DOI: 10.35515/zfa/asj.42/2025.03

Australian Studies Journal
Zeitschrift für Australienstudien
42 — 2025

Heiyeon Myung and Meng Ji

Improving Linguistic Accessibility of Fire Risk Reduction Information in Australia

Abstract: Australia is a country where many culturally and linguistically diverse (CALD) communities reside, with more than 300 languages spoken. In order to bridge language barriers in the nation, the provision of language services has received ample attention from scholars. However, different cultural and linguistic backgrounds are not the only contributing factors to a communication barrier. According to the 2011-2012 Programme for the International Assessment of Adult Competencies (PIAAC), about 44 per cent of Australians are reported to have literacy level two and below. Against this backdrop, researchers, especially in the UK and Australasia, have recently shown an increased interest in accessible information. 'Accessible information', 'easy-to-read' or 'easy-read' are interchangeable terms commonly used to describe information specifically designed for people with literacy needs. Despite a growing body of literature on the accessibility of information, the research to date has tended to focus on health information accessibility and there is still insufficient data for accessibility of fire risk reduction information. This paper seeks to fill the research gap by measuring the level of accessibility of existing online fire and rescue information in NSW, collected in 2023, revising texts that do not score an ideal reading level and suggesting key strategies to improve the readability of information. Linguists reviewing community-targeted fire risk reduction information produced by authorities in the country will help assess community accessibility of current information, provide a practical writing style guideline to different stakeholders and create a cost-effective approach to writing future fire risk reduction information in Australia.

Wildfires or bushfires are a global issue adversely affecting human lives not only for people living at the site of a fire but also for others, not directly in the fire zone who may experience negative effects from the fire: smoke and ash affecting health, transport, agriculture and biodiversity.[1] The concern is that there is a growing incidence of bushfires in Australia, costing millions of dollars each year and labelling the country as a fire-prone zone in the world.[2] Equally problematic, more than half of the fire-related injuries and deaths in Australia are due to residential fires.[3] As the aftermath of a bushfire is dire, several studies have focused on Australia's fire disaster management and prevention. However, accessibility and readability of fire-related information have received scant attention. Therefore, we aim to address this gap in the literature by investigating the readability of fire prevention information provided by authorities for community members.

Australia is home to more than 25 million people where about 23 per cent of the total population belongs to culturally and linguistically diverse (CALD) communities.[4] The 2021 Census data reported by the Australian Bureau of Statistics reveal that, in this multicultural country, 3.4 per cent of Australian residents who reported using a language other than English (LOTE) at home do not speak English well or not at all.[5] Furthermore, the 2011-12 Programme for the International

1 Cf. Timothy Neale: Burning Anticipation.
2 Cf. Marco Desisto, Jillian Cavanagh, Timothy Bartram: Bushfire Investigations in Australia.
3 Cf. W. Kathy Tannous, Kingsley Agho: Domestic Fire Emergency Escape Plans Among the Aged in NSW, Australia.
4 Cf. Sophia Ra, Jemina Napier: Community Interpreting.
5 Cf. Australian Bureau of Statistics: Cultural diversity. Census.

Assessment of Adult Competencies reported that approximately 44 per cent of Australians aged 15 to 74 years had literacy skills at level two or below. People with literacy skills level two are able to match texts that were paraphrased or require low-level inferences. Literacy skills level one indicates that a person is able to read short texts and identify only one piece of information when identical or synonymous information were given in questions. In other words, if any piece of information is delivered in complex texts and has too much information to detect, 44 per cent of adult Australians are unable to understand the writing. Providing information without considering the literacy level of target readers, i.e. the general public, will hinder people understanding and applying the information.[6] Considering the above mentioned cultural and linguistic characteristics and literacy levels in Australia, when disseminating fire prevention related information to the public, it is crucial that this bushfire-prone country provides readable fire prevention related information.

Methods

Data Collection

The main purpose of the study is to evaluate the level of difficulty of the authentic fire prevention information released by the fire and rescue authorities in NSW. Hence, publicly available information on the Fire and Rescue NSW (FRNSW) website, especially pertaining to fire prevention, was collected in 2023 by one of the researchers. A total of 184 segments from different pages of the website were recorded in an excel spread sheet in order to analyse the readability level of the content.

No ethics approval was needed in this study as there were no human participants involved.

Initial Assessment of Data: Fire and Rescue NSW Online Information Readability Assessment

In this study, a total of 91 segments of information from the Fire and Rescue NSW website were selected and assessed for their readability level. Out of 184 segments imported to an excel spread sheet, one of the researchers was able to assess and revise only 91 segments due to time constraints. Each segment was scored and revised in order. The readability level was calculated using a readability scoring website,[7] where a total of seven different formulas exist: i) Automated Readability Index (ARI) which calculates the average number of characters per word and the average number of words per sentence, ii) Flesch Reading Ease

6 Cf. Hana Moon, Geon Ho Lee, Yoon Jeong Cho: Readability of Korean-Language COVID-19 Information From the South Korean National COVID-19 Portal Intended for the General Public.

7 Cf. Readability Formulas: Readability Scoring System Plus.

that counts the total number of words, sentences and syllables in a given text, iii) Gunning Fog Index which analyses the average number of words per sentence and the percentage of complex words in the text, iv) Coleman-Liau Index, which assesses the average sentence length and average number of characters per word, v) Linsear Write Readability Formula that looks at the number of two or more syllable words and one or two syllables, excluding proper nouns and jargon, vi) Flesch-Kincaid Grade Level and vii) SMOG Index.

Initially, all available readability formulas were used for a validity reason. However, it was decided to use only vi) Flesch-Kincaid Grade Level and vii) SMOG Index to calculate text readability of the archived sentences by the authors as their scores correspond with a school grade level and enable easier interpretation of the results. For instance, if a sentence is analysed with the Flesch-Kincaid Grade Level and SMOG Index, and gets a readability score of eight, it means the text requires eight years of schooling, or the average U.S. students in 8th grade can read and understand the text. On the other hand, Flesch reading ease, for example, uses 0 to 100 scale. A text scoring close to 100 equates to 'very easy' and 0 'very confusing'. Using both a 0-100 scoring system and a grade level system may complicate the interpretation of readability as researchers may need to convert the 0-100 scoring system into grading system to ensure that the mean score is easy to interpret.

The Flesch-Kincaid Grade Level calculates the average number of words per sentence and the average number of syllables per word. The SMOG Index requires 30 sentences to assess readability, but it essentially counts the average number of syllables per word that is the number of polysyllabic (having more than three or more syllables) words. The SMOG Index also looks at different punctuation marks, including a semi-colon and a hyphen, in order to count the total number of words per sentence. By using both indices, sentence structure, the average number of total words and polysyllabic words per sentence, the average number of syllables per word can be calculated.

Once readability scores from two indices were recorded, the mean grade level was calculated using the excel spreadsheet formula. Sentences with a mean readability level of eight and higher were revised by the authors using different writing strategies until the grades reached level eight and lower. The reason grade eight is the benchmark of the ideal readability level is because the Style Manual for accessible and inclusive content published by the Australian Government suggests writing content to an Australian year seven level.[8]

It explains that the year seven level of writing enables the content to be useable for most people. Furthermore, students in all States and Territories in Australia are mandated to complete Year 10 and study full time until they are at least 17 years old. Considering the mandatory education and literacy level in Australia, the researchers concluded that the readability of any content should be seven or below.

However, a readability score often has a decimal point, e.g. 7.2. When interpreting scores with a decimal point, only the left of the decimal point is to be

8 Cf. Australian Government: Style Manual: Literacy and Access.

read, e.g. if you get 7.2 that means the text was written at a grade level seven. In order to include scores up to 7.9 as a suitable readability level, which means grade level seven, texts assessed as grade eight and above were selected for revision.

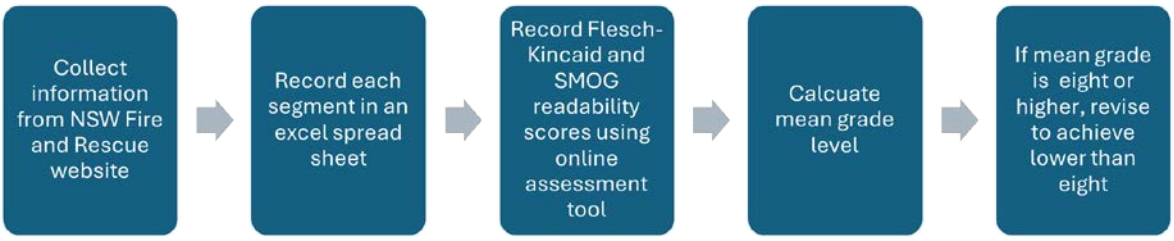

Fig. 1: Data collection and analysis process

Results

Readability Score

Out of the 184 segments collected from online fire risk reduction information released by Australian authorities, only 22 of them scored below eight. Out of those 22 texts, 17 segments consist of only one sentence. In other words, out of 184 pieces of information, 162 were mean grade eight and above or difficult to read and understand.

Those sentences with low readability had distinct characteristics in common; they had more than five words or eight syllables in one sentence or excessive use of formal or long words, such as 'inherent' or 'collaboration'. In order to make these sentences easier to read, they were revised by one of the researchers using a number of basic strategies listed below.

Revision: Main Strategies

Use of Punctuation

As most readability assessment tools count the total number or the average number of words in a sentence, having fewer words in each sentence helps achieve a score eight or below. In order to have short sentences, the first approach was to use more punctuation, such as full stops; in other words, breaking one long sentence into several short sentences (e.g., Table 1).

If the original sentence has a high word count, this means that one massive sentence includes ample information. In such a case, instead of explaining much information in one sentence, a sentence can be broken into multiple short sentences and clauses to have only one main piece of information in each sentence.

	Text	Flesch-Kincaid Grade Level	SMOG Index	Mean Readability Score (Grade Level)
Original version	(Segment number 36) Fire and Rescue NSW runs the Youth Fire Intervention Program which provides face-to-face and over-the-phone help for families to understand and manage children's fire-starting behaviour.	16.3	18.2	17.3
Revised version	Fire and Rescue NSW has the Youth Fire Intervention Program. The program provides face-to-face help or over-the-phone help for families. Families can understand and manage children's fire-starting behaviour.	7.3	7.6	7.5

Table 1: Example of shortening a long sentence

	Text	Flesch-Kincaid Grade Level	SMOG Index	Mean Readability Score (Grade Level)
Original version	(Segment number 5) To help prevent your child playing with fire, FRNSW recommends: Teach children that fire is not a toy, Keep smoking materials such as lighters and matches in a secure place, Watch for evidence of fireplay, such as burns on bedding or clothing, or fire-starting devices in children's pockets, Ensure children are supervised around fires; and Ensure you have working smoke alarms, rehearse a home escape plan and call Triple Zero (000) in an emergency.	20	20	20
Revised version	To stop your child from playing with fire, FRNSW suggests the following: • Teach your child that fire is not a toy. • Keep lighters and matches in a safe place where children cannot reach them. • Look out for signs that your child may be playing with fire. Signs include burns on their clothes or fire-starting objects in their pockets. • Always watch your child closely when they are near fires. • It is important to have working smoke alarms in your home, practice an escape plan, and call Triple Zero (000) if there is an emergency.	5.3	4.4	4.9

Table 2: Example of using listing

Use of Listing

Another method is to have a list of information in bullet points (e.g., Table 2). Similar to the strategy where one long sentence is broken up into several short sentences, lists rather than paragraphs can improve readability as each sentence has a lower total number of words and each information is emphasised by bullet points.

Reducing Multisyllabic Words

The third strategy is to reduce the number of multisyllabic words in one sentence and use more monosyllabic words (e.g., Table 3). A syllable is a part of a word or a whole word that is pronounced as a unit, usually containing a vowel. For instance, the word 'syllable' /ˈsɪl.ə.bəl/ has three syllables as there are three units of speech -/si/, /luh/, /bl/- in the word. Both the monosyllabic and multisyllabic words have prefixes; 'mono-' meaning 'one or single', and 'multi-' meaning 'many', making monosyllabic and multisyllabic one-syllable-word and two or more-syllables-word respectively. As explained above, many readability assessment tools count the number of syllables used in a text. Therefore, using shorter words or words with two or fewer syllables per word helps receiving lower grades in a readability assessment.

	Text	**Flesch-Kincaid Grade Level**	**SMOG Index**	**Mean Readability Score (Grade Level)**
Original version	(Segment number 18) Maintain adequate supervision of your children. (Total 12 syllables)	12.3	11.2	11.8
Revised version	Make sure you watch your children. (Total seven syllables)	0.5	1.8	1.2

Tab. 3: Example of writing in favour of words with two or fewer syllables

Most of the words used in the original segment number 18 are multisyllabic: 'maintain' /meɪnˈteɪn/ (two syllables) + 'adequate' /ˈæd.ə.kwət/ (three syllables) + 'supervision' /ˌsuː.pəˈvɪʒ.ən/ (four syllables) + 'of' /əv/ (one syllable) + 'your' /jɔːr/ (one syllable) + 'children' /ˈtʃɪl.drən/ (two syllables), resulting in 13 syllables in one sentence. Although it is a short sentence containing only six words, the number of syllables is 13. It means that the average number of syllables per word is two and a half. On the other hand, the revised version of the same text consists of six small words: 'make' /meɪk/ (one syllable) + 'sure' /ʃɔːr/ (one syllable) + 'you' /juː/ (one syllable) + 'watch' /wɒtʃ/ (one syllable) + 'your' /jɔːr/ (one syllable) + 'children' /ˈtʃɪl.drən/ (two syllables), having seven syllables in one sentence. By reducing

the total number of syllables in a sentence from 13 to seven, the readability score drops below eight.

Use of Swadesh Word List

Morris Harry Swadesh is a linguist who developed a field of lexicostatistics[9] and created the Swadesh 100 and 200 lists to determine relationships among languages and the relatedness of them.[10] Swadesh's vocabulary list, often referred to as 'basic vocabulary', is a collection of words which he believed to be present in all languages, such as 'we, 'come' or 'water'.[11] The main reason for using vocabulary from the Swadesh word list is that it reduces the readability score because most of these words have two or fewer syllables per word. However, replacing multi-syllabic words with those from Swadesh word list offers more than reduced number of syllables in a sentence. As mentioned, words included in the Swadesh list are common in any language. In other words, it excludes specialised or cultural vocabulary.[12] Although the texts analysed in this study were expected to be read by Australians, or native English speakers, given that Australia is a multicultural and multilingual country where more than 300 languages are spoken,[13] including more words from the Swadesh list may be beneficial to help readers with a CALD background understand the information more effectively.

Providing Definitions or Visual Aid

However, in some cases, we cannot avoid using multisyllabic or polysyllabic words or technical terms, such as 'electricity' or 'firefighters' as they are keywords of essential information. They often constitute domain-specific jargon and substitute words are difficult to find. On such occasions, the words can be used in the body of the text but definitions to explain the meaning in shorter words must be included. Below is an excerpt from existing Easy English health information released by the Victoria State Government:

> How to make a health support plan
> To make the plan, you might use reports from
> – your family doctor
> – other allied health professionals.
> Allied health professionals are experts such as speech pathologists.[14]

9 Cf. Anthony P. Grant: Swadesh's Life and Place in Linguistics, pp. 1-6.
10 Cf. Uri Tadmor, Martin Haspelmath, Bradley Taylor: Borrowability and the Notion of Basic Vocabulary; Jennifer Sullivan, April Mcmahon: Phonetic Comparison, Varieties, and Networks Swadesh's Influence Lives on here too.
11 Cf. Uri Tadmor, Martin Haspelmath, Bradley Taylor: Borrowability and the Notion of Basic Vocabulary.
12 Cf. ibid.
13 Cf. Andrea C. Schalley, Diana Guillemin, Susana A. Eisenchlas: Multilingualism and Assimilationism in Australia's Literacy-Related Educational Policies, pp. 162-177; Sophia Ra, Jemina Napier: Community Interpreting, pp. 45-61.
14 Scope (Aust) Ltd.: Health Support Plans for Your Child At School the Department of Education and Training, S. P.

As seen in the example, the term 'allied health professionals' was considered a jargon or difficult-to-understand word, therefore, a definition was provided in plain English. The same strategy was used in this study. In the example illustrated in Table 4, the term 'mechanical failure' was explained using simple and short words, and the mean readability score is reduced by almost half. Simply providing additional information is not the only factor contributing to lower grades. When a text is revised, it is essential that the sentence contains words that replace somewhat difficult words in the original text (e.g. 'majority' was replaced to 'most of'). Therefore, by having definitions in plain English, the average number of difficult words may have been reduced.

	Text	Flesch-Kincaid Grade Level	SMOG Index	Mean Readability Score (Grade Level)
Original version	(Segment number 72) The majority of residential fires begin in the kitchen and are often as a result of cooking being left unattended on the stove. Other common causes of fire include mechanical failure and falling asleep whilst smoking.	11.8	11.2	11.5
Revised version	Most house fires start in the kitchen. Often the fire starts because people did not watch and leave cooking on the stove. Other common reasons for fire are: • mechanical failure • falling asleep while smoking *Mechanical failure means machines not working	7.9	5.0	6.5

Tab. 4: Example of providing definition of a difficult word

Also, using pictures to explain difficult words or concepts while providing definitions can provide additional help for readers to understand the context.

Rewriting

Rewriting refers to combining two or more strategies listed above. When using this set of skills, caution is required, because if an editor does not fully understand the original text, the revised text may convey a completely different meaning. The easiest way is to replace 'difficult' words with their easier synonyms or definitions from dictionaries (e.g., Table 5).

As in the below instance, instead of using the word 'seek', use an easier word, such as 'get'. Rather than using the multisyllabic word, like 'immediately', use 'straight away' to have words with two or fewer syllables. By doing so, the information becomes easier to read and understand for more people because less

difficult and shorter vocabulary is used, meaning the text is suitable for people with lower literacy levels. If it is challenging to find monosyllabic words to replace long and difficult words, rephrasing the whole sentence can help reduce the mean readability level as well.

	Text	Flesch-Kincaid Grade Level	SMOG Index	Mean Readability Score (Grade Level)
Original version	(Segment number 38) Seek help immediately by calling the Fire and Rescue NSW toll-free number 1800 600 700.	20	14.6	17.3
Revised version	Get help straight away by calling the Fire and Rescue NSW. The call is free, and number is 1800 600 700.	2.6	1.8	2.2

Tab. 5: Example of rewriting

Discussion

The aim of the present research was to investigate the readability level of existing online fire risk reduction information in Australia. Our results demonstrate that almost 90 per cent of the content we collected on fire risk reduction information from the Fire and Rescue NSW website in Australia was found to have a readability score of eight and above which is above the recommended English writing level in Australia.[15] Fire risk reduction information is important for reducing Australian residents' injuries and deaths by fire. Therefore, for the information to be read and understood by the general public, such content must be written in plain English to help communities in Australia understand the information.

After analysing and revising currently available fire prevention information, some writing strategies were found to create community-oriented fire risk reduction information for the general public to access and understand, and to lower readability scores. Generally, in the sentences with a score below eight, the use of punctuation, pronouns and auxiliaries, subordinating conjunctions to link two clauses, words from the Swadesh word list or monosyllabic words, were predominantly observed. Using punctuation and pronouns lowers the readability score because the readability formulas account for the total number of words in each sentence. The more words a sentence has, the higher the readability score becomes. In other words, having many short sentences with fewer than five words rather than one long sentence consisting of more than five words lowers the score. When breaking up a long sentence into several sentences, it is inevitable to use increased punctuation, such as a full stop. Also, because English

15 Cf. Deborah Chinn, Claire Homeyard: Easy Read and Accessible Information for People with Intellectual Disabilities.

disprefers repetition, when a long sentence is broken up into different sentences, pronouns must be used to avoid the repetition of a subject or an object in previous sentences. Using pronouns can also make a text shorter and easier. Similar to punctuation and pronouns, conjunctions help separate one long sentence into two or more short sentences and clauses. As conjunctions connect sentences or clauses, and explain the relationship between the sentences, they help readers understand the context better while keeping each sentence shorter.

Readability formulas also count the number of syllables in a word and a sentence. Hence, using monosyllabic (one-syllable) words or words with fewer than two syllables reduces the readability score. Auxiliaries play an important role here. Instead of using multisyllabic words that describe possibilities, such as 'potentially', shorter auxiliaries, like 'can', help keep the number of syllables low. Furthermore, considering the fact that words from the Swadesh list, including 'I', 'you' and 'big', are mostly basic words with fewer than three syllables, it is worth using words from the Swadesh list to lower readability scores. Lastly, when a sentence includes multisyllabic keywords that are essential to deliver central information, definitions can be provided with plain vocabulary. Added to this, when a more accessible word cannot replace a multisyllabic keyword, visual aids like pictures or drawings can also be used at the same time. However, it is important to note that using visual aids does not lower the readability score because readability scoring systems do not account for features other than text.

Conclusion

Accessibility of information began to receive ample attention from researchers, however, most literature on information accessibility are focused on health information.[16] While this paper presents data to fill the research gap present in fire risk reduction information accessibility, the results also serve as practical guidelines for people who write not only fire risk reduction information but any information that aims to be read and understood by the general public. The strategies outlined above will be especially useful when potential readers include people from CALD communities or with low literacy levels as the readability score benchmark used in the study was based on Australian residents' literacy level and their backgrounds.

Limitations and Future Study

The data was collected from only one website and was analysed based on the general Australian's average literacy level known, not the level of those accessing the fire prevention information on the website. Furthermore, the evaluation of actionability or comprehensibility cannot be made as the resources were not

16 Cf. ibid.

evaluated by target readers and community members. It is important to remember that the readability level is only a rough estimate and may not always translate into actual readability, comprehensibility and actionability of individuals.

References

Australian Bureau of Statistics: Cultural diversity. Census, www.abs.gov.au/statistics/people/people-and-communities/cultural-diversity-census/2021 (accessed 11 October 2024).

Australian Government: Style Manual: Literacy and Access, www.stylemanual.gov.au/accessible-and-inclusive-content/literacy-and-access (accessed 11 October 2024).

Chinn, Deborah, Claire Homeyard: Easy Read and Accessible Information for People with Intellectual Disabilities. Is It Worth It? A Meta-Narrative Literature Review. In: Health Expectations, 20, 2017, 6, pp. 1189-1200.

DeSisto, Marco, Jillian Cavanagh, Timothy Bartram: Bushfire Investigations in Australia. A Case for Building Collective Leadership Practices for Crises Events. In: Leadership & Organization Development Journal, 41, 2020, 2, pp. 177-192.

Moon, Hana, Geon H. Lee, Yoon J. Cho: Readability of Korean-Language COVID-19 Information from the South Korean National COVID-19 Portal Intended for the General Public. Cross-sectional Infodemiology Study. In: MIR Formative Research, 6, 2022, 3, pp. e30085.

Neale, Timothy: Burning Anticipation. Wildfire, Risk Mitigation and Simulation Modelling in Victoria, Australia. In: Environment and Planning A: Economy and Space, 48, 2016, 10, pp. 2026-2045.

Ozolins, Uldis: Communication Needs and Interpreting in Multilingual Setting. The International Spectrum of Response. Vancouver: Benjamins Publishing Company 2011.

Ra, Sophia, Jemina Napier: Community Interpreting. Asian Language Interpreters' Perspectives. Translation & Interpreting. In: The International Journal of Translation and Interpreting Research, 5, 2013, 2, pp. 45-61.

Readability Formulas: Readability Scoring System Plus, www.readabilityformulas.com/readability-scoring-system.php (accessed 11 October 2024).

Schalley, Andrea C., Diana Guillemin, Susana A. Eisenchlas: Multilingualism and Assimilationism in Australia's Literacy-Related Educational Policies. In: International Journal of Multilingualism, 12, 2015, 2, pp. 162-177.

Scope (Aust) Ltd.: Health support plans for your child at school The Department of Education and Training, www.education.vic.gov.au/Documents/school/teachers/learningneeds/Health%20support%20plans_accessible.pdf (accessed 11 October 2024).

Sinyai, Clayton, Brenda MacArthur, Thomas Roccotagliata: Evaluating the Readability and Suitability of Construction Occupational Safety and Health Materials Designed for Workers. In: American Journal of Industrial Medicine, 61, 2018, 10, pp. 842-848.

Sullivan, Jennifer, April McMahon: Phonetic Comparison, Varieties, and Networks. Swadesh's Influence Lives on here too. In: Søren Wichmann, Anthony P. Grant (eds.): Quantitative Approaches to Linguistic Diversity Commemorating the Centenary of the Birth of Morris Swadesh. Amsterdam [et al.]: John Benjamins Publishing Company 2012, pp. 139-154.

Tadmor, Uri, Martin Haspelmath, Bradley Taylor: Borrowability and the Notion of Basic Vocabulary. In: Søren Wichmann, Anthony P. Grant (eds.): Quantitative Approaches to Linguistic Diversity Commemorating the Centenary of the Birth of Morris Swadesh. Amsterdam [et al.]: John Benjamins Publishing Company 2012, pp. 35-55.

Tannous, W. Kathy, Kingsley Agho: Domestic Fire Emergency Escape Plans Among the Aged in NSW, Australia. The Impact of a Fire Safety Home Visit Program. In: BMC Public Health, 19, 2019, pp. 1-10.