

BACKGROUND PAPER



UN COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT: MEASURES TO IMPLEMENT THE USE OF ARTIFICIAL INTELLIGENCE TO AID LOW AND LOWER-MIDDLE INCOME NATIONS



1. Welcome Letter

Hello delegates, and welcome to the Model United Nations Commission on Science and Technology for Development (CSTD) 2022, aiming to move forward and foster development in a globalising world.

My name is Lara Avila and I will be one of your co-chairs. I am a first-year student at the University of Groningen and will be fulfilling the role of a chair for the first time. I am very internationally oriented, as I have a double nationality and have lived in a third country for most of my life. I really enjoy investigating and learning about current events and youth empowerment, as well as my other hobbies, such as playing team sports, travelling and making art. I attended the International School of Panama, which is the highlight and the start of my MUN journey. I have delegated in the Social, Humanitarian, and Cultural Committee, representing the country of France, as well as in the Security Council, representing the country of Peru. I am beyond excited to be involved in the UN CSTD with you all, and wish you all the best in tackling this complex global issue. I trust in your preparation and enthusiasm to dive deep into the world of AI and its potential to aid developing nations.

My name is Beth Casserly, and I will be your other co-chair. I am also a first-year student at the University of Groningen. I have been doing Model UN for about three years now, and I have a huge passion for chairing. I have lived my entire life up till now in Ireland, so I have really been enjoying getting to know people from all over the world. I have delegated in the Social, Humanitarian, and Cultural Committee as well, as a delegate of Turkey, as well as in the Ecology and Environment Committee as Brazil, along with many others. I am extremely excited to be exploring the world of technology this year in the UN CTSD, and am intrigued to see your views and solutions on AI and how we can use it to aid and develop struggling nations.

Sincerely,

Lara Avila and Beth Casserly

2. Introduction

The United Nations Commission on Science and Technology for Development (CSTD) is a subsidiary body of the adjacent United Nations Economic and Social Council (ECOSOC). It is concerned with holding an annual intergovernmental forum for discussion on set issues that are timely and pertinent and affect science, technology, development and related.

The members that make up the composition of this commission include national Governments, and civil society contributes to discussions that are held. There are other strong connections between distinct UN bodies, such as the Commission on Status of Women, Regional Commissions, International Telecommunication Union, and the UN Educational, Scientific, and Cultural Organisation.

The outcomes that arise from the UN CSTD provide the United Nations General Assembly and ECOSOC with high-level advice, along with suggestions and resolution proposals that are directly relevant to scientific and technological global issues.

The United Nations Conference on Trade and Development is responsible and in charge for the substantive servicing of the Commission.

The global issue being held up for debate at the UN CSTD of this year's edition of GrunnMUN 2022 is "Measures to Implement the Use of Artificial Intelligence to Aid Low and Lower-Middle Income Nations".

In consequence of the rapid and high number of developments in information and technology, technology has become a crucial characteristic in the daily functioning of many, or most, countries. Thus, it has become evident that low and lower-middle income nations are in need of Artificial Intelligence to aid country issues.¹

Artificial Intelligence is expanding in the emerging markets within its high potential of commercial uses, in fields operating with energy and manufacturing, as well as financial services and education.² An example of this is the case of Mexico and its use of Artificial Intelligence to analyse data in order to improve health outcomes with at-risk diabetic patients in the Clinicas de Azucar clinics.³

Even though the case of Mexico and other limited uses of AI have been seen in the developing world, there are presently 1.2 billion people without any access to power grids. As a result of this immense issue, various companies are starting to develop innovative technologies in order to aid those inhabitants that suffer from this limited access. Azuri Technologies, for example, has been seen and proven to have developed a solar-

¹ See Alami (2020)

² See *Artificial Intelligence in Emerging Markets: Opportunities, Trends, and Emerging Business Models*. (2021)

³ See Gonzalez (2018)

powered pay-as-you-go model specifically for rural households in 12 countries throughout Africa. What the system entails is a changing model setup that makes use of Artificial Intelligence to optimise the amount of power consumption, by learning about energy needs and adjusting its output by slowing fans, automatically dimming lights, or even managing divide charging. What this response has accomplished is not only a great solution potential, but a secured \$20 million private equity investment in order to expand throughout Africa.⁴

In this year's debate, we will dive deep in discussing questions that encircle such technological developments and tackle how policymakers are taking advantages of this future driven by Artificial Intelligence, while keeping in mind that the use of Artificial Intelligence to automate tasks also poses the danger of replacing workers in industries that are crucial for the development of the economy.

⁴ See <https://www.azuri-group.com/>

3. Problem Specification

As you have read, AI can be applied to many fields, providing positive change to the countries that use it. However, many countries have shied away from implementing AI. This technology is only as good as the data put into it. As an example, where a given hospital facility has installed a system that classifies asthma as high-priority, it may automatically declassify pneumonia as high priority, unless that is stated as well. A patient with pneumonia would not be able to benefit from the services at this hospital in the same way a patient with asthma would.

Additionally, bringing in AI lessens the need for human workers, leaving them out of jobs. This is especially concerning in low-income nations, where work is essential to people’s survival. Companies which make use of artificial intelligence rely on reducing the number of human subjects with whom they are involved. The case, therefore, brings in some major problems given the fact that it reduces the number of people who have the chance of benefiting from the different employment opportunities that could be put across by such companies. Employment would increase the overall amount of disposable income that people would be exposed to, for the sake of ensuring that they have the ability to meet some of their needs.⁵

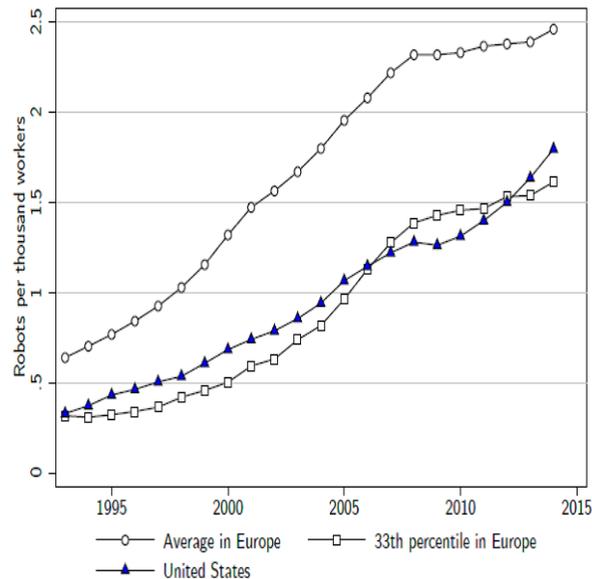


Figure 1: Acemoglu and Restrepo (2017)

Both of these concerns should be kept in mind when creating your resolutions. It is essential that your solutions can counter these problems if they are to be implemented. A misconception associated with AI is

⁵ See Petropoulos (2017)

that it can replace human intelligence, which should also be kept in mind. Some believe that when people become more reliant on AI, they are allowing the idea that human knowledge is not sufficient or needs to be replaced with the use of machines. This practice sends the message that human beings do not have the capacity to handle various activities of relevance to them. The process would also help human beings lose general value towards humanity. The idea that people have been replaced in various quarters with the use of computers and machines is quite scary, and sends the message that they are dispensable. Such a view is, however, misleading as people have the chance of keeping up with their general state and carry out various actions they are commonly involved with, towards attaining success. These misconceptions and fears must be handled if countries are to comfortably implement AI into their working environments. How can AI coexist with workers, without losing them jobs or being a detriment to the workplace?

4. Questions a Resolution Must Answer

There are certain questions your resolution must answer if it is to be passed. These questions cover many of the necessary points surrounding the topic, but your resolution can, and should, contain more questions than those present here. We have provided some background information on each of these questions to help you write about them, but urge you to not allow your research to end here.

4.1. QARMA 1: What is Artificial Intelligence? What has it been, what is it currently, and what does it have the power to be?

4.1.1 Background: Artificial Intelligence Definition

Today, Artificial Intelligence is defined as “the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.” It has also been described as the ability of a machine or computer to emulate human tasks through learning and automation. However, it has not always had such a clean definition.

As written by Stephanie Dick (2019), the first use of the term “Artificial Intelligence” was in 1956, in the Dartmouth Summer Research Project on Artificial Intelligence. On a plaque at Dartmouth College, placed there in 2006 to celebrate the 50th anniversary of the Summer Research Project, can be seen an account of the history of Artificial Intelligence, born in 1955. After the 1956 workshop, researchers set out to identify human behaviours which could be replicated by machine, namely in fields such as medical diagnoses, language processes, and the game of chess. The hope was to replicate these human behaviours by automated systems. Human intelligence was the central exemplar around which early automation attempts were oriented. The goal was to reproduce intelligent human behaviour in machines by uncovering the processes at work in our own intelligence such that they could be automated.

4.1.2. Recent Developments: Artificial Intelligence Today

Today, however, most researchers want to design automated systems that perform well in complex problem domains by any means, rather than by human-like means (Floridi, 2016). As also pointed out by Stephanie Dick, this history also points to the fact that attempts to produce intelligent behaviour in machines often run parallel to attempts to make human behaviour more machine-like. Machine-learning systems are generally aimed towards making accurate predictions, which they have shown to be extremely good at. In the modern day and in developed countries, AI has shown that it can evolve by learning new strategies that

have worked well in the past or can write new algorithms all by themselves (Katsikeas 2016). Currently, the average person may use AI in their daily lives through our many digital assistants, the likes of Siri and Alexa, self-parking and self-driving cars, and predictive search engines or smart email replies and filtering. Most of these are small luxuries, but many have become essential parts of daily life for many people. These technologies have become so ingrained in some societies that life without them would feel odd. This must be considered when we acknowledge that these technologies are not available in every state present for this debate.

4.1.3. Relevant Actors and Institutions

The country responsible for much of this development has evidently been the United States of America, but they are not the only nation responsible for the creation of this tech. In recent years, China has produced more AI-related papers than any other country. In 2019, China published 102,161 AI-related papers, and the US published 74,386. India, in third, published 23,398. In Fig.1 below you can see the top 10 institutions for AI-related publications. However, as Jeffrey Ding (PhD student, Oxford, UK) stated, “Just pumping out raw numbers of papers that don’t have a lasting impact isn’t really useful. It’s more important to keep up with the technology frontier.”

Looking at the number of AI-related articles published in the 82 high-quality natural-science journals tracked by the Nature Index between 2015 and 2019, the USA led, with the UK, Germany, and China following in that order. In the near future, Ding claims that the US will continue to lead in AI. He states, “Though China has some exceptional universities, such as Tsinghua University, the US dominates in terms of maybe the top 20 universities doing AI research, and that is reflected in the quality of the papers. It’s very unlikely that China will become the singular innovation centre by 2030.”

Looking at Germany, they have been able to compete using automation to keep manufacturing costs down while maintaining quality. Could Germany’s approach be adapted for developing countries? Even with other countries placing emphasis on AI research, including Israel, Japan, Singapore and Australia, the race comes down to China versus the USA. Also claimed by Ding, countries are most likely to make advances with AI in fields they already have expertise in. Examples of this are automation with Germany and robotics in Japan. This is also essential to consider in your resolutions, keep in mind what countries’ strengths are, and how AI can be adapted to them.

4.2. QARMA 2: In what fields and roles can AI be applied in developing nations today?

4.2.1. Background: Artificial Intelligence Already Implemented

A growing number of developing countries have already begun to utilize AI to aid their countries. For example, Apollo Agriculture, based in Kenya, has been using satellite imagery and agronomic (technology of producing and using plants by agriculture) machine learning, to deliver customized advice to farmers via their mobile phones. Gringgo, based in Indonesia, has been using an image recognition tool to create better plastic recycling rates, reduce ocean pollution rates, and strengthen waste management in under-resourced areas and communities. Both of these companies are playing to the regions' strengths, providing help to the fields that are most valuable to the communities. How can this be taken further, or in what other ways can AI be used to strengthen these regions.

4.2.3. International Approaches That Have Already Been Taken: Artificial Intelligence & the Medical Industry

Focusing on the medical industry as a case study, there are certain barriers facing low-income regions. AI has been invaluable in the medical field in developed countries. Due to its skill at finding patterns and insights, it helps optimize health systems and supports clinical judgment. It helps immensely where human cognitive judgment is limited. All of these benefits though, can be seen as either luxuries or as required tools, depending on the view. In some countries, investing in the use of AI could be seen as a distraction, especially when there are barriers to healthcare delivery. The potential of AI though, is to build more robust surgical systems in countries that need it. As written by Reddy, 2019, "In 2015, WHO member states adopted a resolution that emphasized the crucial role of surgery in Universal Health Coverage. Surgically treatable conditions contribute to more deaths each year than HIV, tuberculosis, and malaria combined - a burden inequitably borne by low-income and middle-income countries.". AI has the capability to improve surgical care and target the areas that most need it, the weaker health systems which may be lacking resources and facing operational challenges. Many countries, such as South Africa, have very large data sets regarding the health system, which could be applied to AI to help policy makers gain insight on which challenges should be prioritized. Most of the data in low-income countries are not low quality, but rather varied in type, and spread across many locations. With work, these could be utilized to work with AI systems in interesting ways.

Following the COVID-19 pandemic, there is even more incentive to use AI, to help rebuild developing countries. Lockdowns and restrictions have provided expansion for the market. As an example, the company 1mg in India has been using AI to help customers compare prices between medical service providers and labs.

4.2.4. Relevant Actors and Institutions

To name a few notable workers in the field to help with your research, the Institute for Ethics in Artificial Intelligence, based in Germany, have been focused on engineering, with a focus on human-centrism, and on the social and cultural anchoring of rapid AI developments, covering fields including ethics, philosophy, political science and sociology. Similarly, The Institute for Ethical AI and Machine Learning, based in the United Kingdom, have set their goal as aiming to empower whole nations, as well as individuals, to develop AI. They base this on 8 core principles to conduct responsible machine learning. These principles are focused on the appropriate redress for AI impact, explicability, maintenance of human control, evaluation of bias, reproducibility, transparency, accuracy, effect of AI of automation of workers, cost, trust, privacy, and security.

Currently in Belgium, an organisation by the name of AI4People has been conducting research around the core social impacts of Artificial Intelligence. They also work on the founding policies, politics, principles and practices all within building a “good AI society”. They have also been working on a campaign around chronic diseases, the strategies of which are expected to be implemented in the next 10 years.

4.3. QARMA 3: What steps will be taken to prevent issues arising from the use of AI?

4.3.1. Background: Benefits of Artificial Intelligence

As stated by the Future of Life Institute, Artificial Intelligence “holds great economic, social, medical, security, and environmental promise”. There are many other great potential benefits of Artificial Intelligence, many of which have not been mentioned up to this point. These include, but are not limited to; reducing the overall energy usage, developing new types of enjoyable interaction and experiences for people, creating and offering faster production methods (and faster iteration cycles), offering people help to gain new training and skills, enhancing cybersecurity defences, reducing healthcare faults and inefficiencies, democratizing services, boosting national production and overall output, offering environmental monitoring for air quality and pollution, and improving translation services to form relationships between people all over the world.

4.3.2. Potential Limitations of Artificial Intelligence

Naturally, we don’t expect you to cover all of these in your research and resolutions, but all should at least be considered. Nonetheless, Artificial Intelligence may lead to expected and unexpected breakthroughs in the long term, as it already has. This can be seen in various fields, ranging all the way from basic applied

sciences to much more advanced systems and medicine. However, increasingly able intelligent systems develop significant ethical issues, as written by Winfield, 2019.

This section of the background papers will discuss what are thought to be the main, or most prominent, social, ethical, and legal considerations within the deployment of Artificial Intelligence. The issues being focused on deal with impacts on, but not limited to; the financial system, the environment and the planet, human society, the legal system, human psychology, and trust.

4.3.3. Specific Field Risks

Many of the risks and issues surrounding Artificial Intelligence have already been discussed above, however there are always more. As discussed, the introduction of Artificial Intelligence poses the problem of putting people out of work. Many companies who implement AI do it with the purpose of cutting down on human workers and letting them be replaced by an algorithm, but in developing countries this would be overtly negative when many or most of the population rely on these jobs for income and survival. Finding ways for these workers to work alongside Artificial Intelligence, rather than opposing it, is essential. In Fig.2 below, you can see where and how new technologies are being implemented into workplaces, what types of intelligence are expected from these, and the precise ways that management uses the data produced by such technological processes with the assumptions of respective types of intelligence.

There is also the risk that, when working alongside Artificial Intelligence, workers may be unsure if decisions made by Ai are fair, accurate, or honest, especially if they do not have access to the data being used by their employers. The risk of stress and anxiety arise if workers feel that decisions are being made based on numbers and data that they have no access to, nor power over. As theorized by Phoebe V. Moore, this is particularly worrying if people analytics data leads to workplace restructuring, job replacement, job description changes, and the like. People analytics are likely to increase workers' stress if data is used in appraisals and performance management without due diligence in process and implementation, leading to questions about micromanagement and feeling "spied on." If workers know their data is being read for talent spotting or for deciding possible layoffs, they may feel pressured to advance their worker performance, and begin to overwork, yet another risk.

4.3.4. Rise of Robot Substitutions

Currently, Amazon has over 100,000 AI-augmented robots (or "cobots", automation enhanced by AI). These help with certain tasks, but do not leave the need for full automation of the process. Their use has

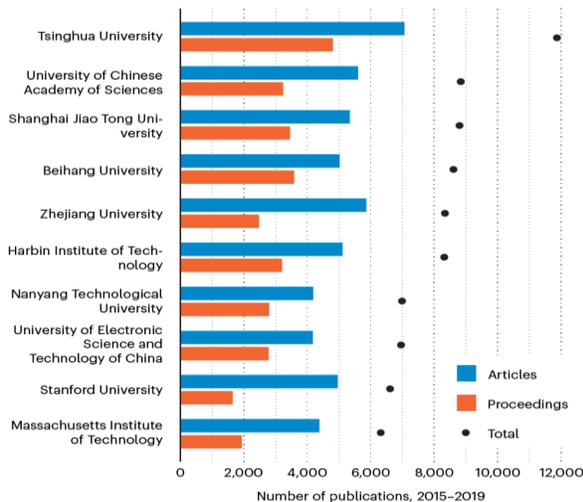
also shortened the period needed to train workers to less than two days. Airbus and Nissan are also using cobots to increase efficiency.

Chatbots have also become increasingly popular, generally now being the voice, you hear when calling a company, rather than a real person. However, chatbots pose psychosocial risks around fears of job loss and replacement. Workers should be trained to understand the role and function of workplace bots and to know what their contributions are, and employers and policy makers should be aware of how to integrate chat bots without eliminating customer service jobs. A recent Netherlands Organization for Applied Scientific Research report states that there are three major risks associated with this integration of robot and human workers.

One of these is robot/human collisions, as in machine learning leading to unpredictable robot behaviour. There should be limits to the abilities of all AI used in the workplace. A second issue is security risks. Robots’ internet links can affect the integrity of software programming, which can lead to vulnerabilities in security. The final risk is environmental, where sensor degradation or human interference or action in unstructured environments can lead to environmental risks. Potential risks exist in human workers are expected to keep up with a robot’s pace when working, or also where one person is assigned to “look after” one machine and is sent notifications and status updates about machines on personal devices like a smartphone or a home laptop. This can lead to risks of overwork, where workers feel responsible to take note of notifications in out-of-work hours, where a work/life balance is disrupted. Many of these issues can be easily addressed by setting limits and regulations upon employers and companies implementing AI, but they must be heavily mentored and monitored to ensure there are as few of these issues as possible.

QUANTUM EFFORT

The ten institutions with the greatest number of AI-related publications across all fields in the Dimensions database. The dominance of Chinese institutions in this list is in striking contrast to the corresponding list for the Nature Index, where Western institutions dominate in the application of AI to the natural sciences.



Technology:	Platforms (algorithms, artificial intelligence [AI], machine learning [ML])	People analytics, chatbots (filming interviews, software, AI, ML, emotion coding)	Cobots, wearables (RFID, dashboards, tablets, GPS, data glasses/HoloLens)
Type of intelligence:	Predictive, prescriptive, descriptive	Affective, assistive, predictive, descriptive	Assistive, collaborative
Where/what:	Home, street (gig work)	Office, call center (service work)	Factory, warehouse (manual work)
Decision-making:	Human resource (HR), performance monitoring (PM), micro-management (MM)	HR, PM, MM	HR, PM, MM

Fig. 1. Technologies in workplaces

5. Sources for Further Research

Artificial Intelligence: <https://hdsr.mitpress.mit.edu/pub/0aytgrau/release/2>

The emerging role of Artificial Intelligence in modern society: <https://deliverypdf.ssrn.com/delivery.php>

Artificial Intelligence Risks & Benefits: https://www.researchgate.net/profile/Meenakshi-Nadimpalli/publication/319321806_Artificial_Intelligence_Risks_and_Benefits/links/59a47dd20f7e9b4f7df37ab9/Artificial-Intelligence-Risks-and-Benefits.pdf

The benefits of Artificial Intelligence in Cybersecurity:
https://digitalcommons.lasalle.edu/cgi/viewcontent.cgi?article=1035&context=ecf_capstones

Smart Technology, Artificial Intelligence, Robotics, and Algorithms (STARA): Employees' perceptions of our future workplace: <https://www.cambridge.org/core/journals/journal-of-management-and-organization/article/smart-technology-artificial-intelligence-robotics-and-algorithms-stara-employees-perceptions-of-our-future-workplace/41DB312743EA253848ED846B2882F5DE>

How AI can help developing countries rebuild after the pandemic: <https://blogs.worldbank.org/digital-development/how-ai-can-help-developing-countries-rebuild-after-pandemic>

Can AI help tackle the most pressing challenges in developing countries?:
<https://www.gsma.com/mobilefordevelopment/region/africa/can-ai-help-tackle-the-most-pressing-challenges-in-developing-countries/>

How AI could transform developing countries:
https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/inline-files/How%20AI%20could%20transform%20developing%20countries_0.pdf

Artificial Intelligence and its role in surgical care in low-income and middle-income countries:
[https://www.thelancet.com/journals/landig/article/PIIS2589-7500\(19\)30200-6/fulltext](https://www.thelancet.com/journals/landig/article/PIIS2589-7500(19)30200-6/fulltext)

Artificial Intelligence and sustainable development:
<https://www.sciencedirect.com/science/article/abs/pii/S1472811719300138>

Artificial Intelligence in education: challenges and opportunities for sustainable development:

<http://repositorio.minedu.gob.pe/handle/20.500.12799/6533>

Toward understanding the impact of Artificial Intelligence on labour:

<https://www.pnas.org/content/116/14/6531.short>

Prominent countries in AI: <https://www.nature.com/articles/d41586-020-03409-8>

The risks of implementing AI in the workplace: <https://www.bbvaopenmind.com/en/articles/artificial-intelligence-in-workplace-what-is-at-stake-for-workers/>

6. Bibliography

Alami, H. (2020). Artificial intelligence in health care: laying the Foundation for Responsible, sustainable, and inclusive innovation in low- and middle-income countries. *Artificial Intelligence in Health Care: Laying the Foundation for Responsible, Sustainable, and Inclusive Innovation in Low- and Middle-Income Countries*.

Artificial Intelligence in Emerging Markets: Opportunities, Trends, and Emerging Business Models. (2021). International Finance Corporation, Washington, DC. <https://openknowledge.worldbank.org/handle/10986/36264>

Bhattacharya, Kamal. “How Ai Could Transform Developing Countries.” *Oxford Government Review*, 2018, https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/inline-files/How%20AI%20could%20transform%20developing%20countries_0.pdf.

Gonzalez, Mauricio. *IFC Invests in Clínicas Del Azúcar to Promote Diabetes Control in México*, 2018, <https://pressroom.ifc.org/all/pages/PressDetail.aspx?ID=25869>.

Makala, Baloko, and Tonci Bakovic. “Artificial Intelligence in the Power Sector.” *International Finance Corporation*, 2020, https://www.ifc.org/wps/wcm/connect/bd3a196d-a88f-45af-bbc6-e0b00790fba8/EMCompass_Note_81-05-web.pdf?MOD=AJPERES&CVID=n72pj5g.

Petropoulos, G. (2017). *Do we understand the impact of artificial intelligence on employment?* Bruegel. <https://www.bruegel.org/2017/04/do-we-understand-the-impact-of-artificial-intelligence-on-employment/#:~:text=The%20authors%20conclude%20that%20one,affected%20by%20automation%20is%20manufacturing>.

Reddy, Ché L, et al. *Define_me*, 2019, [https://www.thelancet.com/journals/landig/article/PIIS2589-7500\(19\)30200-6/fulltext](https://www.thelancet.com/journals/landig/article/PIIS2589-7500(19)30200-6/fulltext).