11 > **20** Ibid.

considerable 95%[21]. Certain PPE were highlighted as particularly unsuitable: body amour, stab vests, hi-visibility vests and jackets[22]. PPE is the first defense against injury or death at a job site. Ill-fitting gloves can lead to problems gripping, the wrong shoes or overalls can increase the chances of tripping and can also lead to calluses, bunions, foot deformities, back pain and other health and safety concerns[23]. Additionally, if we want women to be 'economically empowered' and have the opportunity to participate equally in these well-paying and dangerous occupations they should have the safety equipment to do so professionally and safely. These are just some examples of a larger system that is unequal by design. It's not just women themselves who have been invisible to the data collection and design process, some of the most important issues in women's lives are also uncounted and unaccounted for such as time spent on household or care work[24].

---

[21] Trades Unions Congress (2017). *Personal protective equipment and women. Guidance for workplace representatives on ensuring it is a safe fit.* [online] Trades Unions Congress. Available at: https://www.tuc.org.uk/sites/default/files/PPEandwomenguidance.pdf [Accessed 11 Nov. 2019]

[22] Ibid.

[23] For example, a British female police officer was stabbed and killed while using a hydraulic ram to enter a flat - she had removed her body armour because it was difficult to use the ram while wearing it. The Guardian (1999). *Breast reduction for PC in 'armour agony'.* [online] Available at: https://www.theguardian.com/uk/1999/may/20/nickhopkins [Accessed 18 Nov. 2019].
Trades Unions Congress (2017).

[24] Women carry out at least two and a half times (250%) more unpaid household and care work than men. On average, women spend between three and six hours on unpaid care work per day, while men spend less than half this time only spending between half an hour and two hours.
UN Women. (n.d.). *Redistribute unpaid work.* [online] Available at: https://www.unwomen.org/en/news/in-focus/csw61/redistribute-unpaid-work [Accessed 16 Nov. 2019].

< 12 >

< 3 >

Accountability

Right now, the data picture is imbalanced.

Despite the 232 indicators for the 2030 Agenda for Sustainable Development, we have gaps in gender data worldwide that mean that we only have a partial snapshot of the lives and challenges of women and girls[25]. Without female data, everything from medical treatment to the design of safety features in cars to the work equipment we wear is biased and designed for the "default male".

The effects range from inconvenient to deadly – it is bad science and it is dangerous. Gender equality in data is crucial. We need gender data to be available, accessible and analysed so that everyone can thrive.

< 3.1 > **Improved policy relevant datasets**

Achieving gender equality requires quality, policy-relevant data on women and girls. Without it, we cannot make informed decisions, and we cannot track if those decisions are improving lives. Therefore, we must improve our datasets[26].

---

25 Data2X. (2019). *What is gender data? - Data2X*. [online] Available at: https://data2x. org/what-is-gender-data/ [Accessed 18 Nov. 2019].

26 The McKinsey Global Institute estimates the global value of improved and more open data at up to $3 trillion of economic value per year across seven sectors. Manyika, J., Chui, M., Groves, P., Farrell, D., Van Kuiken, S. and Almasi Doshi, E. (2013). *Open data: Unlocking innovation and performance with liquid information*. [online] Available at: https:// www.mckinsey.com/business-functions/mckinsey-digital/our-insights/open-data-unlocking-innovation-and-performance-with-liquid-information [Accessed 13 Nov. 2019].

< 13 >

< 3.1.2 > Gender disaggregated data

Within our current landscape, data suffers from several gender blind spots. This includes the fact that too often gender simply isn't recorded[27]. No one should be invisible or left behind. The solution is simple – if we want to achieve gender equality we must produce and only use data that is gender disaggregated. Getting a representative sample is the foundation of good science. To make good policy and fully informed decisions we must ensure the data represents all of humanity and make women visible through gender disaggregated data, with due protections for human rights[28].

The data architecture underpinning the gender disaggregated data should have a user-centered design and user-friendly interfaces so the information can be easily understood[29]. We must ensure that gender disaggregated data is the data revolution default.

---

27 Gender is one of the many blind spots of data that is produced – numbers on ethnicity, disability and LGBTI persons are amongst some of the other blind spots.

28 While gender disaggregated data and big data (referred to further in the paper) has enormous potential to empower women and girls, safeguards must be put in place, as it also poses a risk to the privacy of women and girls. Guaranteeing privacy and security for women and girls must be paramount – therefore big data should be used only when the likelihood of risks and related harms in proportion to the expected benefits of the data use is fully assessed.
Abreu Lopes, C. and Bailur, S. (2018). *Gender Equality and Big Data*. [online] Global Pulse & UN Women. Available at: https://www.unglobalpulse.org/sites/default/files/Gender-equality-and-big-data-en-2018.pdf [Accessed 14 Nov. 2019].

29 UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (2014). *A world that counts - Mobilising the Data Revolution for Sustainable Development*. [online] UN Independent Expert Advisory Group Secretariat. Available at: https://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf [Accessed 9 Nov. 2019].

< 14 >

< 3.1.3 > Gender-responsive big data

The potential to use big data for social good has been well recognized as reflected in the creation of the Big Data UN Global Working Group[30]. Policy makers would better understand the lives of women and girls and specifically the cultural, infrastructural, economic, and political forces that lead to gender inequality if there was investment in big data systems. Big data can capture insights that are difficult to obtain in standard types of data collection or otherwise difficult to measure. For example, national socioeconomic surveys are not able to capture inequalities within the household as they typically offer information about the status of the family as a whole, and are anchored around a "head of household" which is defined generally as the adult male, and leads to female-led households being overlooked and undercounted[31]. We can learn more about women and girls through big data from information gathered from cell phone use for example[32].

---

30 The terms of reference of the Working Group includes that big data sources are recognized as constituting an important part of the data revolution. Additionally, the UN Global Pulse 2018 report 'Gender and Big Data' identifies a number of projects of big data for sustainable development projects sourced from UN Global Pulse, the UN Global Working Group on Big Data for Official Statistics, the UNECE/Sandbox, Data2X, the NYU Governance Lab, the Data Science for Social Good programme at the University of Chicago, Flowminder, UNICEF, and the World Bank Group. Ibid.
Big Data UN Global Working Group. (2015). *Terms of reference and mandate of the Global Working Group on Big Data for Official Statistics.* [online] Available at: https://unstats.un-.org/bigdata/documents/Terms%20of%20Reference%20-%20UN%20Global%20Working%20Group%20on%20BigData.pdf [Accessed 18 Nov. 2019].
Abreu Lopes, C. and Bailur, S. (2018).

31 The New York Times (2019). *Closing the Data Gender Gap - How Efforts to Collect Data About Women and Girls Drive Global Economic and Social Progress.* [online] Available at: https://www.nytimes.com/paidpost/gates-foundation/closing-the-gender-data-gap.html [Accessed 16 Nov. 2019].

32 Data2X (2019). *Big Data, Big Impact? Towards Gender-Sensitive Data Systems.* [online] Data2X. Available at: https://data2x.org/wp-content/uploads/2019/11/BigDataBigImpact-Report-WR.pdf [Accessed 9 Nov. 2019].

< 15 >

The UN Women and UN Global Pulse 2018 report 'Gender and Big Data' and Data2X's recent 2019 report 'Big Data Big Impact? Towards Gender-Sensitive Data Systems' provide numerous case studies and pilots of how gender-responsive big data is ready to scale up particularly when integrated with traditional data[33]. Using 10 case studies across the globe, Data2X clearly demonstrates that big data offers unique insights into women and girls.

For example, case studies on gender gaps in urban mobility in Santiago in Chile (and also New Delhi in India), financial flows in Uganda, school enrolment in Pakistan, the use of health services in New Delhi, economic participation in Nepal and South Africa, access to technology globally, and gender based violence in the Middle East region, demonstrates how big data can help us understand several gendered aspects of economic and social behaviour[34]. It is clear that to make women visible we must improve datasets and always conduct gender disaggregated analysis of any dataset being used in order to responsively address gender insights in data and in turn foster more gender-responsive data.

For example, gender data collection methods should take into account stereotypes and social and cultural factors that may induce gender bias so that we can effectively interpret big data analytics – what women are comfortable saying online may not reflect their actual opinions[35].

Where no gender disaggregated data is currently available, organizations must be transparent and state that the impacts of gender are unknown. Importantly, gender insights in data / statistics / research and / or analysis should never be discarded. Instead more information should be gathered where the original sample size was deemed too small to draw any valid conclusions.

---

[33] Ibid. UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (2014).

[34] Data2X (2019).

< 16 > [35] Ibid.

< 3.1.4 >   Open inclusive quality datasets

Gender bias in data this means that big data is not always or often representative of the lives of women and girls. Engaging in more inclusive data collection processes to focus not only on quantity but on the quality of datasets can improve datasets and contribute to closing the data gender gap[36]. Drawing on the UN Fundamental Principles of Official Statistics, the development of clear standards would assist in safeguarding data quality and integrity[37].

I. Big data gender bias

Open and gender disaggregated datasets better enable an understanding of the sources of bias within the data. Open data is "disaggregated by gender and is easily accessible, machine-readable, accessible for free or at negligible cost, and with minimal limitations on its use, transformation and distribution (open data)"[38].

In the Women at the Table paper *'We Shape Our Tools, and Thereafter Our Tools Shape Us',* we illuminate the potential for in-built bias that leads to the discrimination and exclusion of women in developing ADM systems[39]. Various errors, shortcomings or misinterpretation along the analytics pipeline can

---

36 Celis, E., Huang, L., Keswani, V. and Vishnoi, N. (2018). *Classification with fairness constraints: A meta-algorithm with provable guarantees.* arXiv preprint arXiv:1806.06055.

37 UN Stats. (2014). *Resolution adopted by the Economic and Social Council on 24 July 2013 - 2013/21 Fundamental Principles of Official Statistics.* [online] Available at: https://unstats.un.org/unsd/dnss/gp/FP-Rev2013-E.pdf [Accessed 16 Nov. 2019].

38 Data-Pop Alliance. (2019). *Key Terms.* [online] Available at: https://datapopalliance.org/resources-and-methodologies/key-terms/#open-data [Accessed 1Nov. 2019].

39 Kraft-Buchman, C. and Arian, R. (2019). *Affirmative Action for Algorithms - Artificial Intelligence, Automated Decision-Making & Gender - We Shape Our Tools, and Thereafter our Tools Shape Us.* [online] Geneva: Women At the Table. Available at: https://uploads.strikinglycdn.com/files/71053b68-f23c-400d-9ee0-b8d989f93767/A%20%20AFFIRMATIVE%20ACTION%20FOR%20ALGORITHMS%20-%20Artificial%20Intelligence%2C%20Automated%20Decision-Making%20%26%20Gender%20Position%20paper.pdf [Accessed 1 Nov. 2019].

< 17 >

originate from biases in datasets or in statements or predictions based on the analysis of datasets.[40] The Amazon recruitment algorithm example in 'We Shape Our Tools, and Thereafter Our Tools Shape Us', illustrates that women had not been invited to job interviews as a direct correlation to the choice of data that was used – i.e. the algorithm was "trained" on word patterns rather than relevant skill sets in resumes. The algorithm replicated the realities that existed at Amazon for over 10 years (which was implicitly that high flyers at engineering department = white males from Stanford). The algorithm taught itself to penalise resumes that included the word "women's" such as "women's chess club captain" in the text and downgraded resumes of women who attended "women's colleges". In essence the algorithm learnt to discriminate against women[41]. Making implicit bias explicit bias.

Moreover, low quality data can be either poorly selected data or incomplete, incorrect or outdated data – which all lead to poor predictions and ultimately discrimination against women[42]. For example, as outlined in Women At the Table's paper *'We Shape Our Tools, and Thereafter Our Tools Shape Us'*, researchers at a major U.S. technology company claimed an accuracy rate of more than 97% for a face-recognition system they had designed - however the data set was more than 77% male and more than 83% white[43].

---

40 Debussche, J., César, J. and De Moortel, I. (2019). *Big Data & Issues & Opportunities: Discrimination.* [online] Two Birds. Available at: https://www.twobirds.com/en/news/articles/2019/global/big-data-and-issues-and-opportunities-discrimination [Accessed 16 Nov. 2019].

41 Dastin, J. (2018). *Amazon scraps secret AI recruiting tool that showed bias against women.* Reuters. [online] Available at: https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G [Accessed 20 Jun. 2019].
Kraft-Buchman, C. and Arian, R. (2019).

42 European Union Agency for Fundamental Rights (2018). *#BigData: Discrimination in data-supported decision making.* [online] FRA. Available at: https://fra.europa.eu/sites/default/files/fra_uploads/fra-2018-focus-big-data_en.pdf [Accessed 17 Nov. 2019].

43 United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2019). I'd blush if I could: closing gender divides in digital skills through education. [online] Available at: https://unesdoc.unesco.org/ark:/48223/pf0000367416.page=1 [Accessed 1 Nov. 2019].

< 18 >

The selection bias from data used to train the algorithm over-represents one population, while under-representing another. Therefore, the poorly selected or unrepresentative data that was used was ultimately incorrect data. Additionally, machine-learning software trained on these datasets don't just mirror biases, they amplify them[44].

II. Human-in the loop verification

The quality of data is particularly important in big data because it is generated so quickly without any quality control[45]. In addition to the accountability tools such as algorithmic impact assessments, amongst other tools recommended in Women At the Table's *'We Shape Our Tools, and Thereafter Our Tools Shape Us'* paper, human expert knowledge is required along the analytics process as well as during statistical treatment and accuracy estimation of data[46]. Big data poses certain challenges requiring expert knowledge to estimate the accuracy of conclusions drawn from it[47].

The risks of gender bias when using data (for example for ADM) can be reduced by investing in controls to oversee data collection processes and human-in-the-loop verification, so that data is not collected at the expense of women

---

44 For example, in Women At the Table's paper 'We Shape Our Tools, and Therefore Our Tools Shape Us', it highlights that if a photo set generally associated women with cooking, the software trained by studying those photos and their labels created an even stronger association. In the researchers' tests, people pictured in kitchens became even more likely than reflected in the training data to be labelled "woman": in a photo of a man at a stove he is labelled "woman". Several additional examples of gender bias in data (in the context of ADM and machine learning) can be found within Women At the Table's paper *'We Shape Our Tools, and Thereafter Our Tools Shape Us'.* Kraft-Buchman, C. and Arian, R. (2019).
Zhao, J., Wang, T., Yatskar, M., Ordonez, V. and Chang, K. (2017). *Men Also Like Shopping: Reducing Gender Bias Amplification using Corpus-level Constraints.* In: Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing. [online] Available at: http://markyatskar.com//publications/bias.pdf [Accessed 1 Nov. 2019]. European Union Agency for Fundamental Rights (2018).

45 Ibid.

46 Kraft-Buchman, C. and Arian, R. (2019). Debussche, J., César, J. and De Moortel, I. (2019).

< 19 > **47** Ibid.

and other traditionally excluded groups[48]. This means humans are involved throughout the data process – from involving human operators when collecting the data, to analysing the data, to using the data. Additionally, data quality checks and appropriate documentation of data and metadata is essential for high quality analysis and the use of algorithms for ADM. For example, in Data2X's recent report 'Big Data, Big Impact? Towards gender sensitive data systems', one of the case studies on violence against women relies on human judgment to train a machine learning model to recognize and classify online expressions signifying gender based violence[49]. This example highlights that not only is human engagement and judgement required when using big data, but also that Data2X's approach is a current good practice example of human-in the loop verification.

Validation studies are also a way to evaluate the accuracy of individual gender tags within big datasets and allow for the creation of methods to improve the accuracy of these tags, and thus produce gender-disaggregated results. The power of big data would be amplified with investment in validation research specifically that which allows big data to be gender-disaggregated.[50]

< 3.2 >   **Gender data frameworks**

We must promote enabling accountability frameworks to assist designers, developers, and policymakers to ensure women and those traditionally excluded are not left behind[51].

---

48 World Wide Web Foundation (2017). *Algorithmic Accountability. Applying the concept to different country contexts.* [online] World Wide Web Foundation. Available at: https://webfoundation.org/docs/2017/07/Algorithms_Report_WF.pdf [Accessed 1Nov. 2019].

49 Data2X (2019).

50 Ibid.

51 European Parliamentary Research Service (2019). *A governance framework for algorithmic accountability and transparency. Study - Panel for the Future of Science and Technology.* [online] Available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU(2019)624262_EN.pdf [Accessed 1Nov. 2019].

< 20 >

Further to the accountability recommendations from Women at the Table's paper "We Shape Our Tools, and Thereafter Our Tools Shape Us" countries could appoint a national chief statistician that works across government to ensure a regulatory framework to support a more inclusive national and international statistical system that includes gender disaggregated data[52]. Countries could also follow a good practice of France and appoint an additional data coordinator who can support the chief statistician and help to advocate for data innovation and inclusion across Government[53].

The comprehensive framework to assess data and capacity gaps linked to gender statistics developed by PARIS21 in collaboration with UN Women should be utilized[54]. The framework aimed at national statistical offices, proposes methods, activities and tools for conducting assessments related to gender statistics to support the mainstreaming of gender statistics in national statistical systems[55].

< 3.3 > Strengthen national statistics systems to improve collection of gender data

Investment in and strengthening gender responsive national systems such as civil registration and vital statistics (CRVS) is an indispensable part of the data ecosystem. This system provides essential legal documentation and is foundational for both gender and data equality[56]. Civil registration is a critical first step in securing recognition before the law and safeguarding the

---

52 Sustainable Development Solutions Network Thematic Research Network on Data and Statistics (2019). *Counting on The World to Act A Roadmap for Governments to Achieve Modern Data Systems for Sustainable Development.* [online] SDSN TReNDS. Available at: https://countingontheworld.sdsntrends.org/static/files/19COTW.pdf [Accessed 11 Nov. 2019].

53 Ibid.

54 PaRiS21. (2019). | *PARIS21.* [online] Available at: https://paris21.org/ [Accessed 14 Nov. 2019].

55 Paris 21. (2019). *Assessing Data and Capacity Gaps in Gender Statistics.* [online] Available at: https://paris21.org/node/3286 [Accessed 19 Nov. 2019].

56 Data2X (2018). *CRVS and Gender.* [online] D. Available at: https://data2x.org/resource-center/crvs-and-gender/ [Accessed 11 Nov. 2019].

< 21 >

human rights of women, girls, and other vulnerable groups. Legal identity, proof of age, and civil status facilitate access to key rights and services, including social protection, voting rights, health, education, and financial services[57]. Therefore CRVS is critical.

Many countries do not have robust national information systems to collect or track critical statistics, including the number and registration of births and deaths and are not sufficiently nuanced to capture gender disaggregated data covering basic indicators such as population, health, education and work[58]. For example, it is estimated that births of around one fourth of the global population of children under five have never been registered and without registered births girls in many countries cannot access education and are at an increased risk of child marriage[59].

CRVS systems can be strengthened by[60]: building capacity – technical capacity across all administrative levels of a registration system; centralization of record keeping; facilitation of coordination between agencies and ministries

57 Irina, D. and Nomthandazo, M. (2019). *Making the Invisible Visible: How Strong CRVS Systems Can Empower Women and Girls. Knowledge Briefs on Gender and CRVS.* [online] Centre of Excellence for CRVS.
Available at: https://crvssystems.ca/sites/default/files/inline-files/CRVS_Gender_1.1_In-visibleVisible_e_WEB.pdf [Accessed 11 Nov. 2019].

58 Over over 110 low- and middle-income countries have deficient CRVS systems. World Bank. (2018). *Global Civil Registration and Vital Statistics.* [online] Available at: https://www.worldbank.org/en/topic/health/brief/global-civil-registration-and-vital-statistics [Accessed 19 Nov. 2019].
Irina, D. and Nomthandazo, M. (2019).

59 UNICEF. (2019). *Child marriage - UNICEF DATA.* [online] Available at: https://data.unicef.org/topic/child-protection/child-marriage/ [Accessed 11 Nov. 2019].
UNICEF. (2019). *Birth registration - UNICEF DATA.* [online] Available at: https://data.unicef.org/topic/child-protection/birth-registration/ [Accessed 11 Nov. 2019].

60 Appel, D. and Wahabzada, T. (2019). *Civil Registration and Vital Statistics: Data Gaps and Possible Solutions.* [online] Open Data Watch. Available at: https://opendatawatch.com/blog/civil-registration-and-vital-statistics-data-gaps-and-possible-solutions/ [Accessed 11 Nov. 2019].

< 22 >

at a local and national level[61]; incentivizing improvement of CRVS systems[62]; and linking national ID registers with CRVS systems, which results in better data on women[63]. In countries with limited capacity, this may require investments in human capital, new technology, infrastructure, geospatial data and management systems in both governmental and independent systems, as well as information intermediaries[64]. The result will be to leave no one behind.

---

61 For example, in Cambodia, the Ministry of Interior, National Statistics Office, and Ministry of Health are conducting a comprehensive evaluation on their existing death registration data. This will lead to better assessment of trends and potentially improving public health outcomes through the identification of gaps within the data at the local and national level. Ibid.

62 For example a program in Nepal aimed to improve nutrition amongst the poor. If households provided children's birth certificates they received a cash transfer. Birth registration improved significantly within the targeted group. Similarly in Zimbabwe around 4000 households received either an unconditional cash transfer or a conditional cash transfer dependent on the registration of their under 18 children. Within households receiving conditional cash transfers, registration rates increased.
C. Knowles, J. and Koolwal, G. (2016). *Gender Issues in CRVS and Access to Adult Identity Documentation.* [online] Data2X. Available at: https://data2x.org/wp-content/uploads/2019/09/CRVSAccesstoAdultIdentityDocumentation.pdf [Accessed 13 Nov. 2019]
Robertson, L., Mushati, P., Eaton, J., Dumba, L., Mavise, G., Makoni, J., Schumacher, C., Crea, T., Monasch, R., Sherr, L., Garnett, G., Nyamukapa, C. and Gregson, S. (2013). *Effects of unconditional and conditional cash transfers on child health and development in Zimbabwe: a cluster-randomised trial.* The Lancet, [online] 381(9874), pp.1283-1292. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3627205/ [Accessed 14 Nov. 2019].

63 Importantly, ID registration also allows women and girls to access services, claim their entitlements as citizens, and increase their voice and agency through participation for example in voting. Centre of Excellence for CRVS Systems (2019). *Linking National ID and CRVS Systems: An Imperative for Inclusive Development.* Knowledge Briefs on Gender and CRVS. [online] Available at: https://crvssystems.ca/sites/default/files/inline-files/CRVS_Gender_2.3_ID_e.pdf [Accessed 11 Nov. 2019].
Dahan, M. and Hanmer, L. (2015). *The identification for development (ID4D) agenda : its potential for empowering women and girls - background paper.* [online] Available at: http://documents.worldbank.org/curated/en/859071468190776482/pdf/99543-WP-P156810-PUBLIC-Box393205B.pdf [Accessed 12 Nov. 2019].

64 UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (2014).

< 23 >

< 4 >
Inclusion

< 4.1 > Gender balance in decision-making

According to the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Women in Science data less than 30% of the world's researchers are women – 19% in south and west Asia, 23% in east Asia and the Pacific, 31% in sub-Saharan Africa, 32% in North America and western Europe, and 45% in Latin America and the Caribbean[65]. While the overall proportion of female researchers is increasing worldwide women are less likely to collaborate internationally and publish fewer research papers on average than male researchers[66]. Women are often squeezed out of science careers by structural barriers[67].

---

65 The regional averages are based on the latest available data (2015) and have been rounded e.g. the world average is 28.8%.
UNESCO Women in Science. (2019). *Women in Science | UNESCO UIS.* [online] Available at: http://uis.unesco.org/en/topic/women-science [Accessed 9 Nov. 2019].
UNESCO. (2018). *Women in Science.* [online] Available at: http://uis.unesco.org/sites/default/files/documents/fs51-women-in-science-2018-en.pdf [Accessed 9 Nov. 2019].

66 Elsevier (2017). *Gender in the Global Research Landscape - analysis of research performance through a gender lens across 20 years, 12 geographies, and 27 subject areas.* [online] Amsterdam: Elsevier. Available at: https://www.elsevier.com/__data/assets/pdf_file/0008/265661/ElsevierGenderReport_final_for-web.pdf [Accessed 9 Nov. 2019].

67 Science in Australia Gender Equity, the American Association of University Women, and the European Commission have reported that gender inequality is a function of systemic factors unrelated to ability, including bias, organisational constraints, organisational culture, and differential effects of work and family demands. Science in Australia Gender Equity Gender equity in STEMM. Paradoxically, countries with high levels of gender equality have some of the largest gender gaps in secondary and tertiary education of science, technology, engineering, and mathematics (STEM) according to an analysis of data from the Programme for International Student Assessment. Science in Australia Gender Equity (SAGE). (2016). *Gender Equity in STEMM.* [online] Available at: http://www.sciencegenderequity.org.au/gender-equity-in-stem/ [Accessed 11 Nov. 2019].
Corbett, C. and Hill, C. (2015). *Solving the equation - The Variables for Women's Success in Engineering and Computing.* [online] Washington DC: AAUW. Available at: https://www.aauw.org/research/solving-the-equation/ [Accessed 11 Nov. 2019]. Apap, J., Claros, E. and

< 24 >

Similarly, the reality is that women are still too often underrepresented in low, middle, and high levels of decision-making and in the allocation of resources necessary to meet their needs and thrive. Although the number has increased (from 12 to 21) over the past 20 years female heads of state or government are still a minority – women continue to be under-represented in leadership positions[68]. We must include women in decision-making positions as it is clear this contributes to: efficiency gains; greater innovation and creativity; improved business outcomes including a greater return to shareholders; and a positive correlation between gender equality and a country's level of competitiveness, GDP per capita and its rank in the Human Development Index[69].

We must take clear proactive steps to include an intersectional variety and equal numbers of women and girls in decision making positions as well as in the funding, conducting and collection of data. Underscoring this is digital and data literacy programmes for women and girls to target the often unstated social norms that reserve maths, computing and similar disciplines for boys and men[70].

Zamfir, I. (2019). *Women in politics: A global perspective.* [online] Brussels: European Parliamentary Research Service. Available at: http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635543/EPRS_BRI(2019)635543_EN.pdf [Accessed 12 Nov. 2019].

68 The situation is similarly replicated in the technology sector and in particular in AI and ADM leadership where women have remained largely under-represented and / or excluded. Additionally, the situation is worse for black people, only 2.5% of Google's workforce is black while Facebook and Microsoft are each at 4% and 3.6% of Google's workforce is Latinx, Microsofts is 6% and Facebook reported 5% Hispanic workers. Kraft-Buchman, C. and Arian, R. (2019).

69 Ibid.

70 Badiee, S. and Melamed, C. (2014). *Making the data revolution a gender data revolution - UN Data Revolution.* [online] UN Data Revolution. Available at: https://www.un-datarevolution.org/2014/12/15/gender-data-revolution/ [Accessed 13 Nov. 2019].

< 25 >

< 4.2 > Inclusive innovation

In order for innovation to truly thrive we need an inclusive innovation - gender inequality, including in data, generates wasted opportunities in advancing innovation[71]. The quality of research and an improved acceptance of innovation in the market occurs when there is a gender analysis in the research content[72]. An example used by the OECD to demonstrate inclusive innovation involves the development of a sanitary napkin machine by the Jayaashree Industries in India. When designing the machine, the inventor was aware of local culture and realised that women are often ashamed, shy, or embarrassed to candidly discuss their menstrual problems. The inventor developed questionnaires and conducted trial methods by distributing his preliminary napkin samples to female university students in a particular region in India. Women were involved in the innovation process, influenced the design and were used for data collection purposes[73].

Inclusive innovation also has cross-cutting benefits – in the context of the creation of the sanitary napkin machine in India these include (amongst others): new information services for better communication and awareness raising and improving understanding of menstrual hygiene issues among adolescent girls, boys and women and men; empowering women to protect themselves from social practices like seclusion; women's participation in income generating activities; and prevention of dropping out from education at puberty due to poor sanitation facilities and restrictions on mobility[74].

---

71 Heisook, L. and Pollitzer, E. (2016). *Gender in science and innovation as component of inclusive socioeconomic growth.* [online] London: Portia Ltd. Available at: https://gender-summit.com/images/Gender_and_inclusive_innovation_Gender_Summit_report.pdf [Accessed 17 Nov. 2019].

72 Ibid

73 Ibid.

< 26 > **74** Ibid.

The Seoul Declaration adopted at the Gender Summit 6 Asia-Pacific 2015 offers a set of 10 principles to promote gender aware research and innovation to improve the quality of science and enhance socio-economic development in the Asia-Pacific region. These 10 principles offer a useful guidance for mainstreaming gender into research and innovation[75].

< 27 >

5. Create fresh opportunities for developing new markets for science knowledge by advancing gendered innovation ecosystems by exploiting connections between gender sensitive research, the different interests and product needs of women and men and making better use of available female scientific creative capital. These may involve for instance, speech recognition products or devices promoting healthy ageing.

6. Involve more women in innovation value chains – in idea creation, development and implementation.

7. Identify statistics, indicators, and methods for collecting sex-dissagregated data to enable better understanding of the current situation regarding gender equality in science at institutional, national, and regional level. Key measures include – gender balance in participation in science education, in research and innovation, and in science related academic, industry and related employment; institutional gender equality policies; progression stages in career pathways of women and men; and applications and success rates in access to research funding.

8. Educate, starting with schools and including university students, researchers, managers of research and science communicators about the importance of including gender perspectives in research and innovation.

9. Judge the individual and scientific quality, and potential, of women and men using clear and fair assessment criteria, monitoring outcomes for signs gender bias in order to improve the selection process.

10. Create conditions for the gendered research and innovation principles to be implemented in practice through funding policies and programmes, encouraging cross-disciplinary and cross-sector collaboration, for example between universities, industry and civil society organizations.

< 28 >

< 5 >

International Cooperation

Gender data is rarely prioritized in data collection.

Both at a national and international level, the resources devoted to gender data remains grossly inadequate. Based on recent assessments, over US$400 million is provided annually in bilateral and multilateral assistance for statistical capacity-building. However, very few of these resources are dedicated to improving gender statistics. For example, recent assessments found that only only 2% (US$2.6 million) out of US$131 million committed to statistical capacity building in 2013 by the OEC Development Assistance Committee (OECD-DAC) – approximately the cost of two standalone surveys on violence against women – was devoted to projects in which gender was the principle objective[76].

In the past two decades a proliferation of gender indicators has emerged with methodological and conceptual shortfalls that substantially limit the use of gender data[77]. Unequal country coverage, lack of international

---

76 UN Women (2016). *Making Every Woman and Girl Count: Supporting the Monitoring and Implementation of the SDGs through better production and use of gender statistics.* [online] New York: UN Women. Available at: https://www.unwomen.org/-/media/headquarters/attachments/sections/how%20we%20work/flagship%20programmes/fpi-statistics-concept-note.pdf?la=en&vs=7 [Accessed 14 Nov. 2019].

77 Examples of gender data that has emerged includes: the Organisation for Economic Co-operation and Development OECD reports aggregate gender data on employment, education, entrepreneurship, health, development, and governance; World Bank's Gender Data Portal contains over 500 indicators on agency, economic and social context, economic opportunities, public life and decision making; the UN Statistics Division's Minimum Set of Gender Indicators comprise 52 quantitative and 11 qualitative indicators in the domains of economic structures, participation in productive activities and access

< 29 >

standards for comparability, insufficient complexity of indicators across gender domains and insufficient granularity for disaggregation are some of the methodological limitations. While conceptual shortfalls include lack of meaningful information about within-household gender dynamics, inadequate qualification of unpaid and domestic labour as well as assumptions of heteronormativity and exclusion of non-gender-binary people[78].

While initiatives such as Data2X and Equal Measures 2030 aim to fill research and awareness of these gaps, the mass scale correction of skewed data and data systems will require multilateral and international cooperation to ensure that no one is left behind[79]. The UN is positioned well to lead on this, for example through putting the gender data gap on the official agenda of its third UN World Data Forum in Switzerland in 2020[80]. There should be coordination within the UN and its agencies to ensure efforts are complementary and not duplicative.

For example, the outcomes of UN Women's flagship programmes, Making Every Woman and Girl Count and Flagship Programme Initiative: Better Production and Use of Gender Statistics for Evidence-Based Localization of

---

to resources, education, health, public life and decision making, and human rights; and composite data on various aspects of gender, health, and development is reflected in numerous international gender indexes. OECD. (2019). *Gender - OECD.* [online] Available at: https://www.oecd.org/gender/ [Accessed 14 Nov. 2019]. Worldbank Datatopics. (2019). *Gender Data Portal.* [online] Available at: https://datatopics.worldbank.org/gender/indi-cators [Accessed 14 Nov. 2019]. UN Gender Stats. (2019). *The United Nations Minimum Set of Gender Indicators.* [online] Available at: https://genderstats.un.org/files/Minimum%20 Set%20indicators%20web.pdf [Accessed 7 Nov. 2019].

78   Shannon, G., Jansen, M., Williams, K., Cáceres, C., Motta, A., Odhiambo, A., Eleveld, A. and Mannell, J. (2019). *Gender equality in science, medicine, and global health: where are we at and why does it matter?.* The Lancet, [online] 393(10171), pp.560-569. Available at: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)33135-0/fulltext [Accessed 8 Nov. 2019].

79   Equal Measures 2030. (2019). *Equal Measures 2030.* [online] Available at: https://www.equalmeasures2030.org/ [Accessed 12 Nov. 2019].Data2X. (2019). *What We Do - Data2X.* [online] Available at: https://data2x.org/what-we-do/ [Accessed 12 Nov. 2019].

80   UN World Data Forum. (2019). *Event: UN World Data Forum , United Nations Statistics Division, Statistics South Africa, Sustainable Development Goals.* [online] Available at: https://unstats.un.org/unsd/undataforum/index.html [Accessed 15 Nov. 2019].

< 30 >

the SDGs (Gender Statistics FPI) should be fed into this process, and the recently launched PARIS21 comprehensive framework to assess data and capacity gaps linked to gender statistics should also be leveraged[81]. In this context, data-sharing protocols are encouraged. Grounded in human rights, it is envisaged that this action would guide and provoke creative thinking on a whole of system approach for closing the gender data gap that is fit for purpose in the fast-changing digital age[82].

< 5.1 >   Standards for gender responsive data

Any standards, legal or regulatory mechanisms must be grounded in human rights and protect, respect and fulfill the rights of all individuals. The set of indicators that was approved by the UN Economic and Social Council to track the SDG implementation recognizes the need to disaggregate data by gender, amongst other things[83]. However, only three of the 14 indicators to monitor SDG 5 have internationally accepted standards for measurement which exist and for which data is regularly collected by most countries (referred to as Tier 1 indicators)[84]. Of the remaining 11 indicators, five have internationally accepted

---

81 Making Every Woman and Girl Count is a public-private initiative over the course of five years (2016-2020) where UN Women support countries to improve the production, accessibility and use of gender statistics. The UN Women website says that the program will build a supportive policy and institutional environment to prioritize gender data and effective monitoring of the SDGs, increase data production and improve access to data to inform policy and advocacy. UN Women's Flagship Programme Initiative: Better Production and Use of Gender Statistics for Evidence-Based Localization of the SDGs (Gender Statistics FPI): The objectives of this proposed program are to deliver results in creating an enabling environment, data production and data accessibility. UN Women. (n.d). F*lagship programme: Making Every Woman and Girl Count.* [online] Available at: https://www.unwomen.org/en/how-we-work/flagship-programmes/making-every-wom-an-and-girl-count [Accessed 13 Nov. 2019] and UN Women (2016).PaRiS21. (2019).

82 Ibid.

83 UN Stats. (2019). *SDG Indicators*. [online] Available at: https://unstats.un.org/sdgs/indicators/indicators-list/ [Accessed 13 Nov. 2019].

84 Tier I indicators are 5.3.1 (child marriage), 5.3.2 (female genital mutilation and cutting) and 5.5.2 (women in managerial positions). UN Stats. (2018). *Tier Classification for Global*

< 31 >

standards, but data collection by most countries is largely irregular (referred to as Tier II indicators)[85]. International standards do not yet exist for legal frameworks to promote gender equality, political participation, laws and regulation related to sexual and reproductive health and reproductive rights, and for gender budgeting, and most countries do not regularly collect the data of the final remaining six indicators (referred to as Tier III indicators)[86].

The international community could utilize and leverage the current momentum of the 'Declaration for Gender Responsive Standards and Standards Development' in which signatories pledged to develop gender-responsive standards action plans, and develop international standards for the collection and measurement of gender disaggregated data[87].

SDG Indicators. [online] Available at: https://unstats.un.org/sdgs/files/Tier%20Classification%20of%20SDG%20Indicators_11%20May%202018_web.pdf [Accessed 13 Nov. 2019].

85 Tier II indicators are 5.2.1 (intimate partner violence), 5.2.2 (non-intimate partner sexual violence), 5.4.1 (unpaid care and domestic work), 5.6.1 (decision-making regarding sexual and re-productive health and reproductive rights) and 5.b (ownership of a mobile phone). Ibid.

86 Tier III indicators are 5.1.1, 5.5.1, 5.6.2 and 5.c. Additionally, in this respect, gender is just one of many blind spots in much of the data that are produced – for example numbers on disability, or ethnicity, are also often lacking but are essential for diagnosing and solving the inequalities and exclusion that drive poverty. Ibid.

87 Gender Champions. (2019). Standards | International Gender Champions. [online] Available at: https://genderchampions.com/impact/standards [Accessed 13 Nov. 2019].

< 32 >

< 6 >

Conclusion

WOMEN AT THE TABLE

We need data that accurately reflects and represents the lives and diversity of women. We have been slow to react to the mounting evidence of data bias and a data gender gap, where in some cases, the data on entire groups of women and girls is missing.

The gender neutral approach, in fact, relies on the "default male" and ultimately results in reinforcing existing gender biases, inequalities, and can even have deadly consequences. Gender bias continues to be pervasive in the data and yet continues to be used as viable data.

We are dealing with a sexist data crisis.
We must act now.

< 33 >

< 7 >

Recommendations

We call on Governments, the private sector and civil society organizations to undertake gender data inclusive actions to advance the values of equality we have long embraced and to correct for the visibility, quality and influence of women proportionate to the population.

> Work towards gender equality in data.

> As appropriate to the activity of each organisation, work towards improving efforts to fund, conduct, collect, and distribute data so that data is gender disaggregated.

> Work towards only using data that is gender disaggregated and that always responsively addresses the gender insights of the data.

> Be transparent if no gender-disaggregated data is currently available, and state that therefore the implications / impacts of gender are unknown.

< 34 >

< Bibliography >

Abreu Lopes, C. and Bailur, S. (2018). *Gender Equality and Big Data. [online] Global Pulse & UN Women.* Available at: https://www.unglobalpulse.org/sites/default/files/Gender-equality-and-big-data-en-2018.pdf [Accessed 14 Nov. 2019].

American Public Health Association. (2014). *Breast Cancer and Occupation: The Need for Action.* [online] Available at: https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/01/07/14/55/breast-cancer-and-occupation. [Accessed 12 Nov. 2019].

Apap, J., Claros, E. and Zamfir, I. (2019). *Women in politics: A global perspective.* [online] Brussels: European Parliamentary Research Service. Available at: http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635543/EPRS_BRI(2019)635543_EN.pdf [Accessed 12 Nov. 2019].

Appel, D. and Wahabzada, T. (2019). *Civil Registration and Vital Statistics: Data Gaps and Possible Solutions.* [online] Open Data Watch. Available at: https://opendatawatch.com/blog/civil-registration-and-vital-statistics-data-gaps-and-possible-solutions/ [Accessed 11 Nov. 2019].

Badiee, S. and Melamed, C. (2014). *Making the data revolution a gender data revolution - UN Data Revolution.* [online] UN Data Revolution. Available at: https://www.undatarevolution.org/2014/12/15/gender-data-revolution/ [Accessed 13 Nov. 2019].

Big Data UN Global Working Group. (2015). *Terms of reference and mandate of the Global Working Group on Big Data for Official Statistics.* [online] Available at: https://unstats.un.org/bigdata/documents/Terms%20of%20Reference%20-%20UN%20Global%20Working%20Group%20on%20BigData.pdf [Accessed 18 Nov. 2019].

C. Knowles, J. and Koolwal, G. (2016). *Gender Issues in CRVS and Access to Adult Identity Documentation.* [online] Data2X. Available at: https://data2x.orgwp-content/uploads/2019/09/CRVSAccesstoAdultIdentityDocumentation.pdf [Accessed 13 Nov. 2019].

Celis, E., Huang, L., Keswani, V. and Vishnoi, N. (2018). *Classification with fairness constraints: A meta-algorithm with provable guarantees.* arXiv preprint arXiv:1806.06055.

Centre of Excellence for CRVS Systems (2019). *Linking National ID and CRVS Systems: An Imperative for Inclusive Development. Knowledge Briefs on Gender and CRVS.* [online] Available at: https://crvssystems.ca/sites/default/files/inline-files/CRVS_Gender_2.3_ID_e.pdf [Accessed 11 Nov. 2019].

Conrad Ströppler, M. (2019). *Why Is Breast Cancer More Common in Females than Males?.* [online] MedicineNet. Available at: https://www.medicinenet.com/breast_cancer_in_males_and_females/ask.htm [Accessed 18 Nov. 2019].

Corbett, C. and Hill, C. (2015). *Solving the equation - The Variables for Women's Success in Engineering and Computing.* [online] Washington DC: AAUW. Available at: https://www.aauw.org/research/solving-the-equation/ [Accessed 11 Nov. 2019].

D., Segui-Gomez, ScD, M. and Crandall, J. (2011). *Vulnerability of Female Drivers Involved in Motor Vehicle Crashes: An Analysis of US Population at Risk.* American Journal of Public Health. [online] 101(12), pp.2368-2373. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3222446/ [Accessed 10 Nov. 2019].

Dahan, M. and Hanmer, L. (2015). *The identification for development (ID4D) agenda: its potential for empowering women and girls - background paper.* [online] Available at: http://documents.worldbank.org/curated/en/859071468190776482/pdf/99543-WP-P156810-PUBLIC-Box393205B.pdf [Accessed 12 Nov. 2019].

Dastin, J. (2018). *Amazon scraps secret AI recruiting tool that showed bias against women.* Reuters. [online] Available at: https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G [Accessed 20 Jun. 2019].

Data2X. (2019). *What is gender data? - Data2X.* [online]
Available at: https://data2x.org/what-is-gender-data/ [Accessed 18 Nov. 2019].

Data2X. (2019). *What We Do - Data2X.* [online] Available at: https://data2x.org/what-we-do/ [Accessed 12 Nov. 2019].

Data2X (2018). *CRVS and Gender.* [online] D. Available at: https://data2x.org/resource-center/crvs-and-gender/ [Accessed 11 Nov. 2019].

Data2X (2019). *Big Data, Big Impact? Towards Gender-Sensitive Data Systems.* [online] Data2X. Available at: https://data2x.org/wp-content/uploads/2019/11/BigDataBigImpact-Report-WR.pdf [Accessed 9 Nov. 2019].

Data-Pop Alliance. (2019). *Key Terms.* [online] Available at: https://datapopalliance.org/resources-and-methodologies/key-terms/#open-data [Accessed 1Nov. 2019].

Debussche, J., César, J. and De Moortel, I. (2019). *Big Data & Issues & Opportunities: Discrimination.* [online] Two Birds. Available at: https://www.twobirds.com/en/news/articles/2019/global/big-data-and-issues-and-opportunities-discrimination [Accessed 16 Nov. 2019].

Elsevier (2017). *Gender in the Global Research Landscape - analysis of research performance through a gender lens across 20 years, 12 geographies, and 27 subject areas.* [online] Amsterdam: Elsevier. Available at: https://www.elsevier.com/__data/assets/pdf_file/0008/265661/ElsevierGenderReport_final_for-web.pdf [Accessed 9 Nov. 2019].

Equal Measures 2030. (2019). *Equal Measures 2030.* [online] Available at: https://www.equalmeasures2030.org/ [Accessed 12 Nov. 2019].

European Parliamentary Research Service (2019). *A governance framework for algorithmic accountability and transparency. Study - Panel for the Future of Science and Technology.* [online] Available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU(2019)624262_EN.pdf [Accessed 1Nov. 2019].

European Union Agency for Fundamental Rights (2018). *#BigData: Discrimination in data-supported decision making.* [online] FRA. Available at: https://fra.europa.eu/sites/default/files/fra_uploads/fra-2018-focus-big-data_en.pdf [Accessed 17 Nov. 2019].

Gender Champions. (2019). *Standards | International Gender Champions.* [online] Available at: https://genderchampions.com/impact/standards [Accessed 13 Nov. 2019].

Global Research Council (2019). *Supporting Women in Research. Policies, Programs and Initiatives Undertaken by Public Research Funding Agencies.* [online] Available at: https://anr.fr/fileadmin/documents/2019/GRC_GWG_Case_studies_final.pdf [Accessed 1 Jul. 2019].

Heisook, L. and Pollitzer, E. (2016). *Gender in science and innovation as component of inclusive socioeconomic growth.* [online] London: Portia Ltd. Available at: https://gender-summit.com/images/Gender_and_inclusive_innovation_Gender_Summit_report.pdf [Accessed 17 Nov. 2019].

Irina, D. and Nomthandazo, M. (2019). *Making the Invisible Visible: How Strong CRVS Systems Can Empower Women and Girls. Knowledge Briefs on Gender and CRVS.* [online] Centre of Excellence for CRVS. Available at: https://crvssystems.ca/sites/default/files/inline-files/CRVS_Gender_1.1_InvisibleVisible_e_WEB.pdf [Accessed 11 Nov. 2019].

Jackson, G. (2019). *The female problem: how male bias in medical trials ruined women's health.* The Guardian. [online] Available at: https://www.theguardian.com/lifeandstyle/2019/nov/13/the-female-problem-male-bias-in-medical-trials [Accessed 15 Nov. 2019].

Benjamin, E., Muntner, P., S Bittencourt, M., W Callaway, C., P Carson, A., M Chamberlain, A., R Chang, A., Cheng, S., R Das, S., N Delling, F., S V Elkind, M., Fornage, M., S Khan, S., M Kissela, B., L Knutson, K., W Kwan, T., T Lackland, D., T Lewis, T., H Lichtman, J., T Longenecker, C., Shane Loop, M., L Lutsey, P., S Martin, S., Matsushita, K., E Moran, A., E Mussolino, M., O'Flaherty, M., Pandey, A., M Perak, A., D Rosamond, W., A Roth, G., K A Sampson, U., M Satou, G., B Schroeder, E., H Shah, S., L Spartano, N., Stokes, A., L Tirschwell, D., W Tsao, C., P Turakhia, M., B VanWagner, L., T Wilkins, J., S Wong, S. and S Virani, S. (2019). *Heart Disease and Stroke Statistics—2019 Update: A Report From the American Heart Association.* [online] American Heart Association. Available at: https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000659 [Accessed 12 Nov. 2019].

J Kahane, C. (2013). *Injury Vulnerability and Effectiveness of Occupant Protection Technologies for Older Occupants and Women.* [online] Washington DC: National Highway Traffic Safety Administration. Available at: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811766 [Accessed 10 Nov. 2019].

Kraft-Buchman, C. and Arian, R. (2019). *Affirmative Action for Algorithms - Artificial Intelligence, Automated Decision-Making & Gender - We Shape Our Tools, and Thereafter our Tools Shape Us.* [online] Geneva: Women At the Table. Available at: https://uploads.strikinglycdn.com/files/71053b68-f23c-400d-9ee0-b8d989f93767/A%20%20AFFIRMATIVE%20ACTION%20FOR%20ALGORITHMS%20-%20Artificial%20Intelligence%2C%20Automated%20Decision-Making%20%26%20Gender%20Position%20paper.pdf [Accessed 1 Nov. 2019].

Later, W., Bosy-Westphal, A., Kossel, E., Glüer, C., Heller, M. and Müller, M. (2010). *Is the 1975 Reference Man still a suitable reference?.* European Journal of Clinical Nutrition, [online] 64(10), pp.1035-1042. Available at: https://www.nature.com/articles/ejcn2010125 [Accessed 16 Nov. 2019].

Linder, A. and Svedberg, W. (2019). *Review of average sized male and female occupant models in European regulatory safety assessment tests and European laws: Gaps and bridging suggestions.* Accident Analysis & Prevention, [online] 127, pp.156-162. Available at: https://www.sciencedirect.com/science/article/pii/S0001457519303483 [Accessed 12 Nov. 2019].

Liu, K. and DiPietro Mager, N. (2016). *Women's involvement in clinical trials: historical perspective and future implications.* Pharmacy Practice, [online] 14(1), pp.708-708. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4800017/ [Accessed 11 Nov. 2019].

Manyika, J., Chui, M., Groves, P., Farrell, D., Van Kuiken, S. and Almasi Doshi, E. (2013). *Open data: Unlocking innovation and performance with liquid information.* [online] Available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/open-data-unlocking-innovation-and-performance-with-liquid-information [Accessed 13 Nov. 2019].

National Institutes of Health (2003). *Recruitment and Retention of Women in Clinical Studies, and the Critical Role of Relevance.* [online] NIH. Available at: https://repository.library.georgetown.edu/bitstream/handle/10822/547438/SMR_Final.pdf?sequence=1 [Accessed 11 Nov. 2019].

OECD. (2019). *Gender - OECD.* [online] Available at: https://www.oecd.org/gender/ [Accessed 14 Nov. 2019].

Olson, M. (2019). *Atomic radiation is more harmful to women | Wise International.* [online] Wiseinternational.org. Available at: https://www.wiseinternational.org/nuclear-monitor/736/atomic-radiation-more-harmful-women [Accessed 16 Nov. 2019].

Olson, M. (2017). *Females Exposed to Nuclear Radiation Are Far Likelier Than Males to Suffer Harm.* [online] PassBlue. Available at: https://www.passblue.com/2017/07/05/females-exposed-to-nuclear-radiation-are-far-likelier-than-males-to-suffer-harm/ [Accessed 16 Nov. 2019].

Parekh, A., Fadiran, E., Uhl, K. and Throckmorton, D. (2011). *Adverse effects in women: implications for drug development and regulatory policies.* Expert Review of Clinical Pharmacology, [online] 4(4), pp.453-466. Available at: https://www.fda.gov/files/science%20%26%20research/published/Adverse-effects-in-women--Implications-for-drug-development-and-regulatory-policies.pdf [Accessed 11 Nov. 2019].

Paris 21. (2019). *Assessing Data and Capacity Gaps in Gender Statistics.* [online] Available at: https://paris21.org/node/3286 [Accessed 19 Nov. 2019].

Perez, C. (2019). *Invisible women: Exposing Data Bias in a World Designed for Men.* London: Vintage Books.

Pinn, V. (2003). *Sex and Gender Factors in Medical Studies.* JAMA, [online] 289(4), p.397. Available at: http://biblioteca.asmn.re.it/allegati/sexandgenderfactorsinmedicalstudies_120615110056.pdf [Accessed 11 Nov. 2019].

Raymond, L. (2016). *Scientists Avoid Studying Women's Bodies Because They Get Periods.* [online] Thinkprogress.org.
Available at: https://thinkprogress.org/scientists-avoid-studying-womens-bodies-because-they-get-periods-3fe9d6c39268/ [Accessed 8 Jun. 2016] and World Health Organization. (2019).

Robertson, L., Mushati, P., Eaton, J., Dumba, L., Mavise, G., Makoni, J., Schumacher, C., Crea, T., Monasch, R., Sherr, L., Garnett, G., Nyamukapa, C. and Gregson, S. (2013). *Effects of unconditional and conditional cash transfers on child health and development in Zimbabwe: a cluster-randomised trial.* The Lancet, [online] 381(9874), pp.1283-1292. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3627205/ [Accessed 14 Nov. 2019].

Schiebinger, L. and Klinge, I. (2013). *Gendered Innovations | Stanford University.* [online] Genderedinnovations.stanford.edu. Available at: http://genderedinnovations.stanford.edu/case-studies/crash.html#tabs-2 [Accessed 10 Nov. 2019].

Science in Australia Gender Equity (SAGE). (2016). *Gender Equity in STEMM.* [online] Available at: http://www.sciencegenderequity.org.au/gender-equity-in-stem/ [Accessed 11 Nov. 2019].

Science News (2010). *Bridging the gender gap: Combined technologies offer promise for detecting colon cancer in women.* [online] Available at: https://www.sciencedaily.com/releases/2010/07/100719163241.htm [Accessed 15 Nov. 2019].

Science Nordic. (2013). *Gender equality for crash test dummies, too.* [online] Available at: https://sciencenordic.com/cars-and-traffic-crash-test-dummies-forskningno/gender-equality-for-crash-test-dummies-too/1381623 [Accessed 10 Nov. 2019].

Shannon, G., Jansen, M., Williams, K., Cáceres, C., Motta, A., Odhiambo, A., Eleveld, A. and Mannell, J. (2019). *Gender equality in science, medicine, and global health: where are we at and why does it matter?.* The Lancet, [online] 393(10171), pp.560-569. Available at: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)33135-0/fulltext [Accessed 8 Nov. 2019].

Sustainable Development Solutions Network Thematic Research Network on Data and Statistics (2019). *Counting on The World to Act A Roadmap for Governments to Achieve Modern Data Systems for Sustainable Development.* [online] SDSN TReNDS. Available at: https://countingontheworld.sdsntrends.org/static/files/19COTW.pdf [Accessed 11 Nov. 2019].

PaRiS21. (2019). *| PARIS21.* [online] Available at: https://paris21.org/ [Accessed 14 Nov. 2019].

Taylor, K., Vallejo-Giraldo, C., Schaible, N., Zakeri, R. and Miller, V. (2011). *Reporting of sex as a variable in cardiovascular studies using cultured cells.* Biology of Sex Differences, [online] 2(1), p.11. Available at: https://bsd.biomedcentral.com/articles/10.1186/2042-6410-2-11 [Accessed 11 Nov. 2019].

The Guardian (1999). *Breast reduction for PC in 'armour agony'.* [online] Available at: https://www.theguardian.com/uk/1999/may/20/nickhopkins [Accessed 18 Nov. 2019].

The New York Times (2019). *Closing the Data Gender Gap - How Efforts to Collect Data About Women and Girls Drive Global Economic and Social Progress.* [online] Available at: https://www.nytimes.com/paidpost/gates-foundation/closing-the-gender-data-gap.html [Accessed 16 Nov. 2019].

The Seoul Gender Summit Declaration and Call for Actions to Advance Gendered Research, Innovation and Socio-economic Development adopted at the Gender Summit 6 – Asia Pacific 2015.

Trades Unions Congress (2017). *Personal protective equipment and women. Guidance for workplace representatives on ensuring it is a safe fit.* [online] Trades Unions Congress. Available at: https://www.tuc.org.uk/sites/default/files/PPEandwomenguidance.pdf [Accessed 11 Nov. 2019].

UNESCO Women in Science. (2019). *Women in Science | UNESCO UIS.* [online] Available at: http://uis.unesco.org/en/topic/women-science [Accessed 9 Nov. 2019].

UN Gender Stats. (2019). *The United Nations Minimum Set of Gender Indicators.* [online] Available at: https://genderstats.un.org/files/Minimum%20Set%20indicators%20web.pdf [Accessed 7 Nov. 2019].

UNICEF. (2019). Birth registration - UNICEF DATA. [online] Available at: https://data.unicef.org/topic/child-protection/birth-registration/ [Accessed 11 Nov. 2019].

UNICEF. (2019). *Child marriage - UNICEF DATA.* [online] Available at: https://data.unicef.org/topic/child-protection/child-marriage/ [Accessed 11 Nov. 2019].

United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2019). I'*d blush if I could: closing gender divides in digital skills through education.* [online] Available at: https://unesdoc.unesco.org/ark:/48223/pf0000367416.page=1 [Accessed 1 Nov. 2019].

UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (2014). *A world that counts - Mobilising the Data Revolution for Sustainable Development.* [online] UN Independent Expert Advisory Group Secretariat. Available at: https://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf [Accessed 9 Nov. 2019].

UN Stats. (2014). *Resolution adopted by the Economic and Social Council on 24 July 2013 - 2013/21 Fundamental Principles of Official Statistics.* [online] Available at: https://unstats.un.org/unsd/dnss/gp/FP-Rev2013-E.pdf [Accessed 16 Nov. 2019].

UN Stats. (2015). *What are gender statistics - Gender Statistics Wiki.* [online] Available at: https://unstats.un.org/unsd/GenderStatManual/What-are-gender-stats.ashx [Accessed 7 Nov. 2019].

UN Stats. (2018). *Tier Classification for Global SDG Indicators.* [online] Available at: https://unstats.un.org/sdgs/files/Tier%20Classification%20of%20SDG%20Indicators_11%20May%202018_web.pdf [Accessed 13 Nov. 2019].

UN Stats. (2019). *SDG Indicators.* [online] Available at: https://unstats.un.org/sdgs/indicators/indicators-list/ [Accessed 13 Nov. 2019].

UN Women. (n.d.). *Redistribute unpaid work.* [online] Available at: https://www.unwomen.org/en/news/in-focus/csw61/redistribute-unpaid-work [Accessed 16 Nov. 2019].

UN Women. (n.d). *Flagship programme: Making Every Woman and Girl Count.* [online] Available at: https://www.unwomen.org/en/how-we-work/flagship-programmes/making-every-woman-and-girl-count [Accessed 13 Nov. 2019] and UN Women (2016).

UvN Women (2016). *Making Every Woman and Girl Count: Supporting the Monitoring and Implementation of the SDGs through better production and use of gender statistics.* [online] New York: UN Women. Available at: https://www.unwomen.org/-/media/headquarters/attachments/sections/how%20we%20work/flagship%20programmes/fpi-statistics-concept-note.pdf?la=en&vs=7 [Accessed 14 Nov. 2019].

UN World Data Forum. (2019). E*vent: UN World Data Forum, United Nations Statistics Division, Statistics South Africa, Sustainable Development Goals.* [online] Available at: https://unstats.un.org/unsd/undataforum/index.html [Accessed 15 Nov. 2019].

Wizemann TM, P. (2001). *Exploring the Biological Contributions to Human Health: Does sex matter?.* Washington DC: National Academies Press (US).

World Bank. (2018). *Global Civil Registration and Vital Statistics.* [online] Available at: https://www.worldbank.org/en/topic/health/brief/global-civil-registration-and-vital-statistics [Accessed 19 Nov. 2019].

Worldbank Datatopics. (2019). *Gender Data Portal.* [online] Available at: https://datatopics.worldbank.org/gender/indicators [Accessed 14 Nov. 2019].

World Health Organization. (2019). *Breast cancer.* [online] Available at: https://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/ [Accessed 15 Nov. 2019].

World Wide Web Foundation (2017). *Algorithmic Accountability. Applying the concept to different country contexts.* [online] World Wide Web Foundation. Available at: https://webfoundation.org/docs/2017/07/Algorithms_Report_WF.pdf [Accessed 1Nov. 2019].

Yoon, D., Mansukhani, N., Stubbs, V., Helenowski, I., Woodruff, T. and Kibbe, M. (2014). *Sex bias exists in basic science and translational surgical research.* Surgery, [online] 156(3), pp.508-516. Available at: https://www.surgjournal.com/article/S0039-6060(14)00425-5/fulltext [Accessed 12 Nov. 2019].

Zhao, J., Wang, T., Yatskar, M., Ordonez, V. and Chang, K. (2017). *Men Also Like Shopping: Reducing Gender Bias Amplification using Corpus-level Constraints.* In: Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing. [online] Available at: http://markyatskar.com//publications/bias.pdf [Accessed 1 Nov. 2019].

WOMEN AT THE TABLE