Supporting Information

Supplementary methods

This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

Appendix to: Mac OA, Muscat DM, Ayre J, et al. The readability of official public health information on COVID-19. Med J Aust 2021; doi: 10.5694/mja2.51282.
Coronavirus (COVID-19) vaccination information must pay attention to health literacy: analysis of readability of official COVID-19 public health information

Website Selection
We purposively selected websites from three countries (Australia, New Zealand, and the United Kingdom), three Australian states (New South Wales, Queensland, and Victoria), and three international Public Health Agencies (Centres for Disease Control and Prevention (CDC), European Centre for Disease Prevention and Control (ECDC), and World Health Organization (WHO)). We had a focus on resources from Australia, with other sources selected to provide global comparisons. The three Australian states were selected based on number total number of COVID-19 cases as of April 2021. We also identified easy-read resources which have been developed by some jurisdictions. Easy-read resources are generally translated from the main content into ‘easy English’, and often have a specified audience for people with disability, elderly, or people that speak English as a second language. Multi-media formats were excluded.

Readability
We used the health literacy editor ‘Sydney Health Literacy Lab (SHeLL) Editor’ to calculate readability. The SHeLL editor is an online real-time editor that provides automated feedback on text complexity. It uses the Simple Measure of Gobbledygook (SMOG) Index to calculate readability in the form of grade reading level. The SMOG index uses an algorithm based on the number of polysyllabic words (≥3 syllables) in each sentence. It is considered best suited for health applications as it has been validated against 100% comprehension; people with an eighth-grade reading ability would score 100% on a multiple-choice comprehension test for text written at an eighth grade reading level. It is, therefore, less likely to underestimate the grade reading level compared to other readability formulas, such as the Flesch Kinkaid Grade Level, which assumes 75% comprehension.

We copied and pasted text from each webpage separately into the SHeLL editor. Text was prepared following best practice guidelines from health literacy experts. Any part of the text that was not written as a complete sentence (e.g., bullet points and headings with less than four words) was excluded from the readability calculation to avoid underestimating the grade reading level. However, bullet points and headings that were written as full sentences or phrases were included. We removed any colons or full stops that did not indicate the end of a sentence (e.g., U.S. would be changed to US) and removed any URLs. We reported the proportion that exceeded an 8th grade reading level.

Understandability and Actionability
We used the validated Patient Education Materials Assessment Tool (PEMAT) developed by the Agency for Healthcare Research and Quality to assess the understandability and actionability of COVID-19 information. The understandability domain consists of 17 items under 6 topic areas (content, word choice and style, use of numbers, organisation, layout and design, and use of visual aids; Table 1) and measures the extent to which materials can be understood by consumers from diverse backgrounds and levels of health literacy. The actionability domain consists of 7 items and assesses how well consumers can use the information to take action. Each item is given a score of 0 (disagree) or 1 (agree), with some items having a not applicable (NA) option. Final scores are given as a percentage of all agree items for all items excluding those rated as not applicable. Higher scores indicate the material is easier to understand and act on, with scores of at least 70% considered adequate. Two evaluators with previous experience using the PEMAT scored the content independently, with any discrepancies resolved via discussion.
Table 1. Overview of the Patient Education Materials Assessment Tool (PEMAT) for printable materials

| Domain: Understandability |
|----------------------------|
| **Content**                |
| Makes its purpose completely evident |
| Does not include information that distracts from its purpose |
| **Word choice and style**  |
| The material uses common everyday language |
| Medical terms are defined and used only to familiarise readers |
| The material uses the active voice |
| **Use of numbers**         |
| Numbers are clear and easy to understand |
| The material does not expect the user to perform calculations |
| **Organisation**           |
| The material breaks or ‘chunks’ information into short sections |
| The material’s sections have informative headers |
| The material presents information in a logical sequence |
| The material provides a summary |
| **Layout and design**      |
| The material uses visual cues to draw attention to key points |

**Use of visual aids**

- The material uses visual aids whenever they could make content more easily understood
- The material’s visual aids have clear captions or titles
- The material uses illustrations and photographs are clear and uncluttered
- The material uses simple tables with short and clear column and row headings

| Domain: Actionability |
|-----------------------|
| The material clearly identifies at least one action the user can take |
| The material addresses the user directly when describing actions |
| The material breaks down any actions into manageable, explicit steps |
| The material provides a tangible tool whenever it could help the user take action |
| The material provides simple instructions of how to perform calculations |
| The material explains how to use charts, graphs, tables or diagrams to take action |
| The material uses visual aids whenever they could make it easier to act on instructions |

Analysis

For the PEMAT assessment, we grouped all webpages for each topic together. This was because one page often linked to another page with additional information, and for each source, material was presented in a similar style. We assessed the readability of each webpage separately however, as the actual written content varied across the pages, and we wanted to fully capture the range of readability scores. As the easy-read resources were designed to be viewed as a standalone resource, we assessed both the readability and PEMAT separately for each PDF. We conducted analyses exploring adjusting for clustering (by jurisdiction), which had no impact on the medians or interquartile ranges, therefore have just reported the raw values.
References

1. Ayre J, Muscat D, Bonner C, et al. Sydney Health Literacy Lab (SHLL) Health Literacy Editor. Sydney; 2021. https://ses.library.usyd.edu.au/handle/2123/24642 (Viewed April 2021).
2. McLaughlin GH. SMOG grading: A new readability formula. Journal of Reading. 1969; 12: 639–646.
3. Wang LW, Miller MJ, Schmitt MR, et al. Assessing readability formula differences with written health information materials: Application, results, and recommendations. Res Social Adm Pharm 2013; 9:503–16.
4. Shoemaker SJ, Wolf MS, Brach C. Development of the Patient Education Materials Assessment Tool (PEMAT): A new measure of understandability and actionability for print and audiovisual patient information. Patient Educ Couns 2014; 96: 395–403.
Table 2. Title and URL of webpages accessed between 15 March and 9 April 2021

| Information type, source and title | URL* |
|------------------------------------|------|
| **Australia (Federal Department of Health)** | |
| **Standard content** | |
| Getting vaccinated for COVID-19 | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19 |
| When will I get a COVID-19 vaccine? | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/when-will-i-get-a-covid-19-vaccine |
| Learn about COVID-19 vaccines | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/learn-about-covid-19-vaccines |
| How will I get my COVID-19 vaccine? | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/how-will-i-get-my-covid-19-vaccine |
| Who can get vaccinated | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/covid-19-vaccination-program-for-people-aged-12-to-59 |
| What should I do before I get vaccinated for COVID-19? | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/what-should-i-do-before-i-get-vaccinated-for-covid-19 |
| Which COVID-19 vaccine will I receive? | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/which-covid-19-vaccine-will-i-receive |
| Information for Aboriginal and Torres Strait Islander peoples about COVID-19 vaccines | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/getting-vaccinated-for-covid-19/covid-19-vaccines-indigenous |
| Information for people with disability about COVID-19 vaccines | https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/information-for-service-providers-workers-and-people-with-disability-about-covid-19-vaccines/information-for-people-with-disability-about-covid-19-vaccines |
| Physical distancing for coronavirus | https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/how-to-protect-yourself-and-others-from-coronavirus-covid-19/physical-distancing-for-coronavirus-covid-19 |
| Masks | https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/how-to-protect-yourself-and-others-from-coronavirus-covid-19/masks |
| **Easy read content** | |
| COVID-19 vaccine overview** | |
| COVID-19 vaccination – What is the COVID-19 vaccine? | https://www.health.gov.au/resources/publications/covid-19-vaccination-what-is-the-covid-19-vaccine-easy-read |
| COVID-19 vaccination – Who will get the vaccine? | https://www.health.gov.au/resources/publications/covid-19-vaccination-who-will-get-the-vaccine-easy-read |
| COVID-19 vaccination – Where can you get the vaccine | https://www.health.gov.au/resources/publications/covid-19-vaccination-where-can-you-get-the-vaccine-easy-read |
| COVID-19 vaccination – The Pfizer vaccine | https://www.health.gov.au/resources/publications/covid-19-vaccination-the-pfizer-vaccine-easy-read |
| COVID-19 vaccination – Getting ready for the vaccine | https://www.health.gov.au/resources/publications/covid-19-vaccination-getting-ready-for-the-vaccination-easy-read |
| COVID-19 vaccination – What to expect when you have your vaccination | https://www.health.gov.au/resources/publications/covid-19-vaccination-what-to-expect-when-you-have-your-vaccination-easy-read |
| COVID-19 vaccination – Giving your consent | https://www.health.gov.au/resources/publications/covid-19-vaccination-giving-your-consent-easy-read |
| COVID-19 vaccination – Side effects you might have after your vaccination | https://www.health.gov.au/resources/publications/covid-19-vaccination-side-effects-you-might-have-after-your-vaccination-easy-read |
| COVID-19 vaccination – Other information | https://www.health.gov.au/resources/publications/covid-19-vaccination-other-information-easy-read |
| Coronavirus: Social distancing | https://www.health.gov.au/resources/publications/coronavirus-social-distancing-easy-read |
| Country          | Standard Content/ Easy Read Content |
|------------------|-------------------------------------|
| **New South Wales** |                                     |
| About the vaccine rollout | [https://www.nsw.gov.au/covid-19/health-and-wellbeing/covid-19-vaccination-nsw/vaccine-rollout](https://www.nsw.gov.au/covid-19/health-and-wellbeing/covid-19-vaccination-nsw/vaccine-rollout) |
| Physical distancing | [https://www.nsw.gov.au/covid-19/rules/changes/social-distancing](https://www.nsw.gov.au/covid-19/rules/changes/social-distancing) |
| How wearing a face mask may help | [https://www.nsw.gov.au/covid-19/health-and-wellbeing/face-masks/how-wearing-a-face-mask-may-help](https://www.nsw.gov.au/covid-19/health-and-wellbeing/face-masks/how-wearing-a-face-mask-may-help) |
| **Queensland**    |                                     |
| About COVID-19 vaccines | [https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/protect-yourself-others/covid-19-vaccine/about](https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/protect-yourself-others/covid-19-vaccine/about) |
| How to protect yourself and others | [https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/protect-yourself-others/coronavirus-prevention](https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/protect-yourself-others/coronavirus-prevention) |
| Face masks – coronavirus | [https://www.covid19.qld.gov.au/government-actions/how-you-can-help-keep-queensland-covid-safe](https://www.covid19.qld.gov.au/government-actions/how-you-can-help-keep-queensland-covid-safe) |
| **Victoria**      |                                     |
| COVID-19 vaccines | [https://www.coronavirus.vic.gov.au/vaccine](https://www.coronavirus.vic.gov.au/vaccine) |
| About COVID-19 vaccines | [https://www.coronavirus.vic.gov.au/about-covid-19-vaccines](https://www.coronavirus.vic.gov.au/about-covid-19-vaccines) |
| Book your vaccine appointment | [https://www.coronavirus.vic.gov.au/vaccine](https://www.coronavirus.vic.gov.au/vaccine) |
| Who can get vaccinated against COVID-19 | [https://www.coronavirus.vic.gov.au/who-can-get-vaccinated](https://www.coronavirus.vic.gov.au/who-can-get-vaccinated) |
| Hygiene and physical distancing | [https://www.coronavirus.vic.gov.au/hygiene-physical-distancing](https://www.coronavirus.vic.gov.au/hygiene-physical-distancing) |
| When to wear a face mask | [https://www.coronavirus.vic.gov.au/face-masks-when-wear-face-mask](https://www.coronavirus.vic.gov.au/face-masks-when-wear-face-mask) |
| Importance of face masks | [https://www.coronavirus.vic.gov.au/face-masks-importance-face-masks](https://www.coronavirus.vic.gov.au/face-masks-importance-face-masks) |
| Types of face masks | [https://www.coronavirus.vic.gov.au/face-masks-types-face-masks](https://www.coronavirus.vic.gov.au/face-masks-types-face-masks) |
| Face masks – working and volunteering** | [https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19](https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19) |
| Face masks – shopping and retail** | [https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19](https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19) |
| Face masks – study and school** | [https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19](https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19) |
| Face masks – exercise** | [https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19](https://www.coronavirus.vic.gov.au/information-people-disability-coronavirus-disease-covid-19) |
| **New Zealand**   |                                     |
| What to expect when you get your vaccination | [https://covid19.govt.nz/covid-19-vaccines/how-to-get-a-covid-19-vaccination/](https://covid19.govt.nz/covid-19-vaccines/how-to-get-a-covid-19-vaccination/) |
| COVID-19 vaccine rollout groups | [https://covid19.govt.nz/covid-19-vaccines/how-to-get-a-covid-19-vaccination/covid-19-vaccine-rollout-groups/](https://covid19.govt.nz/covid-19-vaccines/how-to-get-a-covid-19-vaccination/covid-19-vaccine-rollout-groups/) |
| Vaccine development, safety and effectiveness | [https://covid19.govt.nz/covid-19-vaccines/get-the-facts-about-covid-19-vaccination/how-covid-19-vaccines-are-developed-and-approved/](https://covid19.govt.nz/covid-19-vaccines/get-the-facts-about-covid-19-vaccination/how-covid-19-vaccines-are-developed-and-approved/) |
| Maintain physical distancing | [https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others/maintain-physical-distancing/](https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others/maintain-physical-distancing/) |
| Wear a face covering | [https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others-from-covid-19/wear-a-face-covering/](https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others-from-covid-19/wear-a-face-covering/) |
| How to wear a face covering safely | https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others-from-covid-19/wear-a-face-covering/how-to-wear-a-face-covering-safely/ |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| How to make a face covering     | https://covid19.govt.nz/health-and-wellbeing/protect-yourself-and-others-from-covid-19/wear-a-face-covering/how-to-make-a-face-covering/ |

**Easy read content**

| Getting your COVID-19 vaccine | https://covid19.govt.nz/iwi-and-communities/alternate-formats/easy-read/covid-19-vaccines-information-in-easy-read/#getting-your-covid-19-vaccine |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Alert level 2 factsheet: leaving your home and going out | https://covid19.govt.nz/iwi-and-communities/alternate-formats/easy-read/information-about-the-alert-levels-in-easy-read/ |
| What to do if you are exempt from wearing a face mask** |                                                                                                                                     |
| When do you need to wear a face covering or face mask??? | https://covid19.govt.nz/iwi-and-communities/alternate-formats/easy-read/looking-after-your-community-information-in-easy-read/ |

**United Kingdom**

**Standard content**

| Coronavirus vaccine | https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/ |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Meeting with others safely (social distancing) | https://www.gov.uk/government/publications/coronavirus-covid-19-meeting-with-others-safely-social-distancing/coronavirus-covid-19-meeting-with-others-safely-social-distancing |
| Masks | https://www.gov.uk/government/publications/coronavirus-covid-19/wear-a-face-covering/when-to-wear-one-and-how-to-make-your-own/face-coverings/when-to-wear-one-and-how-to-make-your-own |

**Centres for Disease Control and Prevention**

**Standard content**

| Key things to know about COVID-19 vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/keythings.html |
|-----------------------------------------|------------------------------------------------------------------|
| Frequently asked questions about COVID-19 vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/faq.html |
| Myths and facts about COVID-19 vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html |
| What to expect at your appointment | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/expect.html |
| What to expect after getting a COVID-19 vaccine | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/after.html |
| Benefits of getting a COVID-19 vaccine | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/vaccine-benefits.html |
| Understanding how vaccines work | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html |
| mRNA vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/mRNA.html |
| Information about the Pfizer vaccine | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/Pfizer-BioNTech.html |
| Understanding viral vector vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/viralvector.html |
| COVID-19 vaccines and allergic reactions | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/allergic-reaction.html |
| Safety of COVID-19 vaccines | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/safety-of-vaccines.html |
| How COVID-19 vaccines get to you | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/distributing.html |
| Vaccine considerations for people with disabilities | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/disabilities.html |
| Ensuring vaccines work | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/effectiveness.html |
| What older adults need to know about the COVID-19 vaccine | https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/older-adults.html |
| **Social distancing** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html) |
|----------------------|--------------------------------------------------------------------------------------------------|
| **Your guide to masks** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html) |
| **How to wear a mask** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-to-wear-cloth-face-coverings.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-to-wear-cloth-face-coverings.html) |
| **How to store and wash masks** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html) |
| **Guidance for wearing masks** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/your-health/effective-masks.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/your-health/effective-masks.html) |
| **Improve how your mask protects you** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html) |
| **Types of face masks** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/mask-fit-and-filtration.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/mask-fit-and-filtration.html) |
| **Improve the fit and filtration of masks** | [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/mask-fit-and-filtration.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/mask-fit-and-filtration.html) |

**European Centre for Disease Prevention and Control**

| **Standard content** |  |
|----------------------|  |
| **COVID-19 vaccination** | [https://www.ecdc.europa.eu/en/covid-19/prevention-and-control/vaccines](https://www.ecdc.europa.eu/en/covid-19/prevention-and-control/vaccines) |
| **How to protect yourself and others** | [https://www.ecdc.europa.eu/en/covid-19/prevention-and-control/protect-yourself](https://www.ecdc.europa.eu/en/covid-19/prevention-and-control/protect-yourself) |
| **Questions and answers on COVID-19 prevention** | [https://www.ecdc.europa.eu/en/covid-19/questions-answers/questions-answers-prevention](https://www.ecdc.europa.eu/en/covid-19/questions-answers/questions-answers-prevention) |

**World Health Organization**

| **Standard content** |  |
|----------------------|  |
| **Coronavirus disease (COVID-19): Vaccines** | [https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines](https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines) |
| **Advice for the public** | [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public) |
| **Coronavirus disease (COVID-19): Masks** | [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-masks](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-masks) |

* Content may have been updated since our assessments were conducted. **These pages have been updated and the URLs are no longer available. ***URL provided for the landing page for easy read resources where PDFs are available to be downloaded