deafscotland

Deafness and Dementia: Predicting the future for Scotland

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Creating better lives.

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Preface Life Changes Trust

Anna Buchanan

The Life Changes Trust is delighted to have funded this important piece of research carried out by deafscotland in partnership with Queen Margaret University. It is our hope that it will be useful to many individuals and organisations, particularly in these currently challenging times when we need more creative and rights-based solutions to support people living with dementia. We know that one size does not fit all.

The links between dementia and hearing loss have been widely researched, however, this research looks more closely at prevalence rates in Scotland in order to better inform advance planning. It was timely when commissioned and even more timely now given the impact of COVID-19 on government funding and, by extension, government priorities.

In 2017, the Lancet Commission reported that 35% of all dementia cases could be prevented if the following nine modifiable risk factors were fully eliminated – education, hearing loss, hypertension, obesity, smoking, depression, physical inactivity, social isolation and diabetes. The three most common modifiable risk factors identified were poor early school education, **hearing loss in mid-life** and smoking.

We also know that those with hearing loss are potentially at risk of social isolation; people with hearing loss and dementia are doubly susceptible and, with limited social interaction during the current 'lockdown', the risk increases further.

It is our hope that the Scottish Government and Integration Joint Boards will consider this evidence and its implications carefully. There is a need to look cross-portfolio and understand the links between hearing loss, social isolation, cognitive decline and dementia so that timely interventions can be put in place to deal with contributory factors that are preventable. I would like to thank deafscotland for having the vision for this work. The research is an example of the ways in which we are beginning to develop a more nuanced understanding of dementia in Scotland, which will benefit people living with dementia both now and in the future.

Anna Buchanan
CEO Life Changes Trust

Preface deafscotland

Despite the circumstances - the COVID-19 pandemic - we are delighted that this report has been written. The emergency has put communication into the front of everyone's minds:

- working with people affected by the virus and preventing its spread requires the use of protective equipment that create barriers to communication;
- the physical two metres distancing makes it almost impossible to communicate with anyone who has a communication support need;
- and having the virus makes speech very difficult.

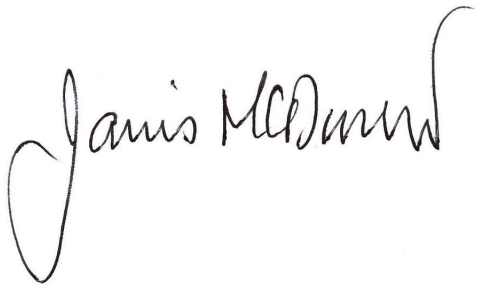
Janis McDonald

The links between dementia and deafness are increasingly evidenced. Communication barriers are known to disrupt relationships and create isolation.

During the emergency, many people are experiencing persistent communication and isolation problems leading to anxiety, distress and fear. It is certainly heightening problems for those who ordinarily have communication barriers and in my opinion, whilst disturbing, it gives a helpful insight for those who have never before experienced barriers to communication. It should also help people understand the communication process when dealing with people affected by dementia and will create some useful hints, tips and new advice.

We see our work fitting well with a better recovery from this immediate crisis and informing policy around the aging population, dementia prevention and improved services.

Please remember the numbers are actual people and we all have a duty to do what we can to prevent and manage dementia better and differently. We hope the figures support the development of better options and involve people affected by dementia in decisions about planning and resourcing services.



Janis McDonald
Chief Officer deafscotland

1 Introduction

There is a known association between hearing loss and incident dementia (Lin et al. 2011) and it is thought that untreated hearing loss may be a risk factor for cognitive decline (Dawes et al. 2015, Shen et al. 2018). Hearing loss, is therefore, now considered to be a modifiable risk factor for dementia (Livingston et al. 2017).

While the link between hearing loss and dementia has been established, and an increasing body of research on the topic has and is being undertaken, there is a noticeable gap in specific to the situation in Scotland. In order to plan health and social care management for an increasingly older population, it is essential to have a detailed understanding of the regional prevalence of these conditions.

This project will be a Mixed Methods study, using a Pragmatic philosophical approach. In the first stage, national prevalence figures for hearing loss and dementia in Scotland will be sourced. These figures will be broken down for each of the 32 Local Authorities. Having established these baseline statistics, National Records Office figures will then be applied to allow future prevalence projections. In addition, a specific Focus Group recruited from members of the Audiology profession will be consulted in an attempt to gauge the status of service provision at present and capture recommendations/suggestions for future service provision.

2 Background/Rationale

The association between hearing loss and dementia has been, and continues to be, widely researched. This project is funded by The Life Changes Trust, which is working at a strategic level to address dementia in Scotland. Its' work is person-centred, rights-based, uses the social model of disability and fits comfortably with the vision and values of deafscotland. deafscotland is a membership based organisation which works across deafness and promotes the concept of a spectrum of deafness which includes 4 key pillars: Deaf/Deaf Sign Language users; Deafened; Deafblind; and Hard of Hearing. Using the social model of disability, this underpins an argument of different barriers and different solutions. There are a number of ideological and political issues within the deaf sector and deafscotland promotes a rights based, person centred approach.

deafscotland has been developing strategic partnership working with Scottish Care and Community Care Providers Scotland and would like to encourage thinking around a strategic approach to dementia. There is evidence of a strong link between deafness and mental health issues and emerging evidence of a link between deafness and dementia.

In order to plan health and social care management for an increasingly older population, there

needs to be a detailed understanding of the regional prevalence of these conditions. Being aware of the links between deafness and dementia, it becomes apparent that research into the regional prevalence rates for both is necessary in order to inform anticipatory planning based on credible best and worst case scenarios.

3 Literature Review

While the link between hearing loss and dementia has been a topic for debate since the late 1980s (Uhlmann et al. 1991); it was brought to the fore by way of Lin's longitudinal study(Lin et al. 2011). Lin's research found evidence that hearing loss is independently associated with incident dementia. Adding to this, research using data from medical insurance sources in Germany, moreover, evidenced that "this relationship also exists on a regional level. These findings underscore the potential role of hearing impairment as a risk factor for dementia that will be relevant for the management of elderly patients" (Teipel et al. 2015). Additionally, in 2015, a cross-sectional study of older adults in the UK focussed on assessing the benefits of hearing aid use and how it impacted upon better cognition, found that there was some evidence of improved cognition by using this intervention. However, it was deemed that further research would be needed to determine if there was a direct causal link between hearing aid use preventing cognitive decline and improving the quality of life for older adults (Dawes et al. 2015). Adding molecular evidence to the research base, hypotheses such as that proposed by Shen have sought to explore the link between Presbycusis and dementia at a molecular level and to consider how prevention and treatment might impact upon cognition (Shen et al. 2018).

By 2017, the now seminal work on dementia prevention, published by the Lancet Commission on Dementia, Prevention, Intervention and Care, identified hearing loss as one of 9 modifiable risk factors for dementia (Livingston et al. 2017). Hearing loss at mid-life (age 45-65) was identified as being one of the risk factors and considered to be potentially modifiable. Following identification of hearing loss as being a modifiable risk, research in the area of deafness and dementia has found impetus. In a recent scoping review study which investigated the impact of visual and auditory interventions, Dawes added to his previous research, arguing that while there is evidence of better cognitive outcomes, there is still a need for further research trials when it comes to evidencing their effectiveness for people with dementia and sensory impairment (Dawes 2019). However, while Dawes highlights the need for further research before effectiveness of intervention can be confirmed, it has been argued that decline in cognitive ability due to age related hearing loss is preventable by 'rehabilitation and increased screening for the elderly' (Ray et al. 2018). This work further argues that social isolation becomes of additional importance when hearing loss is untreated.

Longitudinal studies, moreover, offer the benefit of observing data patterns over time. For example, the 2005 Maastricht University study involved analysis of a 6 year follow up of elderly participants and looked at how cognition is affected by both loss of vision and hearing.

Findings from this research indicated that sensory loss impacted upon cognitive ability, and also argued for the need to screen older patients to ensure that sensory loss can be identified (Valentijn et al. 2005). In a similar direction, a community-based study in 2008 involved the analysis of 5 year follow-up of elderly adults. Again, results found that there was a relationship between hearing loss and cognitive decline and called for further investigation to establish the impact this could have across the medical and social sector (Wallhagen & Pettengill 2008). The 2011 the Baltimore Longitudinal Study of Ageing, moreover, was used to look at the link between hearing loss and its' impact upon memory function, finding that there was an association between hearing loss and cognitive functioning (Lin et al. 2011).

Further research by way of a 6 year study following up a cohort of participants concluded that there was evidence of hearing loss associated with cognitive decline in older adults, however, further research was deemed necessary to ascertain if hearing aids and other interventions were effective at mitigating this process (Lin et al. 2013). Subsequent longitudinal studies have confirmed the association between hearing loss and cognitive decline and highlighted the need for further studies to attempt to understand all related underlying mechanisms (Bush et al. 2015). Deal et al. (2016) used data from the Health, Ageing and Body Composition (Health ABC) study with results showing an association between hearing loss and increased risk of developing dementia in older adults. They advocate, however, that randomised trials are necessary to determine if treatment of hearing loss would delay the onset of dementia in these individuals (Deal et al. 2016).

Strongly arguing for the benefits of hearing aid intervention, the well publicised 2015 French study which observed a sample of adults with reported hearing loss over a 25 year period found that there was, indeed, a link between hearing loss and later cognitive decline but also argued that hearing aid intervention lessened the level of decline (Amieva et al. 2015). The 2018 Australian study by Ford et al. (2018) followed up a cohort sample over time and compared this with a meta-analysis sample, evidencing that hearing loss was associated with an increased risk of dementia. The authors argue that their research supported "recent suggestions that mid-life hearing loss may account for up to 9.1% of dementia cases worldwide", stating that "research efforts to reduce its impact should continue to be explored" (Ford et al. 2018). Maharani et al. (2019) have recently used the English Longitudinal Study on Ageing (ELSA) as a source of data, with their findings arguing that improving social networks of older adults with hearing loss is likely to be a factor limiting cognitive decline. Recent research utilising data from the 'Lothian Birth Cohort' has found that cognitive ability in childhood has a relationship to hearing loss and cognitive ability in later life. This research is a challenge to the theories that later life hearing loss is the catalyst for decline in cognitive ability and, rather, the study suggests that research has to look at the co-morbidities from a holistic, life-long perspective (Okely et al. 2019).

This literature review comprises of both a chronology of relevant theory development together with specific examples of particular studies which give detail on the main themes. Recent systematic review studies highlight the full range of research available (Thomson et al. 2017, Loughrey et al. 2018). In addition, collaborative international studies on-going at present are

scheduled to publish results in 2022. For example, researchers at Johns Hopkins University have launched a major randomised controlled trial which seeks to establish if treatment for hearing loss can actually prevent or slow down cognitive decline. This study will also investigate the impact of any treatment of hearing loss has upon loneliness and social isolation. Furthermore, Dr Piers Dawes will build on previous research at the University of Manchester in a project jointly funded by Alzheimers Research UK and Action on Hearing Loss. As with the previous new project, results are due in 2022 and, within the study, researchers will investigate "if dementia is directly caused by hearing loss, if dementia is an indirect consequence of social isolation caused by hearing problems, or if there are other biological factors that increase the risk of both hearing loss and dementia" https://www.alzheimersresearchuk.org/research-projects/understanding-the-link-between-hearing-loss-and-dementia.

There is a tangible shift in emphasis in terms of research questions as knowledge on hearing loss and dementia is documented; recent studies seek to shed light on the importance of preventing social isolation due to hearing loss and the impact this can have on dementia. In this regard, hearing loss is not only a modifying factor for dementia in its' own right, but it potentially has a strong link to one of the other factors listed by The Lancet Commission, namely, social isolation (Livingston et al. 2017). If the link between the two co-morbidities is further demonstrated, the importance of managing hearing loss in terms of managing dementia becomes apparent.

4 The Four Pillars of Deafness

To ensure that the whole spectrum of deafness is included and to emphasise the diversity required in terms of the range of services needed for those with hearing loss and dementia in Scotland, this report will adhere to the 'Four Pillars of Deafness' model. This model underpins the work of deafscotland and each of these 'pillars' will now be discussed in turn.

4.1 Deaf, British Sign Language Users

Firstly, people who identify as Deaf, BSL users would have been born deaf or became deaf in early childhood and as a consequence British Sign Language (BSL) is their first language. To a greater extent than any of the other categories of deafness, Deaf, BSL users normally identify with a unique Deaf Culture. In the last Census some 12,533 respondents reported that they used BSL at home. It should be noted, however, that there is ambiguity in terms of the Census question as it cannot be assumed that all respondents who ticked 'yes' to using BSL at home were in fact Deaf. It has been argued that it is most probable that the figure 'includes people who are not themselves deaf but live with someone who uses BSL as their first language' (Bezuijen 2016). This question will be refined in the Census in 2021 and

thereafter, it is hoped that a more reflective total of those who are in this pillar of deafness can be obtained from then on.

Current resources on dementia specifically for Deaf, British Sign Language Users

Factsheets in BSL:
https://www.alzheimers.org.uk/get-support/publications-factsheets/bsl-factsheets

Information on the 'Transforming the Deaf Experience' project: https://dementia.stir.ac.uk/blogs/dementia-centred/2019-06-18/transforming-deaf-dementia-experience

'The Deaf Experience user-friendly toolkit for Deaf people who use BSL and who are living with dementia, their families, carers, and staff who are supporting them' https://bda.org.uk/wp-content/uploads/2019/09/Dementia-Toolkit-A4.pdf

4.2 People who are Deafblind

There are various types of deafblindness, also termed 'dual sensory loss'. Firstly, "Congenital", which is a term used to describe: children who born with hearing loss and sight loss or acquire these two conditions prior to language development. The next type of deafblindness is "Acquired", people in this category are either:

- born deaf and experience sight loss later;
- born blind who become deaf later in life;
- or it could apply to those who have lost their sight and hearing later in life.

In addition to "Congenital" and "Acquired", deafblindness can also be due to "Usher's Syndrome" and "CHARGE".

In terms of numbers of individuals that fall into this category, Deafblind Scotland state: "We estimate there are around 5,000 people in Scotland with a dual sensory impairment. Relatively few people are totally deaf and totally blind many have a little hearing and/or sight left". —DeafBlind Scotland (2018)

However, there is a spectrum of dual sensory loss numbers, as with hearing loss, which are increased by age. The Centre for Disability Research at Lancaster University published a study relating to estimated deafblindness figures in the UK. This comprehensive study provides upper and lower estimates for deafblindness in the UK (Emerson & Robertson 2011). Bezuijen (2016) applied this research to population projections and produced upper and lower estimates for Scotland over time. Estimates of the number of deafblind people in Scotland in 2019 range from 12,800 (lower estimate) to 34,000 (upper estimate). The majority here (for

both lower and upper estimates) are over the age of 60 and thus follow a similar pattern to general age-related deafness.

Current resources on dementia specifically for people that are Deafblind

The Social Care Institute for Excellence site provides an informative information sheet. https://www.scie.org.uk/dementia/living-with-dementia/sensory-loss/deafblind.asp

4.3 People who are Deafened

People who are Deafened are those who become deaf after learning to speak. Deafness here can be the result of an accident or trauma or might be a side-effect of an illness. People in this category can lose their hearing suddenly or over time and are sometimes described as having "Acquired Profound Hearing Loss" (APHL). deafscotland estimate that there are 57,000 deafened people in Scotland. https://www.deafscotland.org

Current resources on dementia specifically for people that are deafened

There are no current information resources on dementia available for people who are deafened, however, the general guide below contains a relevant section.

'Dementia and Deafness: What you Need to Know', 2015. This is a useful resource from Deaf Action, which deals with all pillars of deafness. http://www.deafaction.org/wp-content/uploads/2015/11/Dementia-and-Deafness-Report.pdf

4.4 People who are Hard of Hearing

The term 'Hard of Hearing' is used to describe those whose hearing loss is mild to moderate. In general terms, those who are Hard of Hearing lose their hearing gradually over time. The category includes those with age-related hearing loss and as such potentially most affected by dementia. In terms of numbers, it is the largest of all 4 Pillars of Deafness. By applying the Davis model to 2014 population figures it has been estimated that approximately 534,500 people may have been included in this category of deafness (Bezuijen 2016).

Current resources on dementia specifically for people that are hard of hearing

There are no current information resources on dementia available for people who are hard of hearing, however, the general guide below contains a relevant section.

'Dementia and Deafness: What you Need to Know', 2015. This is a useful resource from Deaf Action, which deals with all pillars of deafness. http://www.deafaction.org/wp-content/uploads/2015/11/Dementia-and-Deafness-Report.pdf

5 Procedure

5.1 Stage 1

As has been stated, analysis of sources and publications relating to dementia and hearing loss highlighted the need to provide detail specific to Scotland. As a consequence, the main aim of this project has been to establish regional prevalence figures for hearing loss and dementia in Scotland and, in the first stage, consideration was given as to how best to achieve this.

5.1.1 Prevalence rates for both dementia and deafness

In 2014, an early exploratory survey on hearing loss and dementia argued that it was essential that Audiologists had input into the research because "audiologists are the only professional group which spans the boundary between the two clinical areas" (Wright et al. 2014). The same argument is used here, it was considered essential to seek opinion from members of the Audiology profession as they deal with both co-morbidities. A sample of Audiologists were contacted by email, informed about the intentions of the research project and asked if they were aware of :

(a) what type of data is collected on patients with hearing loss and dementia

(b) which sources, if any, can be used to obtain this data at present.

Discussion confirmed that, within Scotland, at present there is no uniform standardised method to record whether a patient has dementia. In relation to recording data in Audiology Services, it was pointed out that, while it would, of course, be possible to include some sort of 'note' on the patient record, there is no dedicated marker field to enable this and as a consequence it would not be a searchable criteria in terms of data collection. It was suggested that markers

relating to deafness and dementia might be noted on individual patient records at GP level and this may be a way of collecting prevalence figures. However, it was pointed out that, as there is no uniform process for this, it would be at the discretion of practices to carry out such a method and so, if any data was available from this route, it was not likely to provide a national picture.

Subsequently, it was suggested that it might be possible to gain an overview of GP data by making a research request to the new Scottish Primary Care Information Resource (SPIRE). Launched in May 2017, it is stated that :

'The aim of SPIRE is to provide a single national system to extract data from General Practice clinical IT systems in Scotland. SPIRE will analyse and report on the data extracted for specific and approved purposes whilst ensuring the highest standards of patient confidentiality and privacy are maintained. However, it is not a national database - researchers will be able to request tailored extracts of data which, once approved, can be linked to other datasets for specific studies"
(https://understandingpatientdata.org.uk/news/guest-blog-new-scottish-spire-campaign).

Following this line of discussion, then, it was decided to make an information request to SPIRE.

Staff at SPIRE were able to provide aggregate dementia prevalence figures for Scotland for the 3 year period April 2016-April 2019. These figures were broken down into Local Authority areas but it was not possible to break them down into either gender or age categories. The SPIRE database does not hold any information on hearing loss as it is not collected at GP level.

5.1.2 Prevalence rates for dementia

In addition to the dementia rates provided by SPIRE, Alzheimer Scotland statistics were obtained. Alzheimer Scotland state that:

'there are an estimated 90,000 people with dementia in Scotland. Around 3,000 of these people will be under the age of 65 years. This estimate is based on the results of studies that screen for cognitive problems and dementia within the population of a set geographical area. There have been no such studies in Scotland, so we rely on the best available evidence from Europe. We currently adopt the Eurocode prevalence rates, which were published by Alzheimer Europe in 2009. This study brought together the results from a group of population studies across Europe to calculate prevalence rates based on the analysis of this collective evidence-base' (Alzheimer Scotland 2020).

Upon request, prevalence rates for 2019 were provided, these figures were broken down into age, gender and Local Authority area.

5.1.3 Prevalence rates for hearing loss

The problematic nature of gaining comprehensive numbers for the prevalence of hearing loss is widely known. In order to give as accurate a picture of numbers as possible of the largest 'hard of hearing' pillar of deafness, the Davis model will be used. Although published in 1995, Adrian Davis' comprehensive study on the prevalence of deafness in the UK population is still the bench mark for statistics in this field (Davis 1995). The criteria Davis set out in his study was a loss of hearing of 35dB minimum in the better ear of respondents. He argued that this was the level that would require intervention of some kind (hearing aid etc) and thus was a good measure for hearing loss. Davis established percentages of prevalence for pre-defined age groups.

This work was refined in 2014, when Akeroyd et al. (2014), using the 2011 Census data, applied the prevalence rate criteria that Davis had set out in 1995 and calculated estimated hearing loss for the UK population. In this report the categories set out by Davis were followed, with no prevalence calculated for those under the age of 18 or over the age of 80. Akeroyd et al. (2014), however, argued that Davis had in fact factored a percentage for those over 80, that age group having an 81% prevalence rate. Using this Akeroyd produced estimated figures for prevalence based on the 2011 census figures.

In the 2016 report, 'Deafness in Scotland'(Bezuijen 2016), Jeanine Bezuijen took these prevalence rates and applied them to the National Records of Scotland (National Records of Scotland 2020) population projections for Scotland until 2039. From this amalgamation, it was possible to project the prevalence rates for Scotland over time for each age group. Using Davis (1995)' original age groups and including the category of 'over 80' (with prevalence of 81%) Bezuijen was able to project general hearing loss prevalence rates for Scotland up to 2039. This methodology has been applied and expanded upon within this report to project prevalence rates for Local Authorities.

5.1.4 Future Projection

Once obtained, prevalence rates were projected. These projections were accomplished by applying 2016-based populations predictions from the National Records Office to the prevalence rates for dementia and hearing loss which were obtained. Once the prevalence rates for the combined morbidities were estimated, they will be projected over a 20 year period in order to establish the overall trend for all 32 Councils in Scotland.

5.2 Stage 2

This stage of the research took the form of a Focus Group. Participants for the group were recruited from the Audiology profession and discussion was centred around the findings of stage one and perceived gaps in current provision and suggestions for information gathering strategies for the future.

6 Discussion Group: Audiology Service

6.1 Background

By gaining an idea of the regional prevalence rates of those with hearing loss and dementia and projecting these figures into future decades, it has been possible to give some indication of the likely pressure there will be on related services, thus enabling future planning. While this was the main focus of this project, numbers have to be given a qualitative side to put them in context. As has been demonstrated, hearing loss and dementia is a relatively unexplored topic in Scotland and there is no doubt that future qualitative research will enhance and enrich our understanding of the experience of individuals with these co-morbidities. As a step towards this knowledge accumulation, it has been possible, within the scope of this project, to supplement the statistical numbers using Discussion Group input. In 2014, Wright et al. (2014) carried out exploratory research study in which they surveyed members of the Audiology profession, arguing that "audiologists are the only professional group which spans the boundary between the two clinical areas". The study sought to "explore the awareness of dementia amongst audiologists; and to explore audiologists experiences of working with older people with either diagnosed or suspected dementia".

This was the first survey of its kind on the topic and it offers an insight into UK-wide service provision at the time. In terms of how this relates to the project at hand, it was considered important to gain input from the Audiology profession in Scotland. It would be beneficial to replicate this type of survey in the future focussing solely on the situation in Scotland. Results of such a survey could inform and refine service planning

6.2 Ethical Approval

NHS ethical approval was not required for the study, however, the project was subject to Queen Margaret University's ethical approval process and was approved. Participants were asked for their consent to take part in discussions; informed that all responses would be ensured anonymity in any reporting and asked to give permission for responses to be used in findings.

6.3 Format

On the day of the meeting, participants were given a brief overview of the content and purpose of the research. They were informed that, while the overall aim was to establish prevalence rates for hearing loss and dementia and project these figures into the future, there was an additional project aim. This additional aim was to attempt to establish the perception of the current service provision for those with hearing loss and dementia.

Rather than structured questions, a broad theme was put to the participants to encourage discussion. The participants were asked about their opinion on the level of service for those with dementia and hearing loss in Scotland at this time. They were also encouraged to suggest areas for improvement. This was to allow as wide a discussion as possible. Participants were assured confidentiality was guaranteed and all responses would be anonymised.

6.4 Analysis of Data

A summary of the main participant responses were sorted into themes and are listed below.

6.4.1 Referral of Patients to Audiology:

Discussion centred around the importance of being alerted to the fact a patient has dementia, prior to their visit to Audiology. Patients often need a longer appointment and prior notification would allow for this.

6.4.2 Stigma related to the term ‘dementia‘:

The issue of the word ‘dementia’ having negative connotations was brought up. It was suggested that using the term ‘Memory Clinic’ rather than ‘Dementia Clinic’, for example, might result in patients being more inclined to attend clinics and appointments.

6.4.3 Importance of Patient Autonomy/Agency:

The practical difficulties of working with patients who have dementia were discussed, especially the need for the patients to keep some agency. When patients come with carers, it is often the case that the carers are spoken to instead of the patient.

The introduction of telehealth services that allow patients to access audiology services remotely, need further consideration for people with hearing loss and dementia.

Dealing with patients from Care Homes can be difficult also as it is difficult to ensure that advice is passed on to the carer is implemented. It can vary, some situations are better than others in terms of patient/carer bond and transfer of knowledge between them.

6.4.4 Multi-agency Service Provision/Linking in with Cognitive Impairment:

The importance of working across sectors was discussed. It was noted that, in relation to hearing loss and dementia, it would be beneficial to have greater involvement with Health & Social Care Partnerships and with practitioners/groups that deal with general cognitive impairment. Multi-agency service provision was considered necessary.

6.4.5 Need for Education/Training:

Training/Education is something necessary across the board. Training in Care Homes can prove problematic and difficult to maintain due to high staff turn over.

It was noted that different ways of delivering the training may need to be devised as information packs take time to produce but often are not consulted.

The need to work more with the families of patients was highlighted. Also it was noted that it is necessary to make sure family members are informed about hearing loss and given training on procedures regarding hearing aids.

7 Prevalence figures and future projections

7.1 Rate of Deafness and Dementia

7.1.1 Analysis using data from SPIRE

The aggregate dementia numbers obtained from SPIRE for years April 2018 to March 2019 were divided through the projected number of people with hearing loss calculated for each Local Authority, based on populations projections by the National Records of Scotland (NRO 2016-base) and hearing loss prevalence modelled by Davis (1995). (see Table 2 page 18).

The highest prevalence rate can be found in Dundee City with 11.02% and the lowest in North Ayrshire with 5.03%.

The data is obtained from individual GP practices in Scotland, however, the QOF (Quality and Outcomes Framework) Disease Prevalence Register indicates that some practices have not returned data, therefore populations and registers for Clusters, HSCP (Health and Social Care Partnerships), Local authorities and Health Boards are likely to be smaller than the reality. Also, as a means of ensuring patient confidentiality, GP Practices do not detail values where there are less than 5 in a particular field. Again, this will result in lesser numbers. It is known that there is significant underreporting of dementia cases (Alzheimer's Research UK 2020).

Another issue to consider is that Local Authorities with fewer GP practices will be subject to a higher variability due to the smaller sample size.

The regional variation of dementia diagnoses can be seen in figure 1 on page 19.

7.1.2 Analysis using data from Alzheimer Scotland

Alzheimer Scotland's dementia numbers have been produced by taking population numbers from the National Records Office of Scotland (National Records of Scotland 2020) and multiplying these with European Collaboration on Dementia (EuroCoDe) (Alzheimer Europe 2020) prevalence rates per age groups.

Prevalence rates calculated using data obtained from SPIRE differ substantially from the rates calculated using Alzheimer Scotland figures. The difference of values is displayed in Table 1 on page 17.

To predict the rate of deaf people with dementia the following formula (1) was used:

$$R = p \times n \tag{1}$$

R=predicted rate of deaf people with dementia; p=prevalence as used by Alzheimer Scotland (Kinnaird 2019); n=number of deaf people according to Davis (1995) model as calculated in (McMenemy et al. 2020). We have chosen to use the Alzheimer Scotland numbers for the forward projections, because SPIRE excludes some data due to privacy concern.

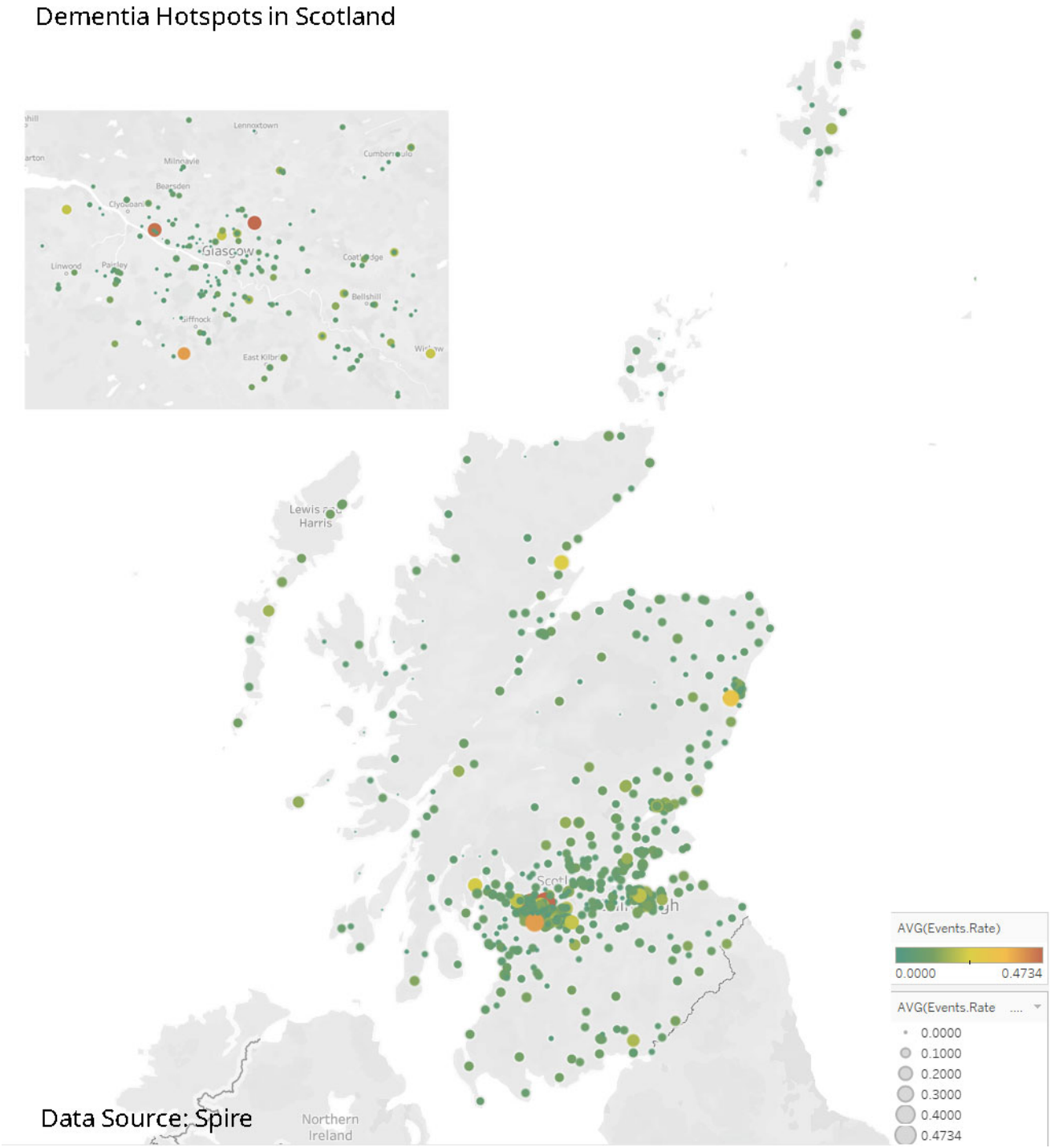
Council	Alzheimer Scotland	SPIRE Dementia Register	Difference AS SPIRE	Error percentage
Aberdeen City	3340	1,704	1.960	196.02%
Aberdeenshire	4342	1,923	2.258	225.79%
Angus	2544	1,120	2.271	227.13%
Argyll & Bute	1969	794	2.479	247.95%
City of Edinburgh	7649	3,836	1.994	199.41%
Clackmannanshire	856	420	2.038	203.76%
Dumfries & Galloway	3419	1,436	2.381	238.06%
Dundee City	2526	1,621	1.558	155.82%
East Ayrshire	2108	904	2.331	233.13%
East Dunbartonshire	2386	845	2.823	282.34%
East Lothian	1941	1,086	1.787	178.70%
East Renfrewshire	1933	744	2.598	259.76%
Falkirk	2664	1,200	2.220	222.00%
Fife	6792	3,142	2.162	216.16%
Glasgow City	7867	3,959	1.987	198.72%
Highland	4681	2,225	2.104	210.40%
Inverclyde	1546	731	2.116	211.56%
Midlothian	1465	941	1.557	155.70%
Moray	1875	722	2.596	259.63%
Na h-Eileanan Siar	640	304	2.104	210.44%
North Ayrshire	2642	801	3.298	329.83%
North Lanarkshire	4900	2,385	2.055	205.45%
Orkney Islands	463	142	3.263	326.31%
Perth & Kinross	3383	1,516	2.232	223.16%
Renfrewshire	3030	1,324	2.288	228.83%
Scottish Borders	2480	1,067	2.324	232.43%
Shetland Islands	398	150	2.653	265.30%
South Ayrshire	2607	1,004	2.597	259.69%
South Lanarkshire	5476	2,937	1.865	186.46%
Stirling	1645	573	2.870	287.02%
West Dunbartonshire	1452	737	1.970	197.03%
West Lothian	2533	1,186	2.136	213.55%

Table 1: Comparison of figures from Alzheimer Scotland and GP reported Alzheimer diagnoses from SPIRE. The error factor percentage highlights the discrepancy between Alzheimer Scotland and GP reported diagnoses. GP data excludes reports of less than 5 patients to protect privacy.

Local Authority	Dementia	Deaf	Ratio	Dem rate/100
Aberdeen City	1704	20411	8.35%	0.69%
Aberdeenshire	1923	27279	7.05%	0.77%
Angus	1120	14564	7.69%	1.02%
Argyll and Bute	794	11524	6.89%	0.90%
City of Edinburgh	3836	45418	8.45%	0.69%
Clackmannanshire	420	5497	7.64%	0.73%
Dumfries and Galloway	1436	19985	7.19%	0.97%
Dundee City	1621	14713	11.02%	1.00%
East Ayrshire	904	13237	6.83%	0.70%
East Dunbartonshire	845	13380	6.32%	0.79%
East Lothian	1086	11652	9.32%	0.98%
East Renfrewshire	744	10756	6.92%	0.68%
Falkirk	1200	16565	7.24%	0.79%
Fife	3142	40913	7.68%	0.82%
Glasgow City	3959	49977	7.92%	0.54%
Highland	2225	25593	8.69%	0.92%
Inverclyde	731	9104	8.03%	0.90%
Midlothian	941	9224	10.20%	0.98%
Moray	722	11120	6.49%	0.77%
Na h-Eileanan Siar	304	3599	8.45%	1.13%
North Ayrshire	801	15930	5.03%	0.59%
North Lanarkshire	2385	32291	7.39%	0.69%
Orkney Islands	142	2751	5.16%	0.66%
Perth and Kinross	1516	19029	7.97%	1.02%
Renfrewshire	1324	18637	7.10%	0.72%
Scottish Borders	1067	14778	7.22%	0.90%
Shetland Islands	150	2485	6.04%	0.83%
South Ayrshire	1004	14902	6.74%	0.88%
South Lanarkshire	2937	36602	8.02%	0.88%
Stirling	573	9819	5.84%	0.75%
West Dunbartonshire	737	9179	8.03%	0.77%
West Lothian	1186	16672	7.11%	0.66%

Table 2: Rate of dementia cases per deafness based on the numbers of GP identified dementia cases per local authority from April 2018 to March 2019 as entered in SPIRE was divided through the projected number of people with hearing loss per local authority 2018 based on populations projections by the National Records of Scotland (NRO 2016-base) and hearing loss prevalence rates by (Davis 1995). Rate of Dementia per 100 patients as per Scottish Primary Care Information Resource (SPIRE).

Figure 1: Dementia rates by GP as acquired by Scottish Primary Care Information Resource (SPIRE)



7.2 Local Authorities

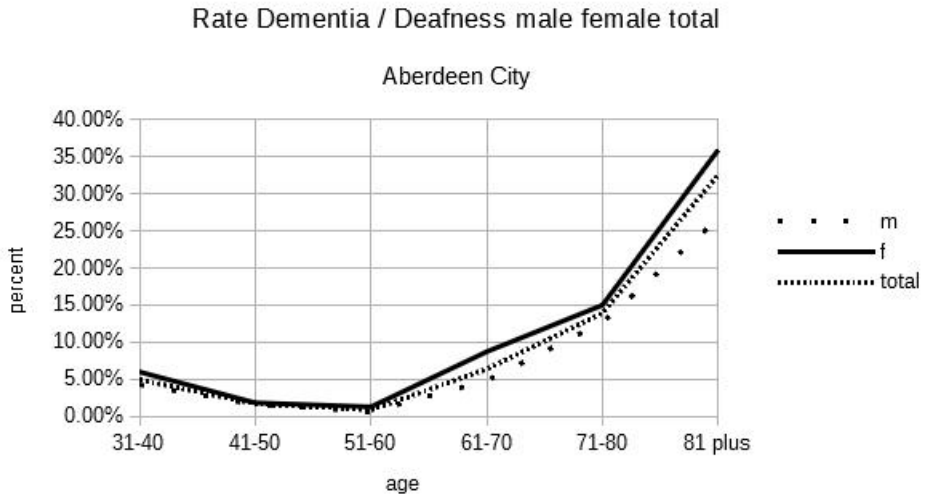
7.2.1 Aberdeen City

From April 2018 to March 2019 Aberdeen City had a dementia to deaf ratio of 8.35% and a 0.69% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1704 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 2 on page 20. It is notable that the relationship between deafness and dementia is not linear in Aberdeen City with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Aberdeen City 2018-2038 can be seen in table 3 on page 20.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	22	135	649	808	**2018**
Female	0	0	1	17	176	1640	1834	
Male	0	0	1	16	175	799	991	**2028**
Female	0	0	0	19	201	1785	2006	
Male	0	1	1	22	193	1130	1346	**2038**
Female	0	0	1	17	230	2199	2448	

Table 3: Estimated and projected prevalence rate of deafness and dementia in Aberdeen City 2018-2038

Figure 2: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Aberdeen City



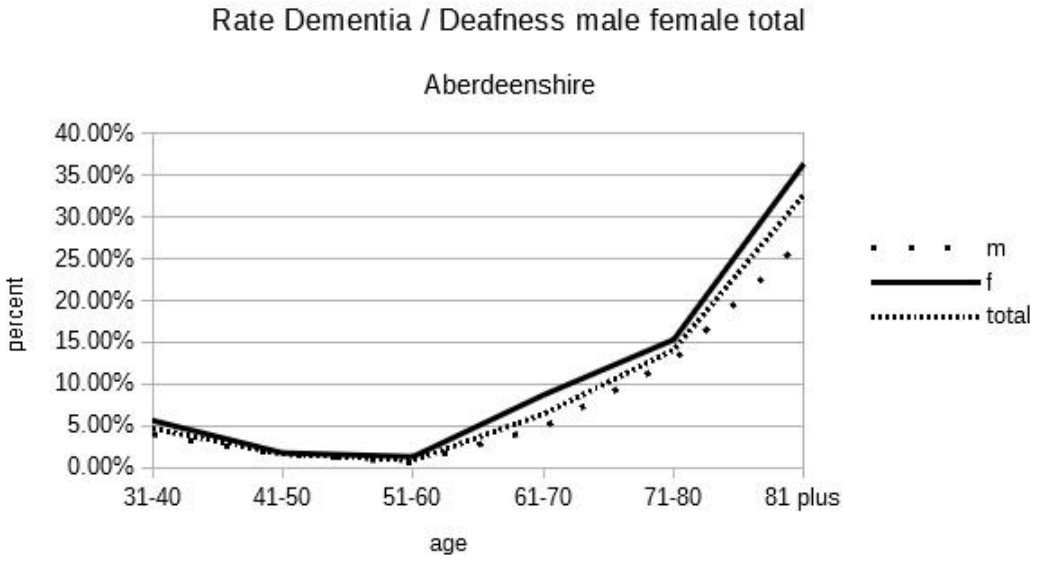
7.2.2 Aberdeenshire

From April 2018 to March 2019 Aberdeenshire had a dementia to deaf ratio of 7.05% and a 0.77% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1923 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 3 on page 21. It is notable that the relationship between deafness and dementia is not linear in Aberdeenshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Aberdeenshire 2018-2038 can be seen in table 4 on page 21.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	1	1	31	210	883	1127	**2018**
Female	0	0	1	25	242	1865	2133	
Male	0	1	1	23	266	1338	1629	**2028**
Female	0	0	1	28	301	2519	2849	
Male	0	1	1	33	304	1854	2193	**2038**
Female	0	1	1	26	346	3318	3692	

Table 4: Estimated and projected prevalence rate of deafness and dementia in Aberdeenshire 2018-2038

Figure 3: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Aberdeenshire



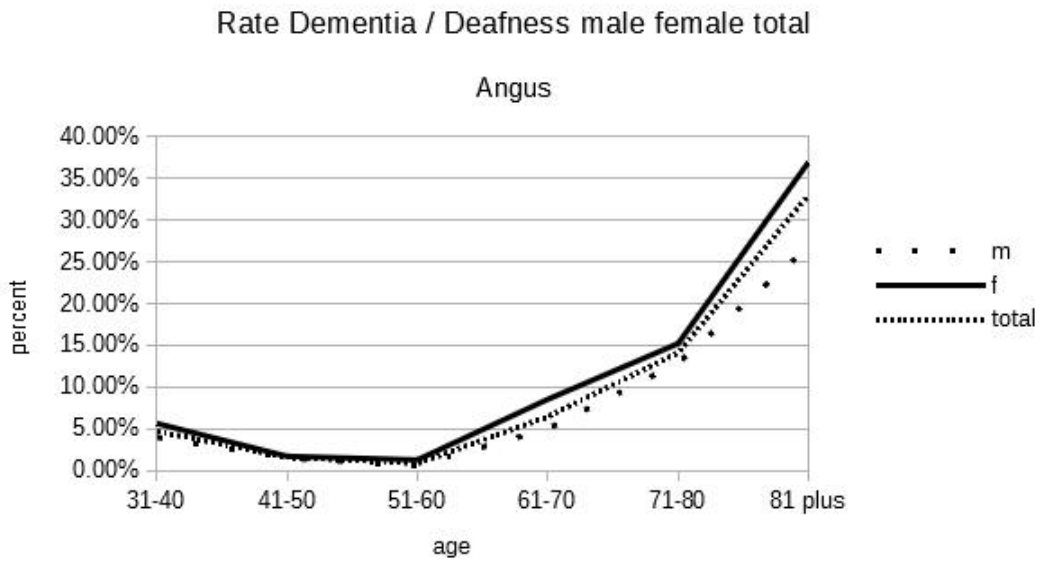
7.2.3 Angus

From April 2018 to March 2019 Angus had a dementia to deaf ratio of 7.69% and a 1.02% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1120 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 4 on page 22. It is notable that the relationship between deafness and dementia is not linear in Angus with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Angus 2018-2038 can be seen in table 5 on page 22.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	15	113	518	646	**2018**
Female	0	0	0	12	136	1176	1325	
Male	0	0	1	11	136	740	888	**2028**
Female	0	0	0	14	156	1496	1666	
Male	0	0	1	14	156	985	1156	**2038**
Female	0	0	0	12	176	1860	2049	

Table 5: Estimated and projected prevalence rate of deafness and dementia in Angus 2018-2038

Figure 4: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Angus



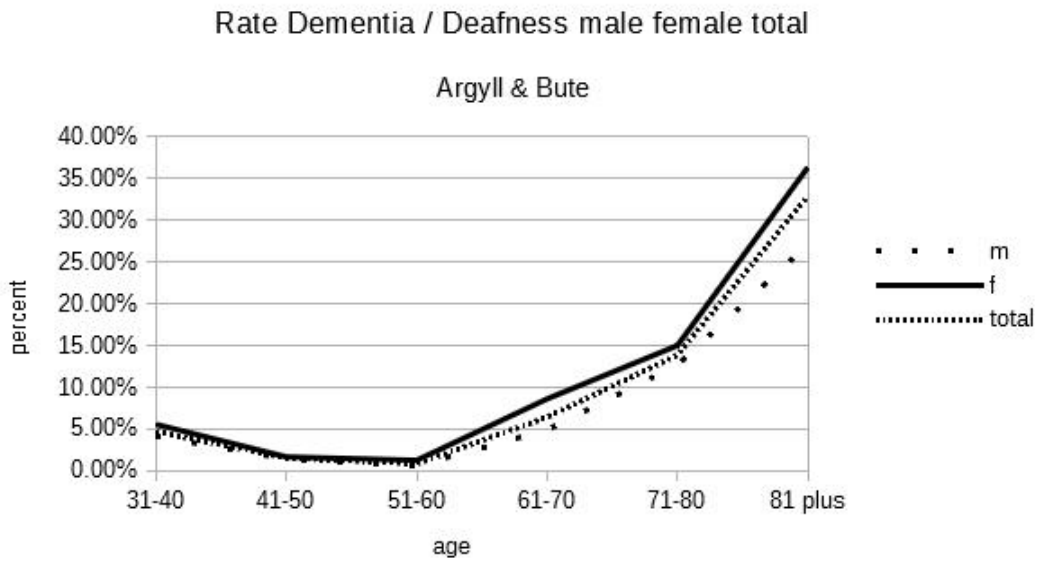
7.2.4 Argyll & Bute

From April 2018 to March 2019 Argyll & Bute had a dementia to deaf ratio of 6.89% and a 0.90% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 794 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 5 on page 23. It is notable that the relationship between deafness and dementia is not linear in Argyll & Bute with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Argyll & Bute 2018-2038 can be seen in table 6 on page 23.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	12	96	373	482	**2018**
Female	0	0	0	10	113	913	1036	
Male	0	0	0	9	110	547	666	**2028**
Female	0	0	0	11	121	1158	1290	
Male	0	0	0	12	125	702	840	**2038**
Female	0	0	0	9	137	1373	1519	

Table 6: Estimated and projected prevalence rate of deafness and dementia in Argyll & Bute 2018-2038

Figure 5: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Argyll & Bute



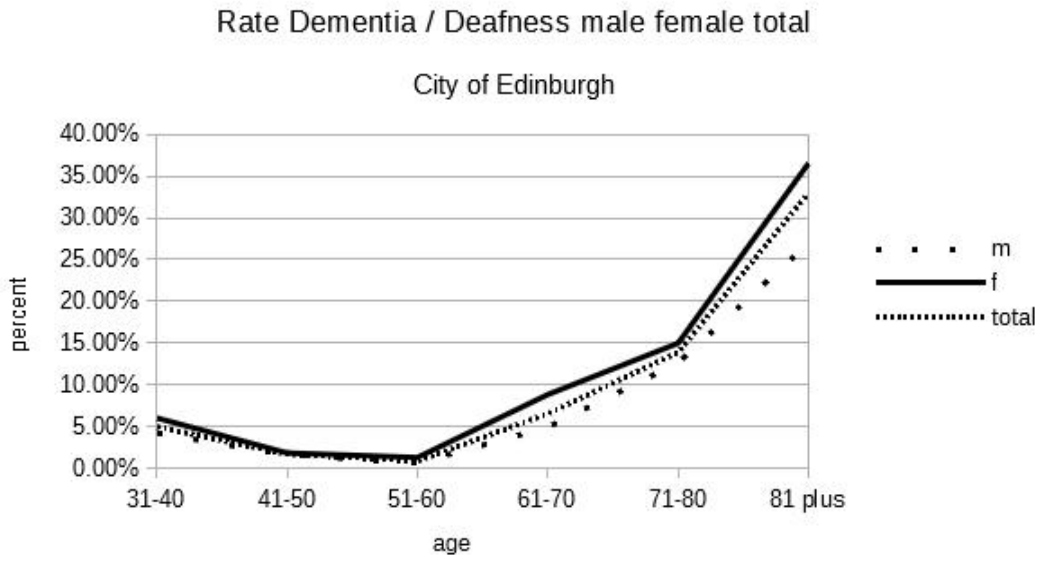
7.2.5 City of Edinburgh

From April 2018 to March 2019 the City of Edinburgh had a dementia to deaf ratio of 8.45% and a 0.69% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 3836 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 6 on page 24. It is notable that the relationship between deafness and dementia is not linear in the City of Edinburgh with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in the City of Edinburgh 2018-2038 can be seen in table 7 on page 24.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	1	2	45	296	1530	1874	**2018**
Female	0	1	1	37	386	3744	4169	
Male	1	1	2	37	386	1999	2425	**2028**
Female	0	1	1	44	469	4286	4801	
Male	0	1	3	55	483	2850	3392	**2038**
Female	0	1	1	43	568	5524	6138	

Table 7: Estimated and projected prevalence rate of deafness and dementia in the City of Edinburgh 2018-2038

Figure 6: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for the City of Edinburgh



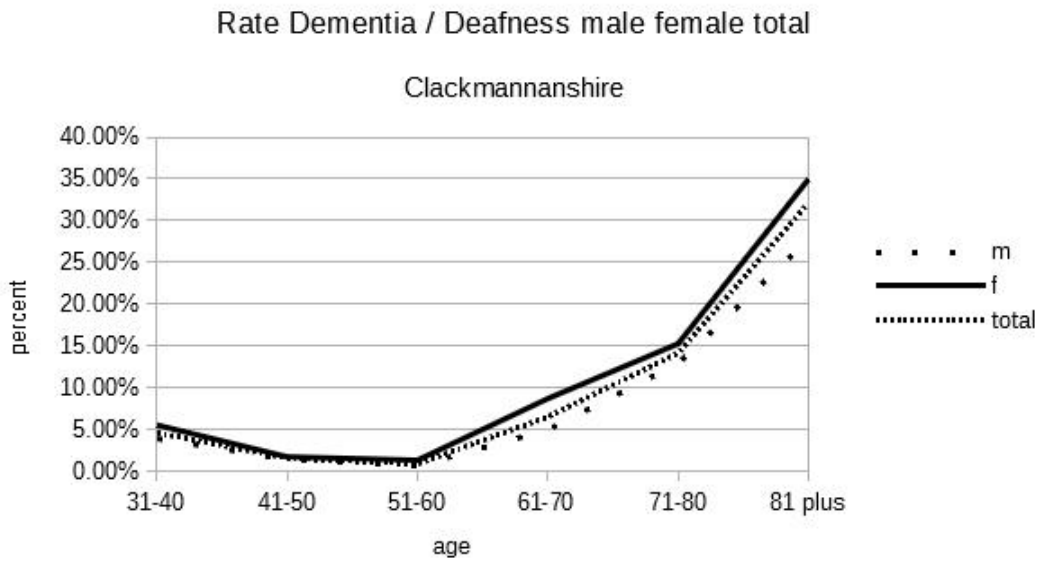
7.2.6 Clackmannanshire

From April 2018 to March 2019 Clackmannanshire had a dementia to deaf ratio of 7.64% and a 0.73% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 420 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 7 on page 25. It is notable that the relationship between deafness and dementia is not linear in Clackmannanshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Clackmannanshire 2018-2038 can be seen in table 8 on page 25.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	6	43	165	215	**2018**
Female	0	0	0	5	53	367	426	
Male	0	0	0	5	55	272	332	**2028**
Female	0	0	0	6	63	506	575	
Male	0	0	0	6	65	382	453	**2038**
Female	0	0	0	5	73	632	710	

Table 8: Estimated and projected prevalence rate of deafness and dementia in Clackmannanshire 2018-2038

Figure 7: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Clackmannanshire



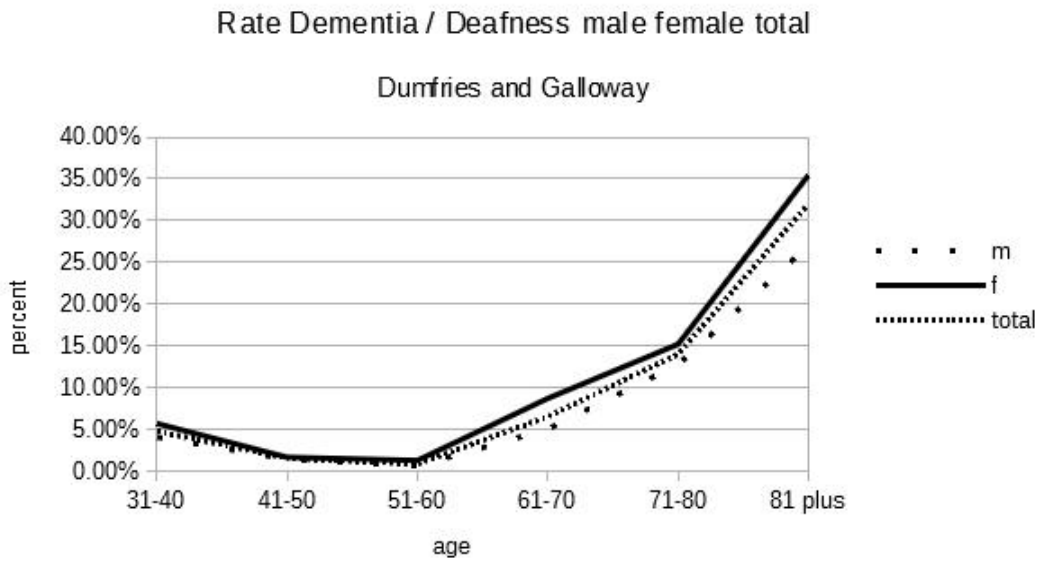
7.2.7 Dumfries and Galloway

From April 2018 to March 2019 Dumfries and Galloway had a dementia to deaf ratio of 7.19% and a 0.97% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1436 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 8 on page 26. It is notable that the relationship between deafness and dementia is not linear in Dumfries and Galloway with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Dumfries and Galloway 2018-2038 can be seen in table 9 on page 26.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	21	164	737	923	**2018**
Female	0	0	0	17	191	1541	1749	
Male	0	0	1	16	191	1032	1240	**2028**
Female	0	0	0	19	211	1925	2156	
Male	0	0	1	19	218	1352	1589	**2038**
Female	0	0	0	16	246	2311	2574	

Table 9: Estimated and projected prevalence rate of deafness and dementia in Dumfries & Galloway 2018-2038

Figure 8: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Dumfries & Galloway



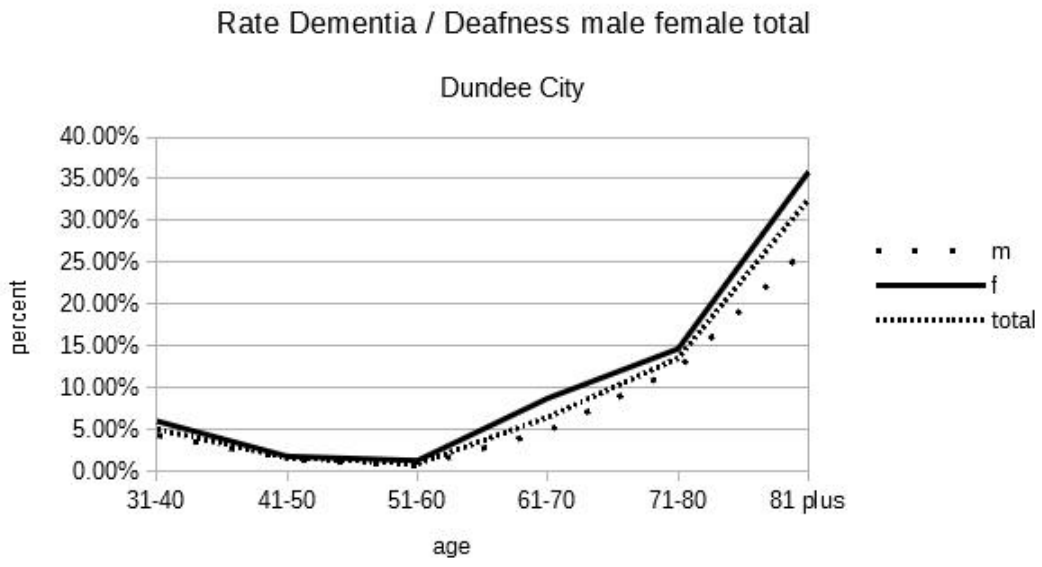
7.2.8 Dundee City

From April 2018 to March 2019 Dundee City had a dementia to deaf ratio of 11.02% and a 1.00% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1621 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 9 on page 27. It is notable that the relationship between deafness and dementia is not linear in Dundee City with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Dundee City 2018-2038 can be seen in table 10 on page 27.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	14	103	506	624	**2018**
Female	0	0	0	12	131	1274	1418	
Male	0	0	1	11	119	615	745	**2028**
Female	0	0	0	14	141	1324	1479	
Male	0	0	1	14	139	793	947	**2038**
Female	0	0	0	11	171	1569	1752	

Table 10: Estimated and projected prevalence rate of deafness and dementia in Dundee City 2018-2038

Figure 9: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Dundee City



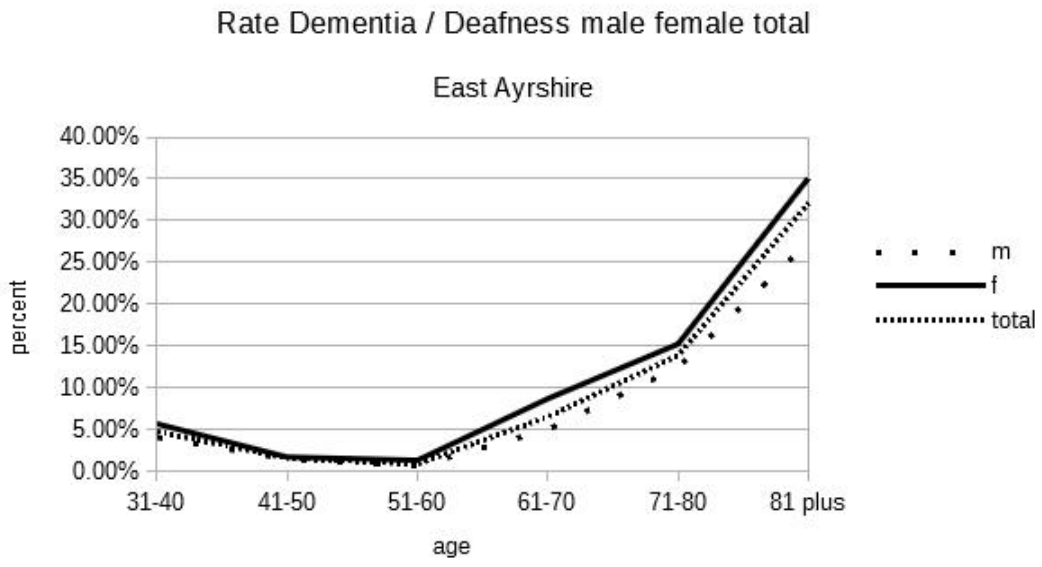
7.2.9 East Ayrshire

From April 2018 to March 2019 East Ayrshire had a dementia to deaf ratio of 6.83% and a 0.70% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 904 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 10 on page 28. It is notable that the relationship between deafness and dementia is not linear in East Ayrshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in East Ayrshire 2018-2038 can be seen in table 11 on page 28.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	14	105	419	539	**2018**
Female	0	0	0	12	125	936	1074	
Male	0	0	1	11	123	604	739	**2028**
Female	0	0	0	14	144	1138	1296	
Male	0	0	1	14	145	792	953	**2038**
Female	0	0	0	12	173	1377	1563	

Table 11: Estimated and projected prevalence rate of deafness and dementia in East Ayrshire 2018-2038

Figure 10: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for East Ayrshire



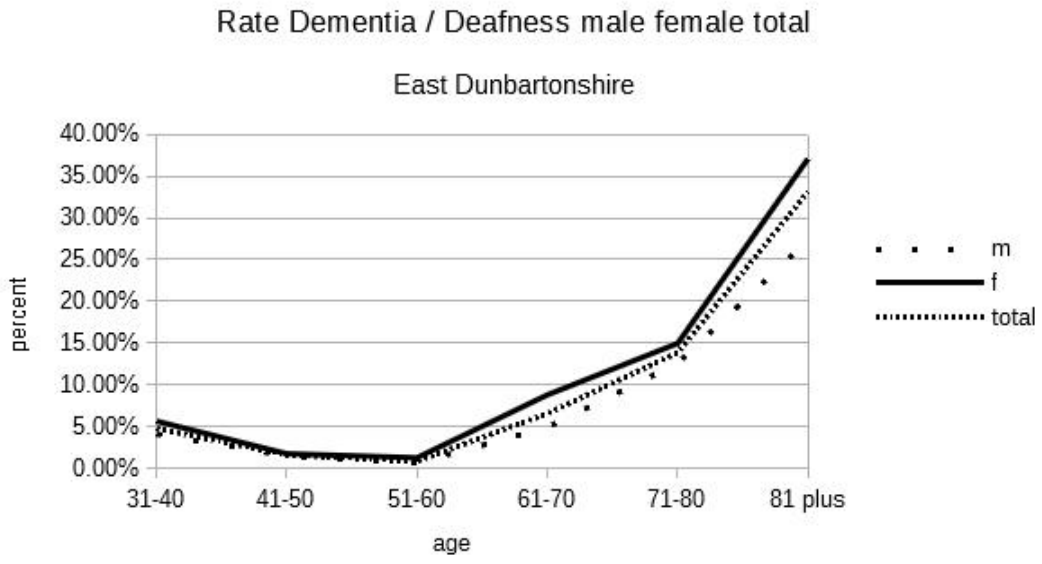
7.2.10 East Dunbartonshire

From April 2018 to March 2019 East Dunbartonshire had a dementia to deaf ratio of 6.32% and a 0.79% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 845 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 11 on page 29. It is notable that the relationship between deafness and dementia is not linear in East Dunbartonshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in East Dunbartonshire 2018-2038 can be seen in table 12 on page 29.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	13	96	519	628	**2018**
Female	0	0	0	11	124	1109	1245	
Male	0	0	0	10	115	731	856	**2028**
Female	0	0	0	13	144	1456	1613	
Male	0	0	0	12	132	1000	1144	**2038**
Female	0	0	0	11	170	1896	2077	

Table 12: Estimated and projected prevalence rate of deafness and dementia in East Dunbartonshire 2018-2038

Figure 11: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for East Dunbartonshire



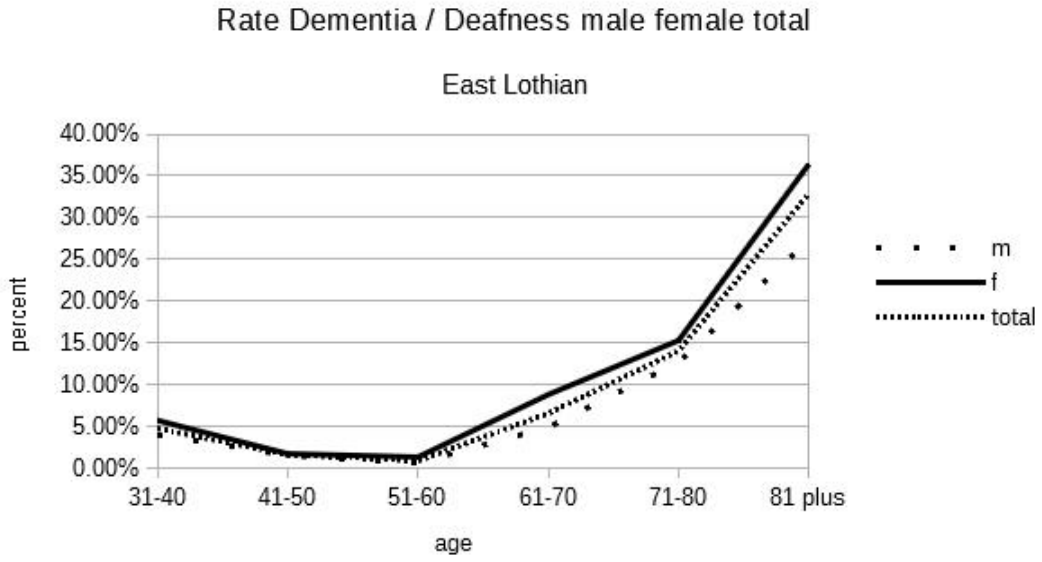
7.2.11 East Lothian

From April 2018 to March 2019 East Lothian had a dementia to deaf ratio of 9.32% and a 0.98% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1086 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 12 on page 30. It is notable that the relationship between deafness and dementia is not linear in East Lothian with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in East Lothian 2018-2038 can be seen in table 13 on page 30.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	12	88	384	485	**2018**
Female	0	0	0	10	110	882	1003	
Male	0	0	1	10	111	571	693	**2028**
Female	0	0	0	13	137	1148	1298	
Male	0	0	1	14	142	801	958	**2038**
Female	0	0	0	12	175	1543	1731	

Table 13: Estimated and projected prevalence rate of deafness and dementia in East Lothian 2018-2038

Figure 12: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for East Lothian



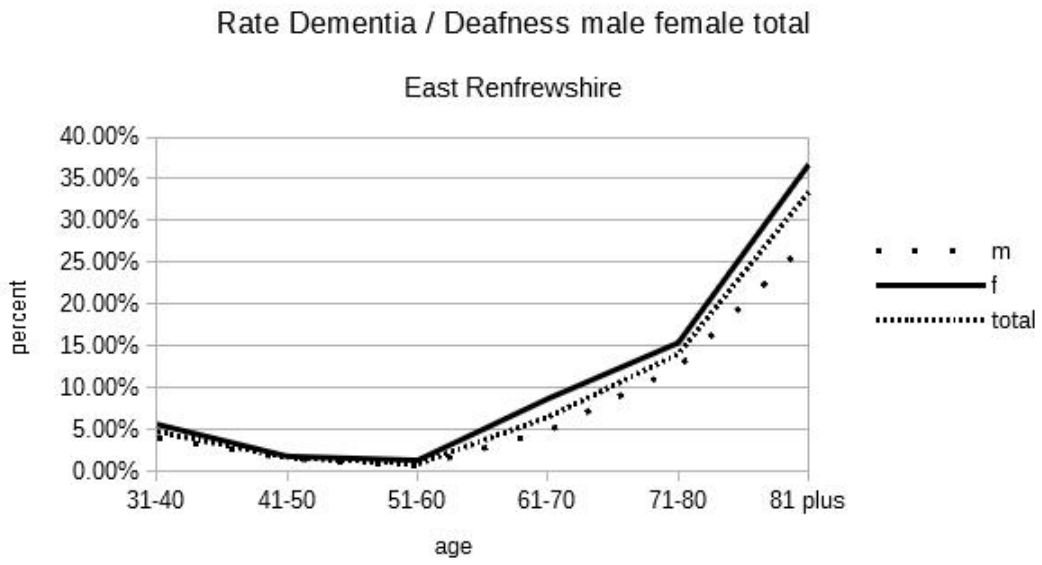
7.2.12 East Renfrewshire

From April 2018 to March 2019 East Renfrewshire had a dementia to deaf ratio of 6.92% and a 0.68% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 744 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 13 on page 31. It is notable that the relationship between deafness and dementia is not linear in East Renfrewshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in East Renfrewshire 2018-2038 can be seen in table 14 on page 31.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	10	72	380	463	**2018**
Female	0	0	0	9	97	968	1075	
Male	0	0	0	8	88	523	619	**2028**
Female	0	0	0	10	116	1215	1342	
Male	0	0	0	10	101	727	839	**2038**
Female	0	0	0	9	137	1596	1742	

Table 14: Estimated and projected prevalence rate of deafness and dementia in East Renfrewshire 2018-2038

Figure 13: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for East Renfrewshire



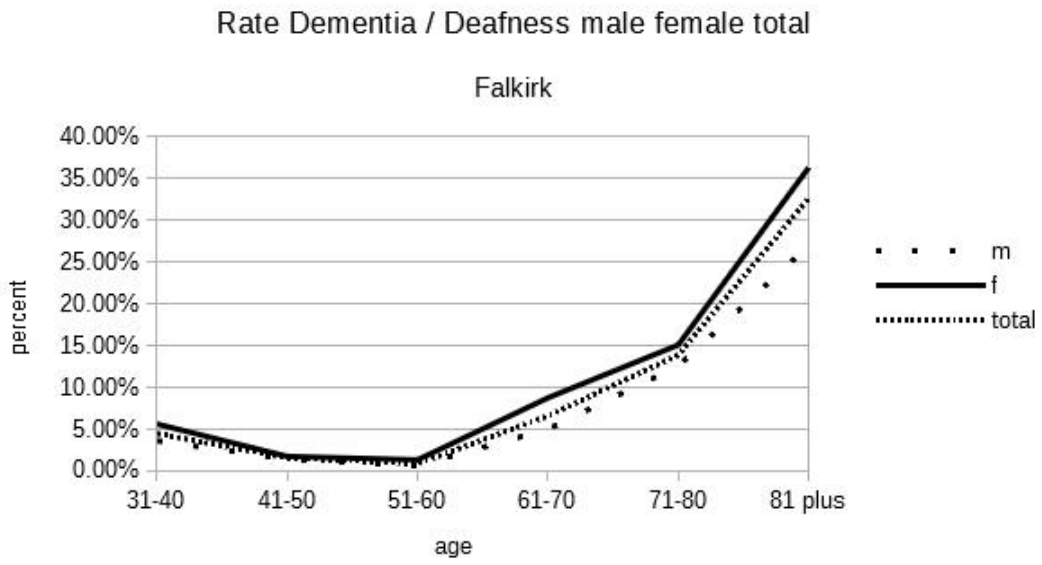
7.2.13 Falkirk

From April 2018 to March 2019 Falkirk had a dementia to deaf ratio of 7.24% and a 0.79% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1200 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 14 on page 32. It is notable that the relationship between deafness and dementia is not linear in Falkirk with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Falkirk 2018-2038 can be seen in table 15 on page 32.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	17	125	532	676	**2018**
Female	0	0	0	15	153	1187	1355	
Male	0	0	1	15	151	770	937	**2028**
Female	0	0	0	18	183	1508	1709	
Male	0	0	1	21	194	1038	1255	**2038**
Female	0	0	0	18	227	1943	2189	

Table 15: Estimated and projected prevalence rate of deafness and dementia in Falkirk 2018-2038

Figure 14: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Falkirk



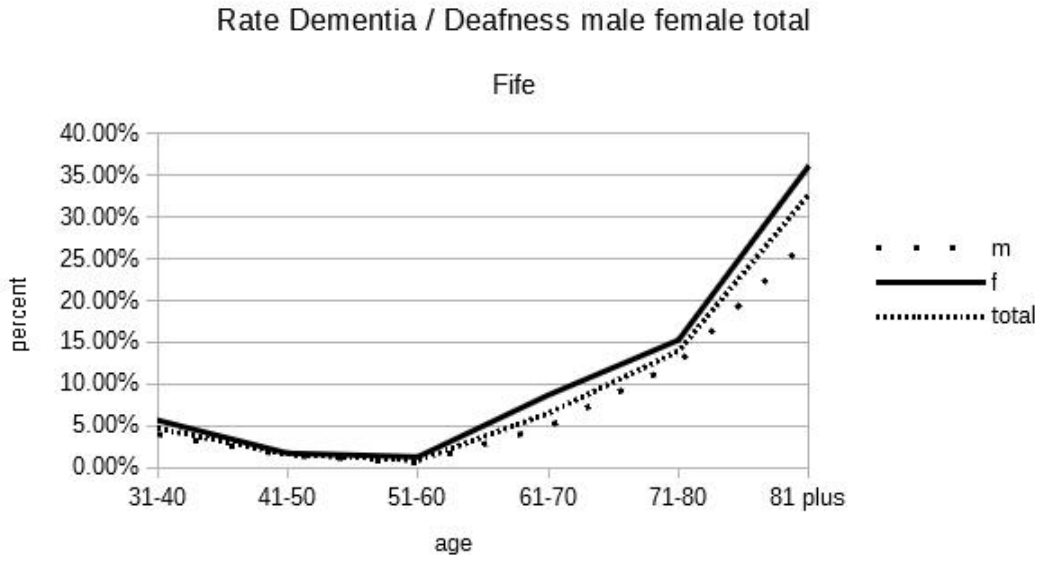
7.2.14 Fife

From April 2018 to March 2019 Fife had a dementia to deaf ratio of 7.68% and a 0.82% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 3142 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 15 on page 33. It is notable that the relationship between deafness and dementia is not linear in Fife with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Fife 2018-2038 can be seen in table 16 on page 33.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	1	2	43	322	1340	1707	**2018**
Female	0	1	1	36	384	3076	3497	
Male	0	1	2	33	380	2015	2430	**2028**
Female	0	1	1	42	451	3939	4433	
Male	0	1	2	44	453	2651	3151	**2038**
Female	0	1	1	38	533	4960	5532	

Table 16: Estimated and projected prevalence rate of deafness and dementia in Fife 2018-2038

Figure 15: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Fife



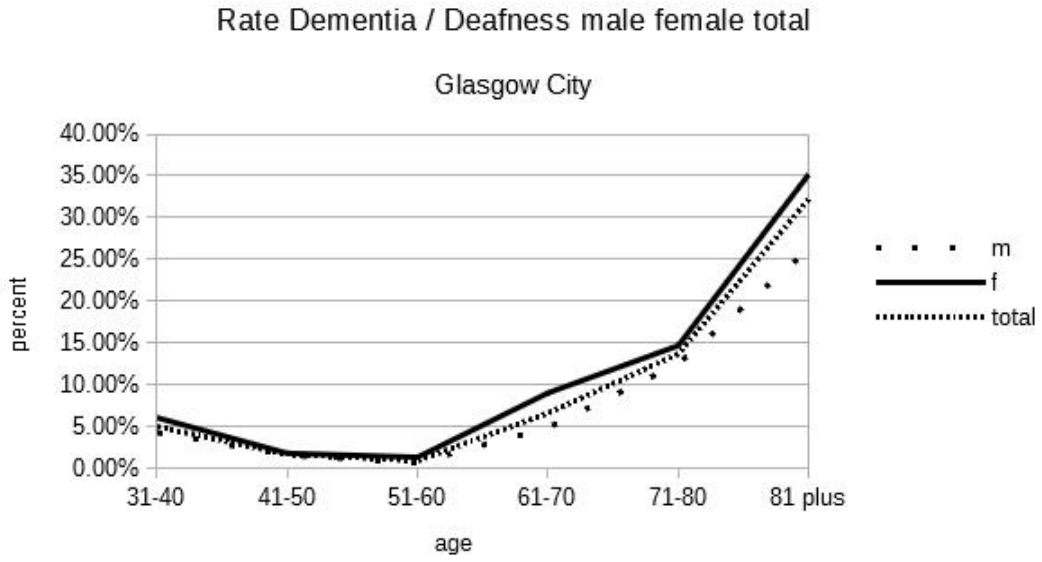
7.2.15 Glasgow City

From April 2018 to March 2019 Glasgow City had a dementia to deaf ratio of 7.92% and a 0.54% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 3959 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 16 on page 34. It is notable that the relationship between deafness and dementia is not linear in Glasgow City with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Glasgow City 2018-2038 can be seen in table 17 on page 34.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	1	1	3	52	317	1381	1755	**2018**
Female	0	1	1	43	427	4068	4541	
Male	1	1	2	43	397	1565	2009	**2028**
Female	0	1	1	57	489	3846	4395	
Male	1	1	3	59	518	2162	2743	**2038**
Female	0	1	1	51	664	4730	5447	

Table 17: Estimated and projected prevalence rate of deafness and dementia in Glasgow City 2018-2038

Figure 16: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Glasgow City



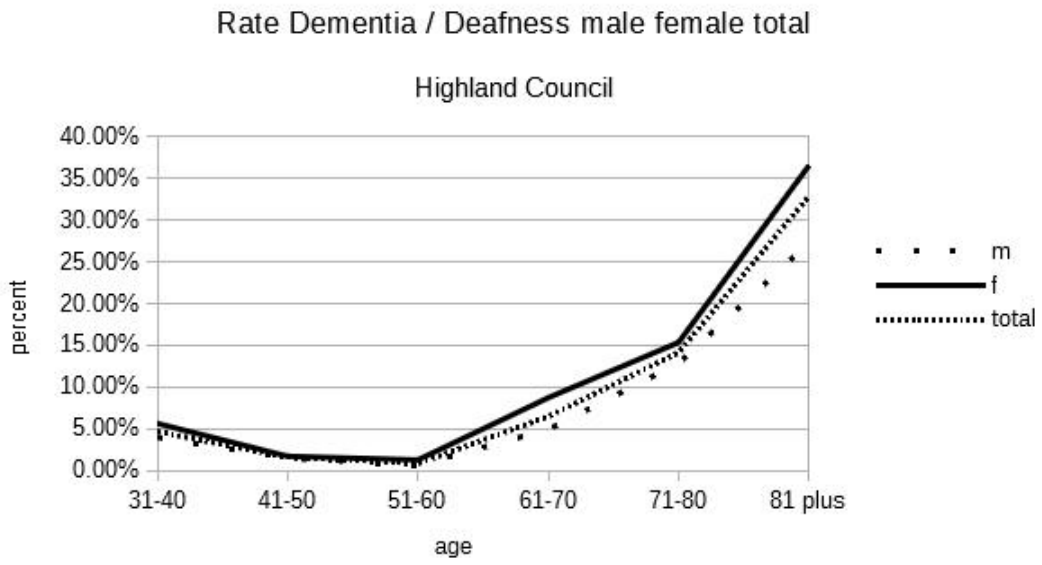
7.2.16 Highland

From April 2018 to March 2019 Highland Council had a dementia to deaf ratio of 8.69% and a 0.92% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 2225 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 17 on page 35. It is notable that the relationship between deafness and dementia is not linear in Highland Council with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Highland Council 2018-2038 can be seen in table 18 on page 35.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	14	217	944	1176	**2018**
Female	0	0	1	25	259	2087	2372	
Male	0	0	1	23	269	1424	1718	**2028**
Female	0	0	1	28	311	2808	3148	
Male	0	0	1	29	309	1980	2320	**2038**
Female	0	0	1	25	359	3681	4066	

Table 18: Estimated and projected prevalence rate of deafness and dementia in Highland Council 2018-2038

Figure 17: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Highland Council



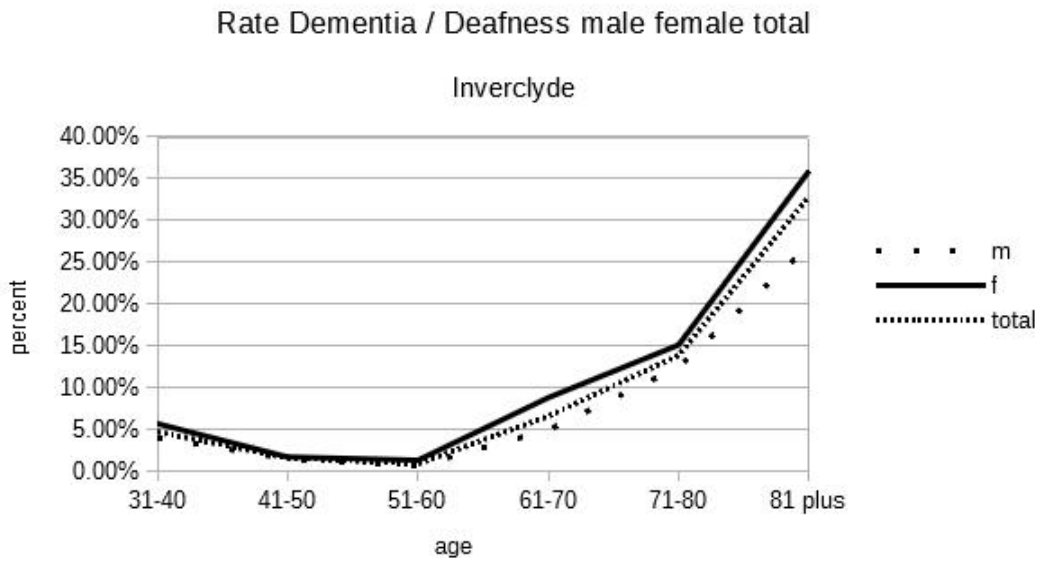
7.2.17 Inverclyde

From April 2018 to March 2019 Inverclyde had a dementia to deaf ratio of 8.03% and a 0.90% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 731 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 18 on page 36. It is notable that the relationship between deafness and dementia is not linear in Inverclyde with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Inverclyde 2018-2038 can be seen in table 19 on page 36.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	9	65	281	356	**2018**
Female	0	0	0	8	84	776	868	
Male	0	0	0	7	75	386	469	**2028**
Female	0	0	0	10	95	862	967	
Male	0	0	0	8	95	502	605	**2038**
Female	0	0	0	8	117	1061	1185	

Table 19: Estimated and projected prevalence rate of deafness and dementia in Inverclyde 2018-2038

Figure 18: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Inverclyde



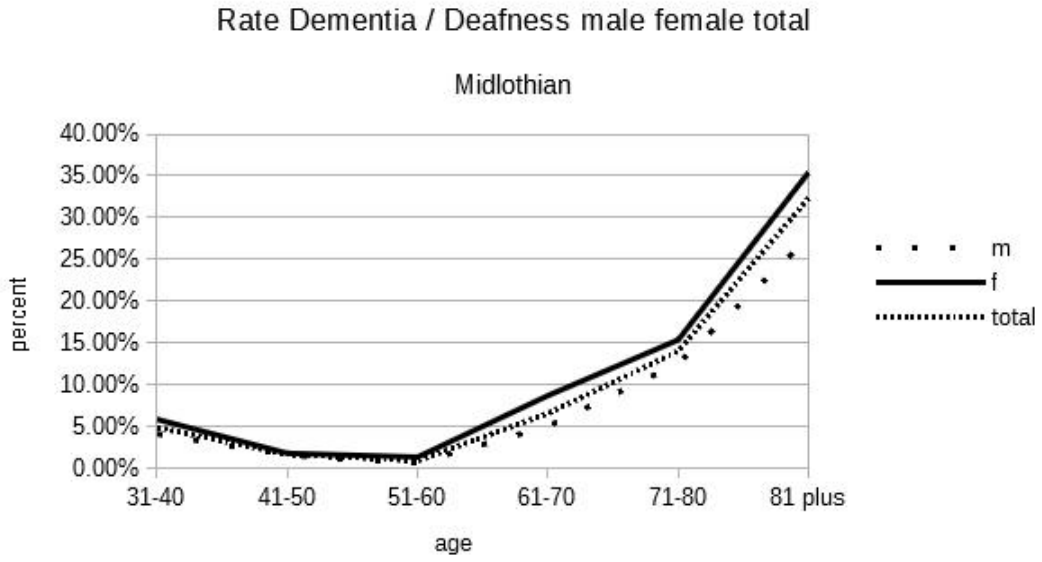
7.2.18 Midlothian

From April 2018 to March 2019 Midlothian had a dementia to deaf ratio of 10.20% and a 0.98% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 941 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 19 on page 37. It is notable that the relationship between deafness and dementia is not linear in Midlothian with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Midlothian 2018-2038 can be seen in table 20 on page 37.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	10	71	287	369	**2018**
Female	0	0	0	8	88	643	740	
Male	0	0	0	8	88	449	546	**2028**
Female	0	0	0	10	107	852	970	
Male	0	0	0	11	107	627	747	**2038**
Female	0	0	0	10	130	1093	1234	

Table 20: Estimated and projected prevalence rate of deafness and dementia in Midlothian 2018-2038

Figure 19: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Midlothian



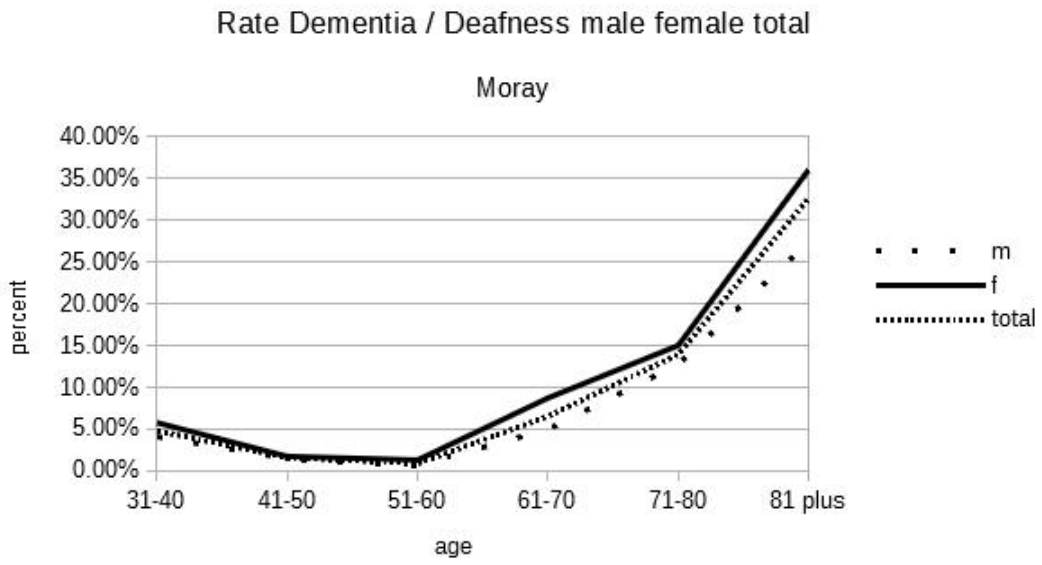
7.2.19 Moray

From April 2018 to March 2019 Moray had a dementia to deaf ratio of 6.49% and a 0.77% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 722 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 20 on page 38. It is notable that the relationship between deafness and dementia is not linear in Moray with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Moray 2018-2038 can be seen in table 21 on page 38.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	11	86	386	483	**2018**
Female	0	0	0	9	104	854	968	
Male	0	0	0	9	104	579	693	**2028**
Female	0	0	0	11	122	1116	1250	
Male	0	0	0	13	129	790	933	**2038**
Female	0	0	0	10	145	1443	1599	

Table 21: Estimated and projected prevalence rate of deafness and dementia in Moray 2018-2038

Figure 20: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Moray



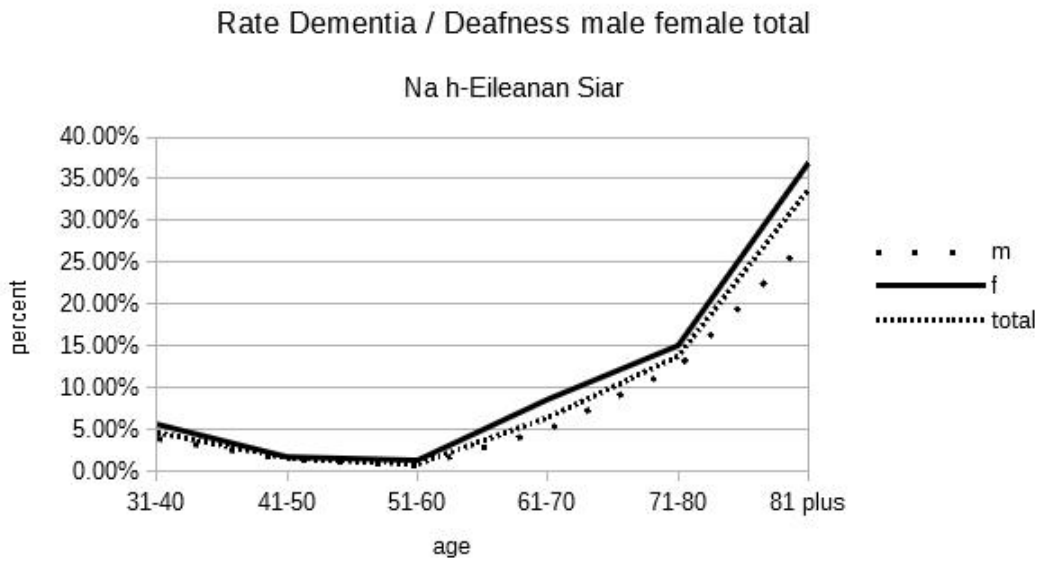
7.2.20 Na h-Eileanan Siar

From April 2018 to March 2019 Na h-Eileanan Siar had a dementia to deaf ratio of 8.45% and a 1.13% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 304 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 21 on page 39. It is notable that the relationship between deafness and dementia is not linear in Na h-Eileanan Siar with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Na h-Eileanan Siar 2018-2038 can be seen in table 22 on page 39.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	4	28	116	149	**2018**
Female	0	0	0	3	34	313	349	
Male	0	0	0	3	32	170	204	**2028**
Female	0	0	0	3	36	373	413	
Male	0	0	0	3	34	213	250	**2038**
Female	0	0	0	3	37	451	491	

Table 22: Estimated and projected prevalence rate of deafness and dementia in Na h-Eileanan Siar 2018-2038

Figure 21: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Na h-Eileanan Siar



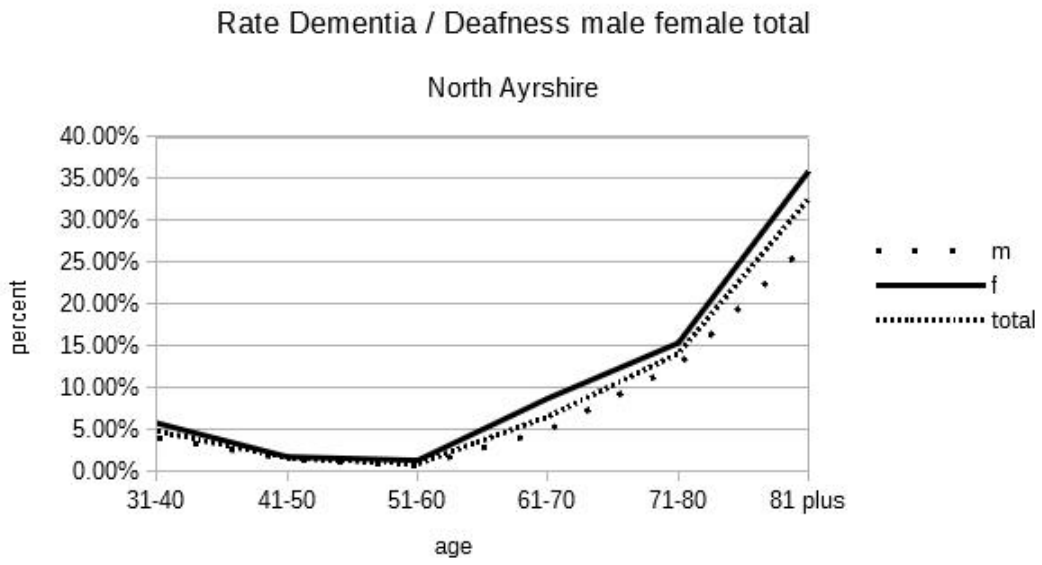
7.2.21 North Ayrshire

From April 2018 to March 2019 North Ayrshire had a dementia to deaf ratio of 5.03% and a 0.59% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 801 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 22 on page 40. It is notable that the relationship between deafness and dementia is not linear in North Ayrshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in North Ayrshire 2018-2038 can be seen in table 23 on page 40.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	17	125	510	653	**2018**
Female	0	0	0	15	158	1189	1362	
Male	0	0	1	13	143	755	912	**2028**
Female	0	0	0	17	179	1522	1719	
Male	0	0	0	15	165	984	1165	**2038**
Female	0	0	0	15	213	1883	2111	

Table 23: Estimated and projected prevalence rate of deafness and dementia in North Ayrshire 2018-2038

Figure 22: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for North Ayrshire



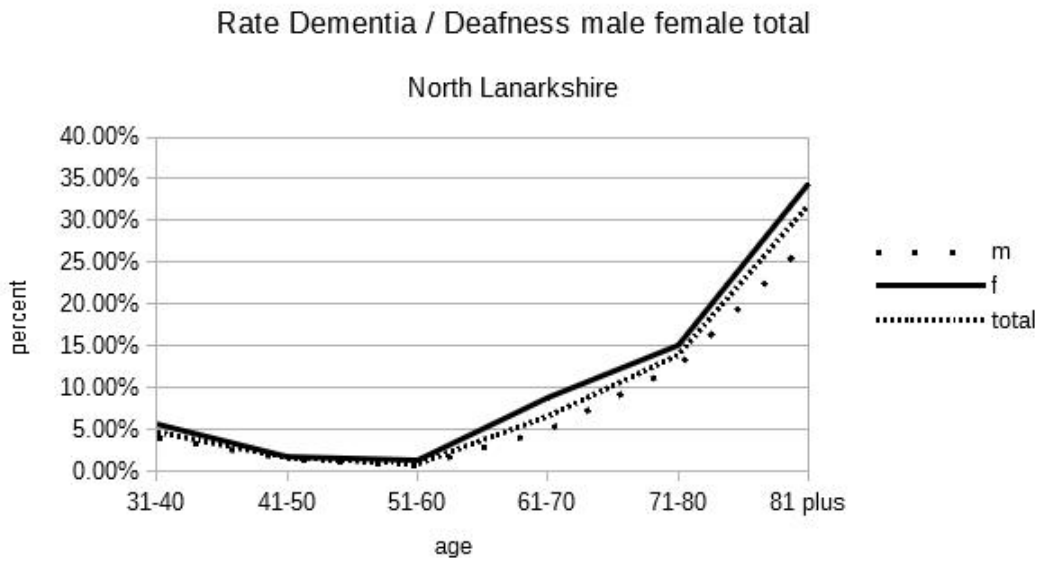
7.2.22 North Lanarkshire

From April 2018 to March 2019 North Lanarkshire had a dementia to deaf ratio of 7.39% and a 0.69% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 2385 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 23 on page 41. It is notable that the relationship between deafness and dementia is not linear in North Lanarkshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in North Lanarkshire 2018-2038 can be seen in table 24 on page 41.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	1	2	35	236	900	1174	**2018**
Female	0	1	1	30	307	2221	2560	
Male	0	1	2	29	288	1303	1623	**2028**
Female	0	1	1	37	364	2634	3037	
Male	0	1	1	39	367	1779	2187	**2038**
Female	0	1	1	35	461	3355	3852	

Table 24: Estimated and projected prevalence rate of deafness and dementia in North Lanarkshire 2018-2038

Figure 23: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for North Lanarkshire



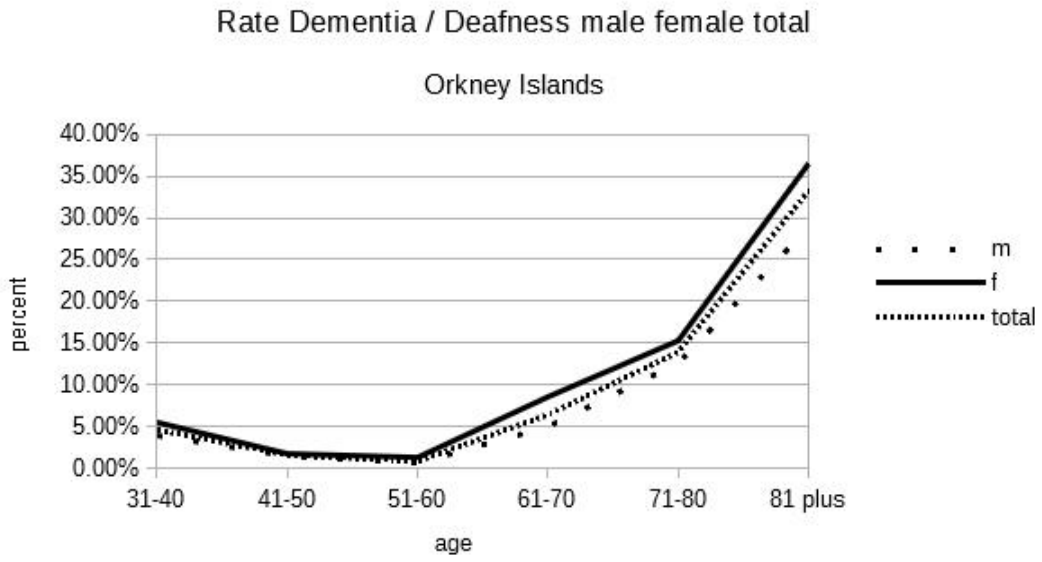
7.2.23 Orkney Islands

From April 2018 to March 2019 the Orkney Islands had a dementia to deaf ratio of 5.16% and a 0.66% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 142 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 24 on page 42. It is notable that the relationship between deafness and dementia is not linear in the Orkney Islands with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in the Orkney Islands 2018-2038 can be seen in table 25 on page 42.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	3	24	98	125	**2018**
Female	0	0	0	2	26	193	221	
Male	0	0	0	2	26	168	197	**2028**
Female	0	0	0	3	29	265	296	
Male	0	0	0	3	32	218	253	**2038**
Female	0	0	0	2	33	329	364	

Table 25: Estimated and projected prevalence rate of deafness and dementia in the Orkney Islands 2018-2038

Figure 24: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Orkney Islands



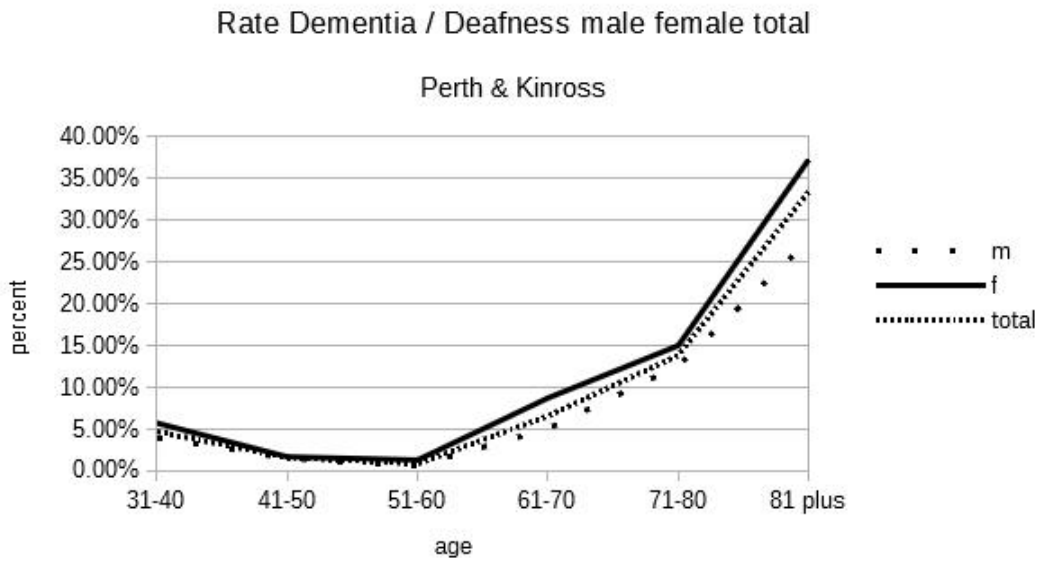
7.2.24 Perth & Kinross

From April 2018 to March 2019 Perth & Kinross had a dementia to deaf ratio of 7.97% and a 1.02% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1516 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 25 on page 43. It is notable that the relationship between deafness and dementia is not linear in Perth & Kinross with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Perth & Kinross 2018-2038 can be seen in table 26 on page 43.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	19	146	713	880	**2018**
Female	0	0	0	16	174	1551	1742	
Male	0	0	1	15	179	1056	1252	**2028**
Female	0	0	0	18	202	2017	2238	
Male	0	0	1	20	215	1466	1701	**2038**
Female	0	0	0	17	238	2561	2817	

Table 26: Estimated and projected prevalence rate of deafness and dementia in Perth & Kinross 2018-2038

Figure 25: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Perth & Kinross



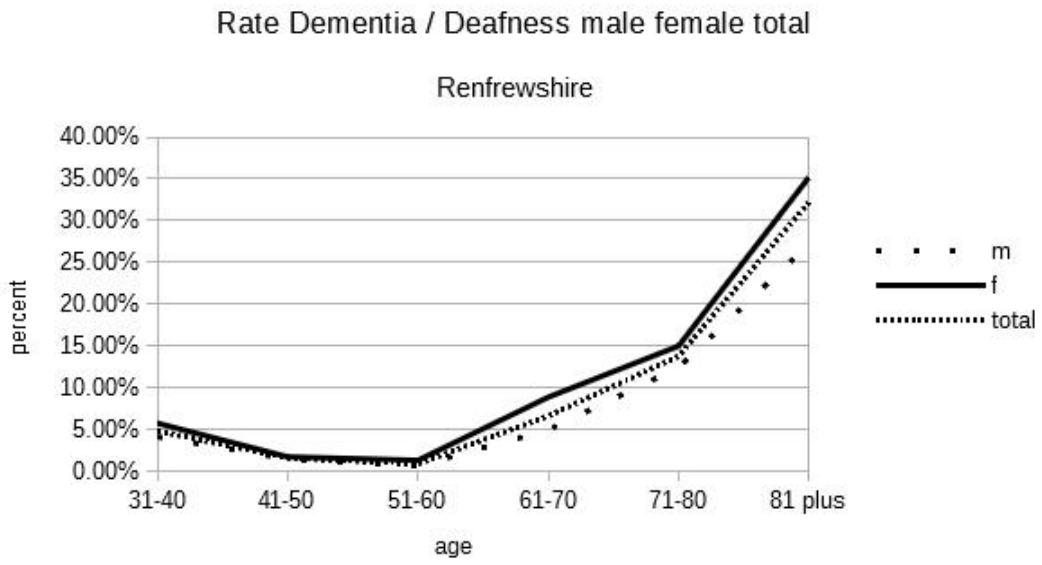
7.2.25 Renfrewshire

From April 2018 to March 2019 Renfrewshire had a dementia to deaf ratio of 7.10% and a 0.72% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1324 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 26 on page 44. It is notable that the relationship between deafness and dementia is not linear in Renfrewshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Renfrewshire 2018-2038 can be seen in table 27 on page 44.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	19	137	591	748	**2018**
Female	0	0	1	16	172	1440	1630	
Male	0	0	1	16	162	818	997	**2028**
Female	0	0	0	20	200	1641	1862	
Male	0	0	1	19	208	1082	1311	**2038**
Female	0	0	0	17	255	2045	2318	

Table 27: Estimated and projected prevalence rate of deafness and dementia in Renfrewshire 2018-2038

Figure 26: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Renfrewshire



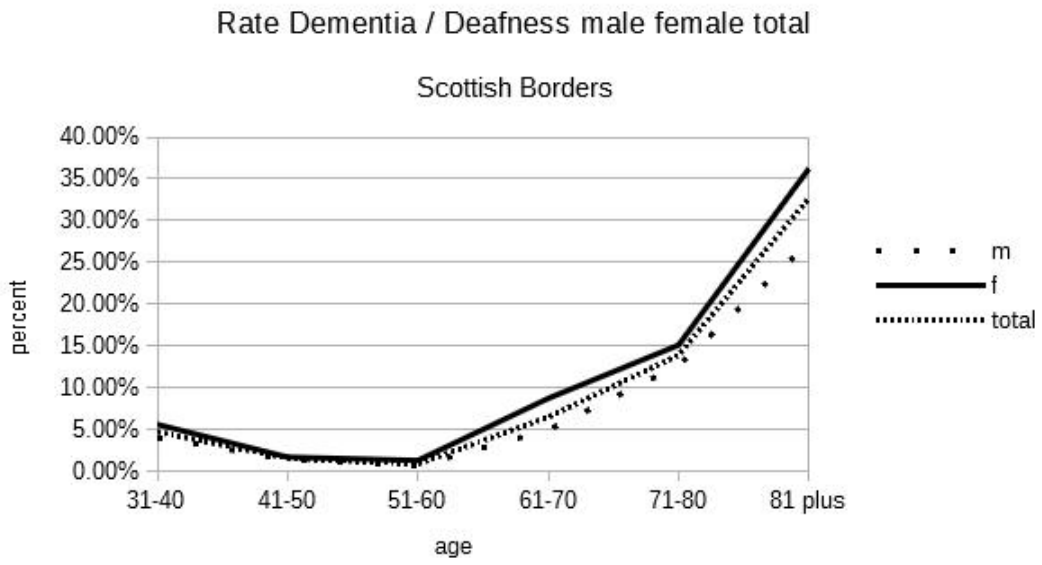
7.2.26 Scottish Borders

From April 2018 to March 2019 the Scottish Borders had a dementia to deaf ratio of 7.22% and a 0.90% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1067 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 27 on page 45. It is notable that the relationship between deafness and dementia is not linear in Scottish Borders with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in the Scottish Borders 2018-2038 can be seen in table 28 on page 45.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	16	122	500	639	**2018**
Female	0	0	0	13	143	1100	1256	
Male	0	0	1	12	148	742	903	**2028**
Female	0	0	0	15	164	1412	1591	
Male	0	0	0	16	174	990	1181	**2038**
Female	0	0	0	13	194	1732	1940	

Table 28: Estimated and projected prevalence rate of deafness and dementia in the Scottish Borders 2018-2038

Figure 27: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for the Scottish Borders



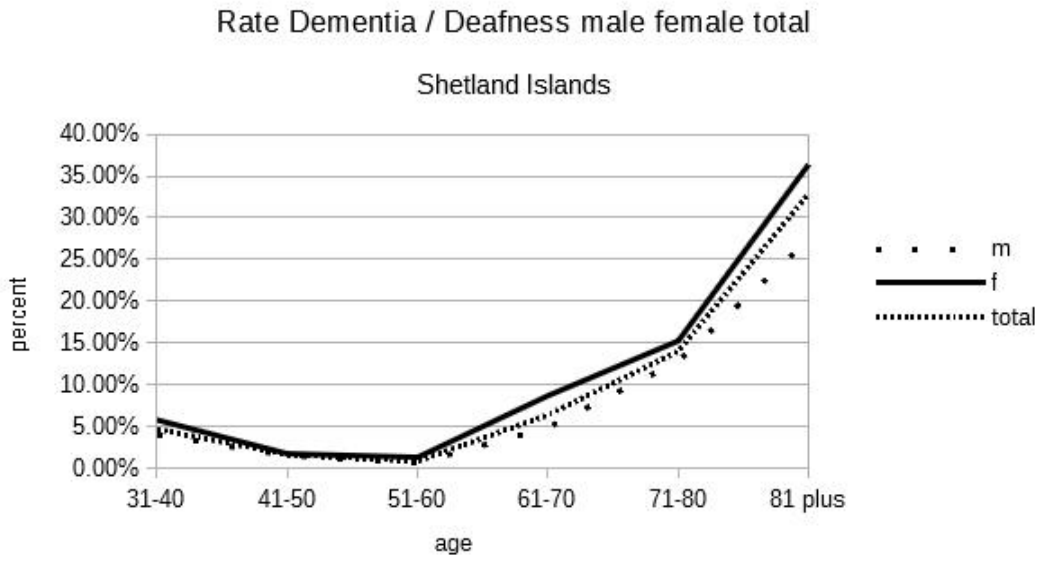
7.2.27 Shetland Islands

From April 2018 to March 2019 the Shetland Islands had a dementia to deaf ratio of 6.04% and a 0.83% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 150 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 28 on page 46. It is notable that the relationship between deafness and dementia is not linear in the Shetland Islands with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in the Shetland Islands 2018-2038 can be seen in table 29 on page 46.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	3	21	77	101	**2018**
Female	0	0	0	2	22	173	197	
Male	0	0	0	2	24	125	151	**2028**
Female	0	0	0	2	27	233	263	
Male	0	0	0	3	28	164	195	**2038**
Female	0	0	0	2	29	308	339	

Table 29: Estimated and projected prevalence rate of deafness and dementia in the Shetland Islands 2018-2038

Figure 28: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for the Shetland Islands



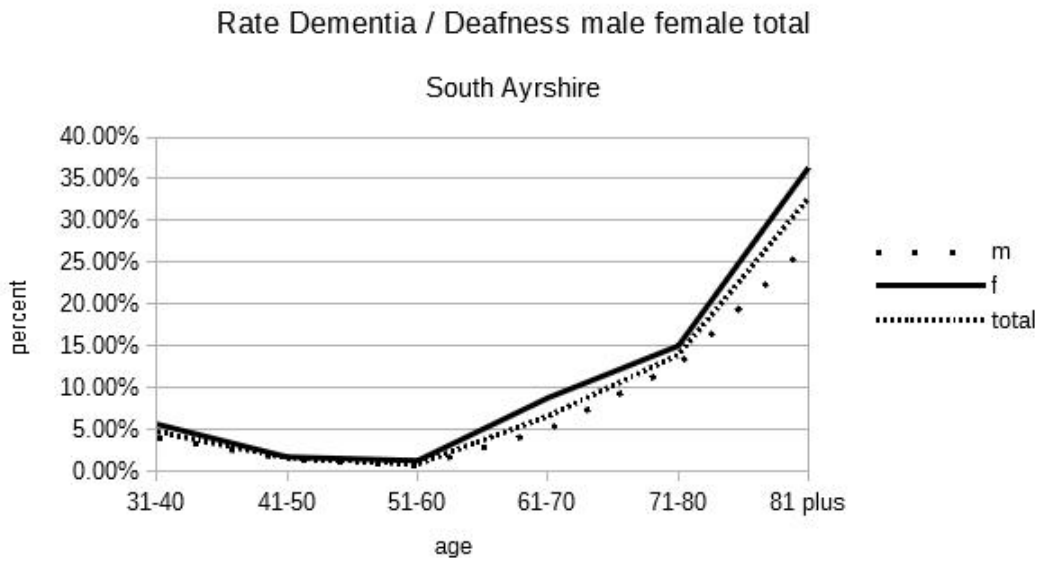
7.2.28 South Ayrshire

From April 2018 to March 2019 South Ayrshire had a dementia to deaf ratio of 6.74% and a 0.88% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1004 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 29 on page 47. It is notable that the relationship between deafness and dementia is not linear in South Ayrshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in South Ayrshire 2018-2038 can be seen in table 30 on page 47.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	15	118	537	671	**2018**
Female	0	0	0	13	145	1199	1357	
Male	0	0	0	11	140	784	936	**2028**
Female	0	0	0	19	167	1498	1684	
Male	0	0	0	13	158	1045	1218	**2038**
Female	0	0	0	12	195	1853	2061	

Table 30: Estimated and projected prevalence rate of deafness and dementia in South Ayrshire 2018-2038

Figure 29: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for South Ayrshire



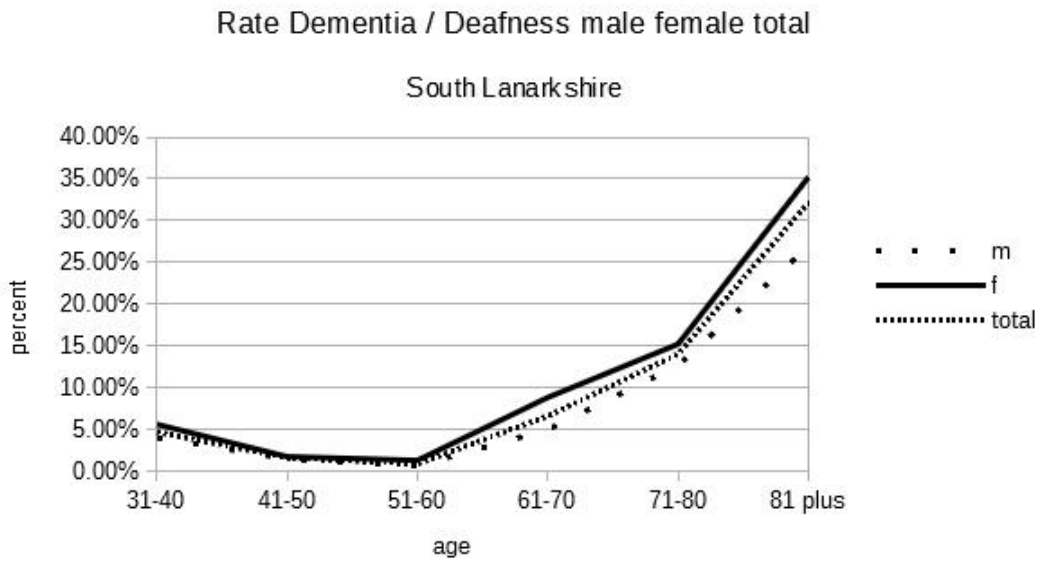
7.2.29 South Lanarkshire

From April 2018 to March 2019 South Lanarkshire had a dementia to deaf ratio of 8.02% and a 0.88% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 2937 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 30 on page 48. It is notable that the relationship between deafness and dementia is not linear in South Lanarkshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in South Lanarkshire 2018-2038 can be seen in table 31 on page 48.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	1	0	86	249	1046	1381	**2018**
Female	0	1	1	31	314	2578	2924	
Male	0	1	2	29	314	1500	1846	**2028**
Female	0	1	1	37	379	3041	3459	
Male	0	1	1	39	387	2113	2541	**2038**
Female	0	1	1	33	466	3939	4440	

Table 31: Estimated and projected prevalence rate of deafness and dementia in South Lanarkshire 2018-2038

Figure 30: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for South Lanarkshire



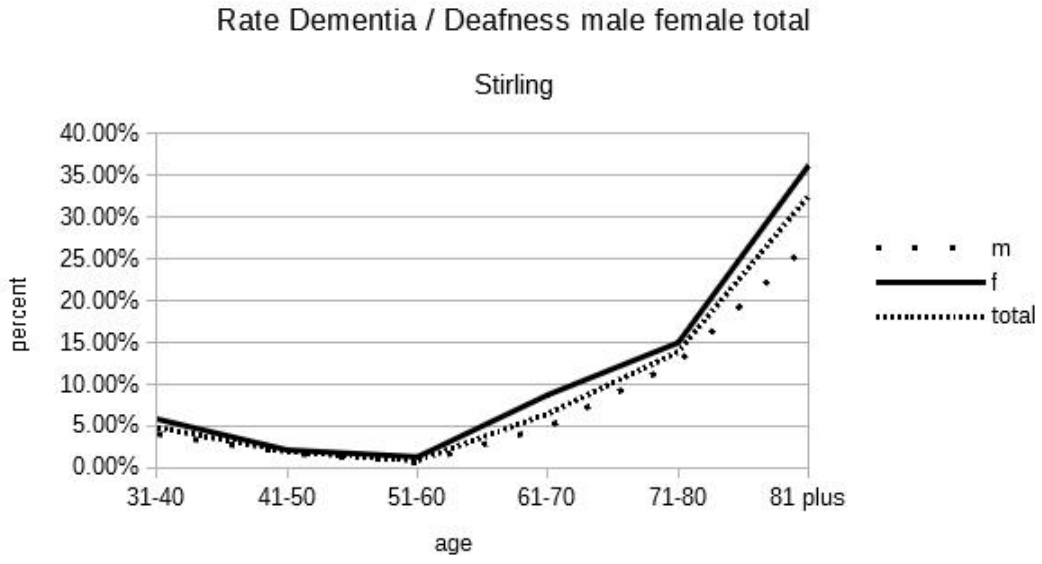
7.2.30 Stirling

From April 2018 to March 2019 Stirling had a dementia to deaf ratio of 5.84% and a 0.75% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 573 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 31 on page 49. It is notable that the relationship between deafness and dementia is not linear in Stirling with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in Stirling 2018-2038 can be seen in table 32 on page 49.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	10	74	330	415	**2018**
Female	0	0	0	8	93	762	863	
Male	0	0	0	8	87	466	562	**2028**
Female	0	0	0	10	101	972	1084	
Male	0	0	0	11	110	622	744	**2038**
Female	0	0	0	10	129	1174	1313	

Table 32: Estimated and projected prevalence rate of deafness and dementia in Stirling 2018-2038

Figure 31: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for Stirling



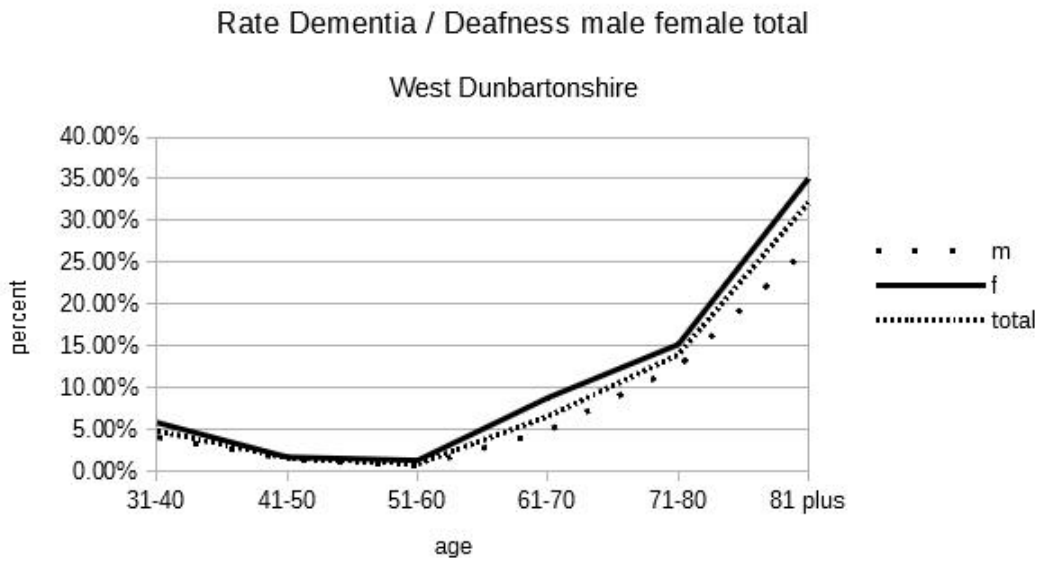
7.2.31 West Dunbartonshire

From April 2018 to March 2019 West Dunbartonshire had a dementia to deaf ratio of 8.03% and a 0.77% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 737 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 32 on page 50. It is notable that the relationship between deafness and dementia is not linear in West Dunbartonshire with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in West Dunbartonshire 2018-2038 can be seen in table 33 on page 50.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	0	10	64	260	335	**2018**
Female	0	0	0	9	85	704	798	
Male	0	0	0	8	80	346	435	**2028**
Female	0	0	0	11	102	772	885	
Male	0	0	0	9	100	473	583	**2038**
Female	0	0	0	9	127	999	1135	

Table 33: Estimated and projected prevalence rate of deafness and dementia in West Dunbartonshire 2018-2038

Figure 32: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for West Dunbartonshire



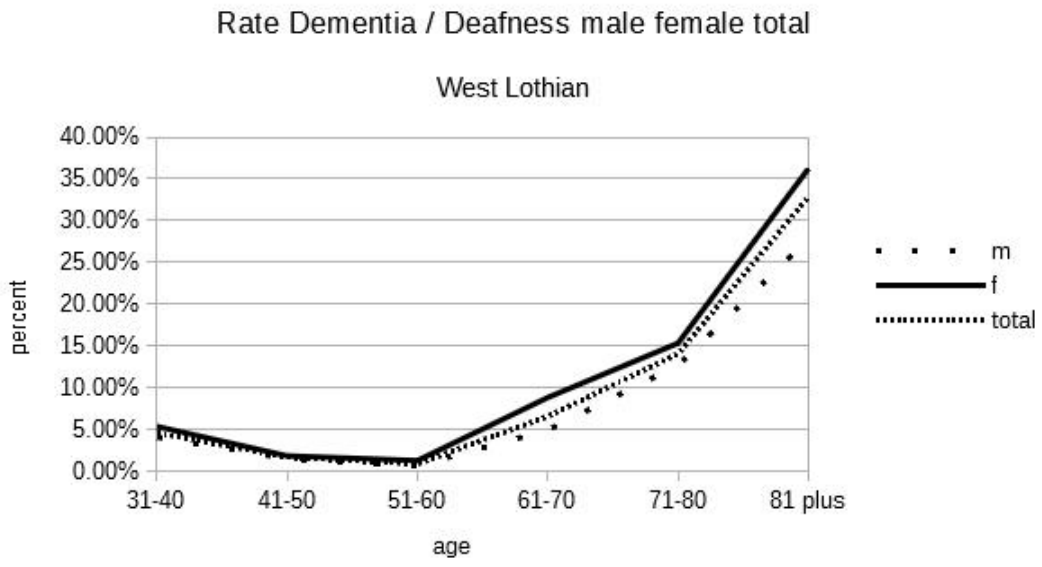
7.2.32 West Lothian

From April 2018 to March 2019 West Lothian had a dementia to deaf ratio of 7.11% and a 0.66% dementia rate per 100 patients based on SPIRE data. SPIRE records from April 2018 to March 2019 show 1186 dementia cases. The rate between dementia and deafness based on Alzheimer Scotland figures can be seen in figure 33 on page 51. It is notable that the relationship between deafness and dementia is not linear in West Lothian with the lowest between 51 and 60 years. The estimated and projected prevalence rate of deafness and dementia in West Lothian 2018-2038 can be seen in table 34 on page 51.

age	31-40	41-50	51-60	61-70	71-80	81 plus	Total	Year
Male	0	0	1	18	128	482	630	**2018**
Female	0	0	0	15	156	1054	1226	
Male	0	0	1	16	158	802	977	**2028**
Female	0	0	0	19	187	1518	1726	
Male	0	0	1	22	211	1114	1349	**2038**
Female	0	0	0	19	242	1976	2237	

Table 34: Estimated and projected prevalence rate of deafness and dementia in West Lothian 2018-2038

Figure 33: The proportion (rate) of people having both deafness and dementia in 2018 in relation to age-groups for West Lothian



8 Conclusion

Since 2017, when the Lancet Commission classified hearing loss as one of the 9 modifiable factors for dementia, the body of research in the field of hearing loss and dementia has greatly increased. However, there is a noticeable gap in research focussing on Scotland. This project has been a scoping exercise to establish base line numbers and future projections to enable planning both at Local Authority and national levels. To supplement this data, it has also been possible to gather some initial views on current provision from members of the Audiology profession. Further qualitative research in this respect would be beneficial. In 2014, Wright et al carried out a UK-wide exploratory survey of the Audiology profession. The researchers define their work as:'one of the first papers to explore audiologists, views and experiences of working with people with dementia' (Wright et al. 2014). As with this project, they argued their study brought to the fore 'interesting points worthy of further research using both quantitative and qualitative methods'.

Moreover, the effectiveness of hearing aids and other interventions has been the subject of intensive research and future international collaborative studies seek to further refine this.

In addition, and alongside this, current research and future research proposals highlight the importance of understanding the link between hearing loss, social isolation and how this influences cognitive decline and dementia in older adults. Social isolation was identified as a later life modifying factor for dementia in Livingston et al's work (Livingston et al. 2017) and as such, establishing the connection with hearing loss has the potential to positively impact two of the 9 factors. The current UK-wide COVID-19 Lockdown has brought social isolation into the mainstream of society and the devastating affects this isolation has on people with dementia has been openly discussed in the media (The Guardian 2020). Those with hearing loss are potentially at risk of social isolation; those with hearing loss and dementia are doubly susceptible and with the limited social interaction during Lockdown increases the risk even further.

It is important to consider deafness within the spectrum of the 4 pillars discussed within this report. Although hearing loss has overarching barriers to inclusion, each pillar has specific barriers that need to highlighted and addressed. Further qualitative research involving people with dementia and their carers is essential to inform service planning. As Murphy et al argue, "it is essential to understand the experience of living with dementia from the perspective of the person with dementia so that services can be appropriately constructed" (Murphy et al. 2014).

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