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# Noise Exposure, Hearing Protection and Noise Injury in Young Adult Farmers

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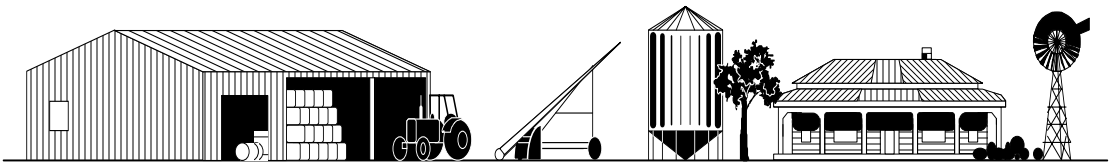

**Australian Centre for Agricultural Health and Safety**

# NOISE EXPOSURE, HEARING PROTECTION AND NOISE INJURY IN YOUNG ADULT FARMERS

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# FOREWORD

Noise injury is a significant problem for the farming community, both in terms of its impact on farmers hearing and on their social life, often isolating farmers from their peers and families. Farmsafe Australia has as one of its four goals, the reduction in the number of young people on farms (aged 15-24 years) with noise induced hearing loss (noise injury) by 15%.

This report provides a detailed examination of the hearing of young adults who have participated in a hearing screening program at an agricultural field day over the last eight years. The finding for young adults that noise injury is both evident and increases is a significant concern for the farming community. This baseline information will allow Farmsafe Australia to progress its programs aimed at reducing noise injury in the farming community and reflect on its success in years to come.

The Rural Industries Research and Development Corporation and the Australian Centre for Agricultural Health and Safety are both proud members of Farmsafe Australia, and have taken responsibility for improving the data and evidence base that the industry is using to guide its injury prevention programs.

The project was funded by the research and development corporations contributing to the Farm Health and Safety Joint Venture - Rural Industries Research and Development Corporation, Grains Research and Development Corporation, Australian Wool Innovation Limited, Cotton Research and Development Corporation, Sugar Research and Development Corporation and Meat and Livestock Australia. The Joint Venture is committed to improving the well-being and productivity of the agricultural industries through careful investment in research and development programs that assist industry to manage Occupational Health and Safety risks in a cost effective way.

This report, a new addition to RIRDC's diverse range of over 700 research publications, forms part of our Human Capital, Communications and Information Systems R&D program, which aims to enhance human capital and facilitate innovation in rural industries and communities.

Most of our publications are available for viewing, downloading or purchasing online through our website:

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Simon Hearn
Managing Director
Rural Industries Research and Development Corporation

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The authors would like to thank all the people who have been involved in agricultural field days screening since its inception in the late 1980's, both those who have provided their services to help conduct the program and those who have participated in the program.

# ABBREVIATIONS

| | |
|---|---|
| ACAHS | Australian Centre for Agricultural Health and Safety |
| FSA | Farmsafe Australia |
| NEC | Not Elsewhere Classified |
| NSW | New South Wales |
| PHP | Personal Hearing Protection |
| RIRDC | Rural Industries Research and Development Corporation |

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A hearing loss caused by noise exposure is progressive painless, and permanent. It can lead to social isolation by limiting verbal interaction so that social interaction becomes an ordeal rather than a pleasurable event. It can also lead to increased risk of occupational injury due to sensory impairment. The effects are also magnified in rural areas where access to health services may be limited.

To address the issue of hearing loss in the farming community, Nurse Audiometrists in the New England area of NSW, introduced hearing screenings in 1985 for farmers at agricultural field days. By the end of 2001 over 9,000 farmers had had their hearing screened through this program at an agricultural field day in NSW, Queensland, Victoria or Tasmania.

The results from the screenings since 1994 have been collated by the Australian Centre for Agricultural Health and Safety and included information about hearing difficulties, noise exposure, tinnitus, hearing protection usage, screening results and recommendations from the screening service. Between 1994 and 2001 6,373 people had a hearing screening at an agricultural field day. Of these 808 were young adults (aged between 15 and 24 years).

Of the 808 young adults screened at agricultural field days (mostly in NSW), 83% were males and the median age was 19 years. The industries in which the young adults were working were sheep, meat cattle, and cereal grain or a combination of these. Of these 808 young adults, 21% were full-time students and 44% were full-time farmers.

Forty three percent (43%) had had a family member or friend suggest that they may have a hearing loss, and this group's hearing was statistically worse than those who had not had anyone suggest they may have a hearing loss. Just under half (47%) of farmers had a problem hearing when background noise was present and one third (35%), had problems hearing in meetings /conservation. Again, those who self reported having hearing difficulties in these selected situations had statistically significant worse hearing than those that did not.

Young farmers are exposed to a range of noisy situations; however this was not a predictor of hearing status. Hearing protection was not worn by one quarter of the young adult farmers (in any situation). In some situations such as when using a firearm, 66% of young adult farmers did not wear any hearing protection. Tinnitus had or continues to affect 59% of young adult farmers and of those affected, 44% found it to be annoying in nature.

The average audiogram results indicated that this age group has signs of noise induced hearing loss, with 23% of right ears and 28% of left ears showing some degree of hearing loss.

The recommendations from this study are: continuation of the field day screening program in New South Wales; include the "increased use of personal hearing protection" and "reduction in the incidence of tinnitus" in young adults as performance indicators for the Farmsafe Australia Strategic Plan 2002-2007; and include questions in surveys about farm health and safety, regarding suggested hearing loss by family/friend and difficulties hearing in particular situations.

# INTRODUCTION

A hearing loss caused by noise exposure is progressive painless, and permanent. It can lead to social isolation through decreased interaction and communication. Persons with hearing loss may choose to limit verbal interactions because of frequent misunderstandings and embarrassment (Dugan & Kivett, 1994). Hearing loss has also been related to increased perception of functional decline in physical activities (Williamson, & Fried, 1996). Interaction with children in noisy playgrounds, socializing in restaurants, and conversation in noisy traffic become situations to be avoided. Social interaction becomes an ordeal rather than a pleasurable event (Orlans, 1988). To add further problems, persons with occupational hearing loss are at increased risk for further occupational injury as a result of their sensory impairment (Zwerling, et al, 1998). The effect of hearing loss is also magnified in rural areas where access to health services may be limited (McKellan, 1995).

In 1985 Nurse Audiometrists in the New England Health area of NSW started providing hearing screenings for farmers at agricultural field days. From this early work, a Farmsafe NSW - NSW Rural Hearing Conservation Strategy was developed (Farmsafe NSW, 1994). A staff training manual on how to organise and conduct a successful field day (Challinor, 1994) and a rural adjustment and management manual (Farmsafe NSW, 1994b) were also developed as extra resources to help people conducting hearing screening at field days. This work was undertaken in conjunction with the Australian Centre for Agricultural Health and Safety that became the coordinating body for information from field days and repository of results. From its inception in 1985 to the end of 2001, over 9,000 farmers had been screened at a field day and over 6,000 results have been recorded on file since 1994.

The early results from the hearing screening showed that noise injury (noise induced hearing loss) in the farming community was a major problem and as such Farmsafe Australia in their goals, targets and strategies document (Fragar, 1996) had goal 4 as "…Reduction in the number of young people on farms (aged 15-24 years) with noise induced hearing loss by 15%..." By the end of 1995 there were only 143 people aged between 15-24 years who had participated in the program. This led to a change in policy at field days, where previously the screening service had targeted all farmers, staff were now going to target farmers less than 40 years of age.

In the Midterm Review of Farmsafe Australia's goals, targets and strategies undertaken by Fragar and Franklin (2000), it was found that there was no improvement in the uptake of personal hearing protection (PHP) by the 15-24 years age group between April 1994 - September 1997 and September 1997 and November 1998. However in the 44-54 years age group the percentage of people reporting that they never wore PHP decreased from 23.6% to 16.0% between the two study periods.

While information collected at field days may be biased, in that the participants have to attend the field day and then choose to have their hearing screened, these results are similar to what others have found. Plakke and Dare (1992) in their study found that 10% of farmers aged 30 years had a hearing loss. Williams et al (2002) found that farmers and farm workers screened at agricultural field days in the Northern Yorke area of South Australia had an average hearing loss that occurred earlier and remained greater than expected compared to the normal population. They also found that hearing protection was most often worn when working on tractors (no cab) (73%), followed by working with chainsaws (69%) and least often worn when working in a pig shed (80% never worn).

# AIM

The aim of this report is to provide industry, and Farmsafe Australia in particular, with baseline measurements for young adults hearing loss, noise exposure and personal hearing protection use by:

- Reporting noise injury in young adults obtained from the current NSW hearing screening program
- Reporting current noise exposure of young adults obtained from the current NSW hearing screening program
- Reporting the use of Personal Hearing Protection of young adults obtained from the current NSW hearing screening program

# METHODS

Farmers / farm workers are invited to attend a hearing screening provided free of charge at field days by Nurse Audiometrists through signage outside the site day site, to have their hearing screened free of charge by Nurse Audiometrists. The people who attended the hearing screening are self-selected on the basis of identifying themselves as;

1) field day attendee,
2) interested in having their hearing screened and
3) farmers / farm workers.

Farmers / farm workers approach the location where the screening is being conducted, where trained staff assists the farmer / farm worker to answer a questionnaire prior to having their hearing screened. Information about age, primary industry of work, noise exposure, hearing difficulties, tinnitus and hearing protection usage is recorded. The ANZCIS (ABS, 1993) was used to define the industry of the person.

Nurse audiometrists and other trained in audiometric techniques perform the hearing screening and record hearing performance. The screening is conducted in an on-site booth using a screening audiometer and using the Hughson Westlake Technique to establish hearing thresholds. Detail on the protocols and equipment used to collect the hearing screening information can be found in the manual "A Staff Training Manual for the New South Wales Rural Hearing Conservation Program: How to Organise a Successful Field Day" (Challinor, 1994)

Hearing loss from noise is defined where the average of the results for the 4K and 6K frequencies (Hertz) is more than 20 decibels (dB). A mild hearing loss is between 20 and 40 decibels, a moderate hearing loss is between 40 and 60 decibels, a severe hearing loss is between 60 and 80 decibels and a profound hearing loss is greater than 80 decibels. A differentiation between other hearing loss and noise induced hearing loss (NIHL) was that those with NIHL had a marked dip in their hearing at either 3K, 4K or 6K with improvements at 6K or 8K as apposed to a continual decrease.

The person conducting the screening completes the audiogram and directs the farmer / farm worker to another staff member who explains the results, provides noise injury prevention education, referral advice, or any other recommendations as appropriate. The farmer / farm worker is then provided with a copy of their hearing screening results and any recommendations.

Once the results and recommendations have been recorded, the questionnaire is then sent to the Co-ordinating Nurse Audiometrist for checking prior to the results being entered into a database. Analyses of the results are undertaken on SPSS ™. Between 1 January 1994 and 31 December 2001 there were 6,373 people who had a hearing screening at a field day in New South Wales, Queensland, Victoria or Tasmania. Of these 17 did not give an age and 808 12.7%) were aged between 15 and 24 years inclusive.

# RESULTS

There have been 808 young adults (aged between 15 and 24 years), who have had their hearing screened, as part of the Farmsafe Hearing Conservation Program, at an agricultural field day in New South Wales (NSW), Queensland or Tasmania between 1 January 1994 and 31 December 2001.

## Location

There were 26 sites, 24 in NSW and one each in Tasmania and Queensland where hearing screenings was undertaken, which included young adults from over 230 different towns. Half of all young adults screened, were at site 2380 (Gunnedah Ag-Quip Field Day). Other major sites where young adults were screened include 2800 (Orange, Orange Field Day) and 2421 (Paterson, Tocal Field Day) (Table 1).

**Table 1 Site Location of hearing screening, 15-24 year olds, agricultural fields days 1994-2001**

| Site Postcode | Site Location | Number of Screenings | Percent |
|---|---|---|---|
| 2312 | Nabiac | 7 | 0.9 |
| 2337 | Scone | 15 | 1.9 |
| 2340 | Tamworth | 6 | 0.7 |
| 2350 | Armidale | 21 | 2.6 |
| 2370 | Glen Innes | 4 | 0.5 |
| 2380 | Gunnedah | 404 | 50.0 |
| 2390 | Narrabri | 10 | 1.2 |
| 2400 | Moree | 7 | 0.9 |
| 2421 | Paterson | 93 | 11.5 |
| 2430 | Taree | 19 | 2.4 |
| 2477 | Alstonville | 9 | 1.1 |
| 2586 | Boorowa | 5 | 0.6 |
| 2594 | Young | 11 | 1.4 |
| 2658 | Henty | 23 | 2.8 |
| 2703 | Yanco | 16 | 2.0 |
| 2710 | Deniliquin | 5 | 0.6 |
| 2716 | Jerilderie | 5 | 0.6 |
| 2800 | Orange | 98 | 12.1 |
| 2825 | Nyngan | 4 | 0.5 |
| 2850 | Mudgee | 21 | 2.6 |
| 4390 | Goondiwindi Qld | 12 | 1.5 |
| 7292 | Westwood Tas | 5 | 0.6 |
| Other | | 8 | 1.0 |
| **Total** | | **808** | **100.0** |

## Age and Gender

Of the 808 young adults, who had their hearing screened at an agricultural field day between 1 January 1994 and 31 December 2001, 672 (83.2%) were males and 136 (16.8%) were females. The median age was 19 years, with 17 years of age (121; 15.0%) and 23 years of age (100; 12.4%) being the most common ages (Figure 1).

**Figure 1. Age of person screened, agricultural field days 1994-2001 (N=808)**


## Industry young adult was working in at time of screening

The industry groups based on the Australian and New Zealand Industrial Classifications (ABS, 1993), were used to collect information about what industry the young adult was working in at the time of their screening. The most common industries were meat cattle – cereal grains (18.1%), meat cattle (14.6%), sheep-meat cattle (13.0%), and sheep-cereal grains (12.5%) (Table 2).

**Table 2. Industry young adult was working in at the time of screening, agricultural field days 1994-2001**

| Agricultural Industry | Frequency | Percent |
|---|---|---|
| Poultry Meat | 7 | 0.9 |
| Grapes | 4 | 0.5 |
| Plantation Fruit | 5 | 0.6 |
| Orchard Other Fruit | 14 | 1.7 |
| Potatoes | 4 | 0.5 |
| Other Cereal Grains | 7 | 0.9 |
| Cereal Grains | 55 | 6.8 |
| Sheep/Cereal Grains | 101 | 12.5 |
| Meat Cattle/Cereal Grains | 146 | 18.1 |
| Sheep/Meat Cattle | 105 | 13.0 |
| Sheep | 38 | 4.7 |
| Meat Cattle | 118 | 14.6 |
| Milk Cattle | 40 | 5.0 |
| Pigs | 8 | 1.0 |
| Sugar Cane | 4 | 0.5 |
| Peanuts | 2 | 0.2 |
| Cotton | 36 | 4.5 |
| Nurseries | 5 | 0.6 |
| Agriculture NEC | 109 | 13.5 |
| **Total** | **808** | **100.0** |

## Employment status at time of screening

There were 48 young adults who were both working on farm and studying, of these only one was engaged in both full-time farm work and part time study, 43 were full time student and part time farmers. There were 352 young adults who were farming only, and 173 who were studying only (Table 3).

**Table 3. Employment status of young adult at the time of screening, agricultural field days 1994-2001**

| Farmer | Student | | | Total | Percent |
|---|---|---|---|---|---|
| | Full-time | Part-time | Non Student | | |
| Full-time | 0 | 1 | 352 | 353 | 43.7 |
| Part-time | 43 | 4 | 220 | 267 | 33.0 |
| Non-Farmer | 173 | 13 | 2 | 188 | 23.3 |
| **Total** | **216** | **18** | **574** | **808** | **100.0** |

## History of hearing loss in family / Hearing loss suggested by others

Of the 808 young adults screened, 719 (89.0%) did not have any family history of hearing loss, 88 (10.9%) did report a family history of deafness and the family history of one was unknown.

There was a slight increase in the number of young adults where someone had suggested that they had a hearing loss, however this was not statistically significant. There were 349 (43.2%) young adults where someone had suggested that they may have a hearing loss (Table 4).

**Table 4. Reported - suggested hearing loss by age, agricultural field days 1994-2001**

| Age | Suggested hearing loss | | Total | Percentage |
|---|---|---|---|---|
| | Yes | No | | |
| 15 | 28 | 41 | 69 | 8.6 |
| 16 | 22 | 61 | 83 | 10.3 |
| 17 | 49 | 71 | 120 | 14.9 |
| 18 | 35 | 46 | 81 | 10.0 |
| 19 | 40 | 49 | 89 | 11.0 |
| 20 | 25 | 38 | 63 | 7.8 |
| 21 | 26 | 26 | 52 | 6.5 |
| 22 | 39 | 39 | 78 | 9.7 |
| 23 | 47 | 53 | 100 | 12.4 |
| 24 | 38 | 33 | 71 | 8.8 |
| **Total** | **349** | **457** | **806** | **100.0** |

Note: There was one person whose age was unknown and one person where it was unknown if someone had suggested they may have a hearing loss.

## Difficulties hearing in selected situations

Of the young adults who had their hearing screened at an agricultural field day, the most common situations where they had problems hearing were; when background noise was present (46.9%); in meetings or having a conversation (34.8%); in the working environment (23.6%); and listening to the television (21.7%). By contrast very few young adults had difficulties hearing the telephone (17.5%) and hearing in a classroom (10.0%) (Table 5).

**Table 5. Difficulties hearing in selected situations, agricultural field days 1994-2001**

| Hearing Situation | Yes | Percent | No | Percent | Total |
|---|---|---|---|---|---|
| Television | 175 | 21.7 | 633 | 78.3 | 808 |
| Telephone | 141 | 17.5 | 667 | 82.5 | 808 |
| Meeting / conversation | 281 | 34.8 | 527 | 65.2 | 808 |
| Working environment | 191 | 23.6 | 617 | 76.4 | 808 |
| Classroom* | 47 | 10.0 | 424 | 90.0 | 471 |
| Background Noise | 379 | 46.9 | 429 | 53.1 | 808 |

* This situation was added to the questionnaire in 1997

## Noise Exposure

Young adults screened at agricultural field days were asked if they were exposed to noise emitted from common situations on a farm. The majority were exposed to all types of situations surveyed, with workshop tools (89.9%), chainsaws (82.4%) and firearms (78.7%) being the most common situations. Recreational activities were also a common situation where young adults were exposed to noise. The particular activities tended to be listening to loud music at concerts, in pubs, on the stereo or through walkmans; motorbike riding; and using firearms (Table 6).

**Table 6. Noise exposure in selected situations, agricultural field days 1994-2001**

| Noise exposure | Yes | Percentage | No | Percentage | Total |
|---|---|---|---|---|---|
| Tractor (no cabin) | 598 | 74.0 | 210 | 26.0 | 808 |
| Firearms | 636 | 78.7 | 172 | 21.3 | 808 |
| Chainsaw | 666 | 82.4 | 142 | 17.6 | 808 |
| Workshop tools | 726 | 89.9 | 82 | 10.1 | 808 |
| Heavy Machinery | 491 | 60.8 | 317 | 39.2 | 808 |
| Tractor (cabin) | 480 | 59.4 | 328 | 40.6 | 808 |
| Recreation | 477 | 59.0 | 331 | 41.0 | 808 |

Of the young adults screened, 96 indicated that they had previously been employed in noisy industries, and 16 had been in the armed forces which included school cadets.

## Hearing protection

In 1997 the hearing questionnaire was changed to include information about how often a person wore hearing protection. From 1 January 1997 to 31 December 2001 there were 543 young adults who undertook screening at an agricultural field day. Young adults were more likely to always wear hearing protection when operating a chainsaw (31.5%), and in other situations, 61.5%. Using firearms (65.7%) and workshop tools (54.2%) were the activities where young farmers were least likely to wear hearing protection (Table 7).

**Table 7. Frequency of wearing hearing protection in selected noisy situations, young adults, agricultural field days 1997-2001[#]**

| Noisy Situation | Always | Percent | Sometimes | Percent | Never | Percent | Total |
|---|---|---|---|---|---|---|---|
| Driving a tractor without a cabin | 87 | 22.8 | 130 | 34.0 | 165 | 43.2 | 382 |
| Operating a chainsaw | 123 | 31.5 | 98 | 25.1 | 170 | 43.5 | 391 |
| Using firearms | 36 | 9.7 | 92 | 24.7 | 245 | 65.7 | 373 |
| Using workshop tools | 76 | 17.8 | 119 | 27.9 | 231 | 54.2 | 426 |
| Other situations | 118 | 61.5 | 53 | 27.6 | 21 | 10.9 | 192 |

[#] This question was added in 1997 and a possible 543 young adults had the opportunity to answer this question.

The type of hearing protection most commonly used by young adults was earmuffs (42.3%), either an earmuff or plug (15.1%) and ear plugs (12.1%). No hearing protection worn was (24.8%) (Table 8).

**Table 8. Type of hearing protection used, young adults, agricultural field days 1994-2001**

| Protectors used | Frequency | Percent |
|---|---|---|
| Nil | 200 | 24.8 |
| Ear Plugs | 98 | 12.1 |
| Ear Muffs | 342 | 42.3 |
| Either | 122 | 15.1 |
| Both | 46 | 5.7 |
| **Total** | **808** | **100.0** |

## Tinnitus

Tinnitus (noises in the ears or head when there is no external noise) is a symptom of noise exposure. There were 335 young farmers who said that they did not have tinnitus. The remainder had tinnitus in either one or both ears. The majority (54.0%) of young adults said it did not have any affect on their life and 43.8% said it was an annoyance (Table 9).

**Table 9. Ears affected by tinnitus, type of tinnitus and effects of tinnitus on young adults screened at agricultural field days 1994-2001**

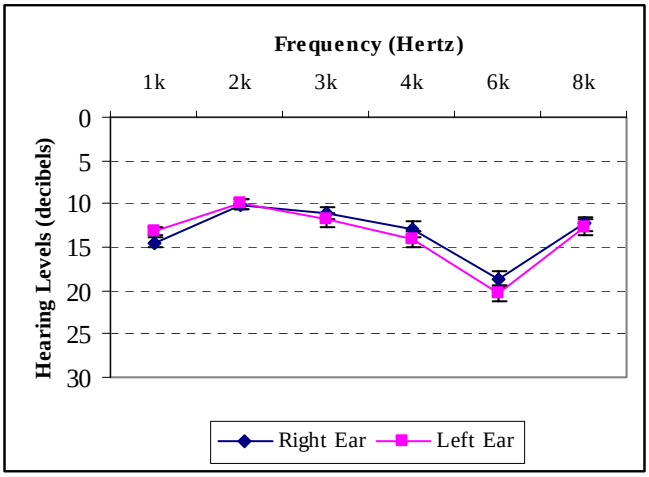
| | | Effects of tinnitus on young adult screened | | | | |
|---|---|---|---|---|---|---|
| **Ears affected** | **Type of Tinnitus** | **Nil** | **Life patterns Annoyance** | **disturbance** | **Other** | **Total** |
| Did not have tinnitus | | - | - | - | - | 335 |
| | Intermittent | * | * | - | - | 3 |
| Right | Continuous | * | * | * | - | 5 |
| | Intermittent | 35 | 12 | - | - | 47 |
| Left | Not Applicable | * | * | - | - | * |
| | Continuous | * | * | - | - | 4 |
| | Intermittent | 15 | 16 | - | - | 31 |
| Both | Not Applicable | * | * | - | - | * |
| | Continuous | 15 | 11 | - | - | 26 |
| | Intermittent | 183 | 160 | 4 | 5 | 352 |
| **Total** | | **256** | **207** | **5** | **5** | **808** |

* Number equal to or less than three have been hidden to preserve confidentiality

## Hearing Screening Results

The following series of figures examines the hearing results from the screenings conducted at agricultural field days. Figure 2 displays the overall average audiogram for the 808 young adults screened. The audiogram shows that overall the group have normal hearing with a slight hearing loss in the 4K to 6K range, which is typical of noise injury.

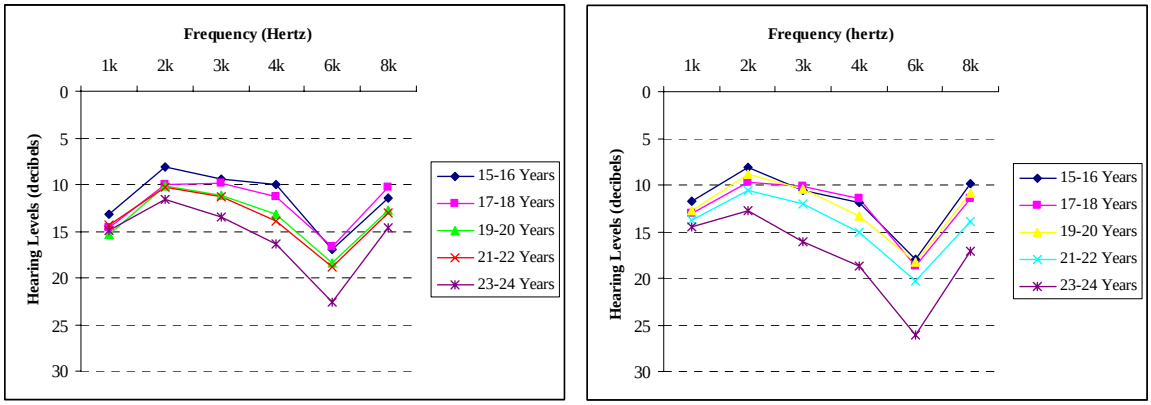
**Figure 2. Mean hearing screening results of young adults, agricultural field days 1994-2001**




The hearing status by two-year age groups clearly shows a decline in hearing performance as the person ages. By the time the young adult reaches the age of 23 years they have mild hearing loss in their left ear which has the noise injury pattern (Figure 3).

**Figure 3. Hearing screening results by two-year age groups, young adults, agricultural field days 1994-2001**

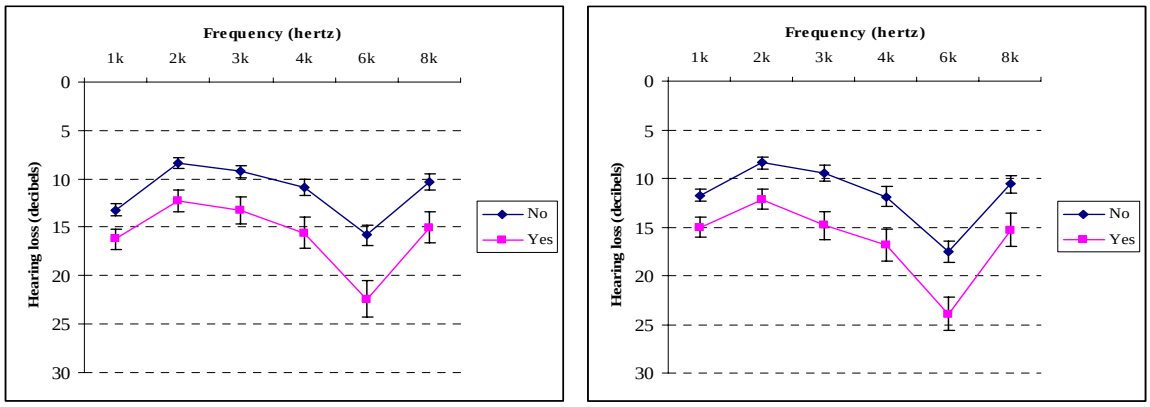
**Right Ear** **Left Ear**




An indicator of when a person may have some form of noise injury is when someone else has suggested that they may be suffering from hearing loss. Figure 4 displays the hearing results for both ears of young people who did have someone suggest that they had a hearing loss against those who did not, 95% confidence intervals were also calculated. For each frequency for young adults where it had been suggested that they had a hearing loss, they consistently had significantly ($F_{(1, 804)}$>25.8, p<0.001) worse hearing than those young adults who had not had someone suggest that they may have a hearing loss.

**Figure 4. Hearing screening results by hearing loss suggested by others, young adults, agricultural field days 1994-2001**

**Right Ear** **Left Ear**




When the audiogram results are averaged for people who responded that they had difficultly hearing in a particular situation as opposed to people who did not have difficulty hearing in the same situations, the group who had identified as having a hearing difficulty had a statistically significant difference in average hearing results ($F_{(1,806)}$>6, p<0.01) (Figure 5). Exposure to different noisy situations was not a predictor of hearing loss.

Although the average results for each age group found a significant decrease in the average audiogram results, the individual results found that overall 23.0% of young adults had from mild to severe hearing loss in their right ear and 27.9% in their left ear (Table 10).

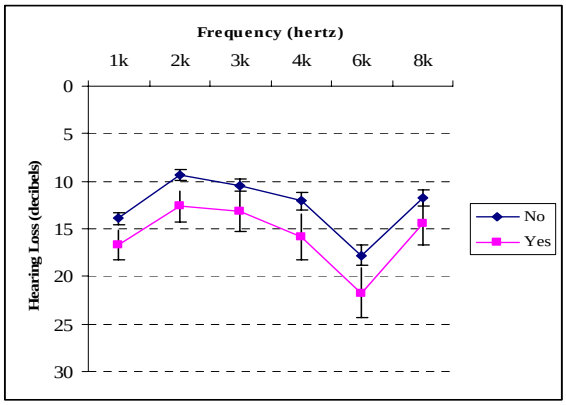
**Table 10 Hearing results interpretation, young adults, agricultural field days 1994-2001**

| Age Group | Right Ear | | | | | | | | Left Ear | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Normal | | Mild NIHL | | Moderate to Profound NIHL | | Other | | Normal | | Mild NIHL | | Moderate to Profound NIHL | | Other | | Total |
| | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N |
| 15-16 Years | 122 | 80.3 | 25 | 16.4 | 1 | 0.7 | 4 | 2.6 | 117 | 77.0 | 32 | 21.1 | 2 | 1.3 | 1 | 0.7 | 152 |
| 17-18 Years | 153 | 75.7 | 42 | 20.8 | 2 | 1.0 | 5 | 2.5 | 146 | 72.3 | 44 | 21.8 | 4 | 2.0 | 8 | 4.0 | 202 |
| 19-20 Years | 115 | 75.7 | 25 | 16.4 | 8 | 5.3 | 4 | 2.6 | 113 | 74.3 | 31 | 20.4 | 6 | 3.9 | 2 | 1.3 | 152 |
| 21-22 Years | 92 | 70.2 | 25 | 19.1 | 2 | 1.5 | 12 | 9.2 | 84 | 64.1 | 32 | 24.4 | 6 | 4.6 | 9 | 6.9 | 131 |
| 23-24 Years | 106 | 62.0 | 47 | 27.5 | 9 | 5.3 | 9 | 5.3 | 94 | 55.0 | 49 | 28.7 | 19 | 11.1 | 9 | 5.3 | 171 |
| **Total** | **588** | **72.8** | **164** | **20.3** | **22** | **2.7** | **34** | **4.2** | **554** | **68.6** | **188** | **23.3** | **37** | **4.6** | **29** | **3.6** | **808** |

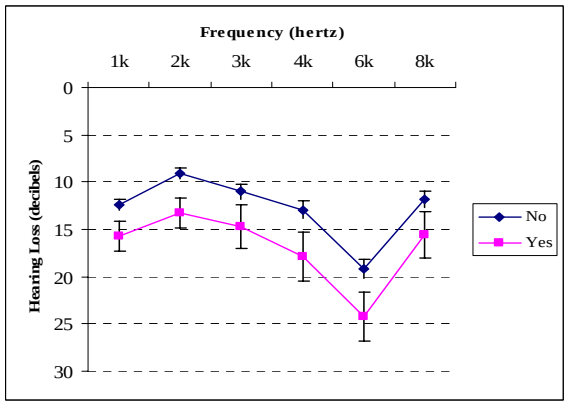
**Figure 5. Hearing screening results by difficulty hearing in selected situations, young adults, agricultural field days 1994-2001**

## A. Television

### Right Ear

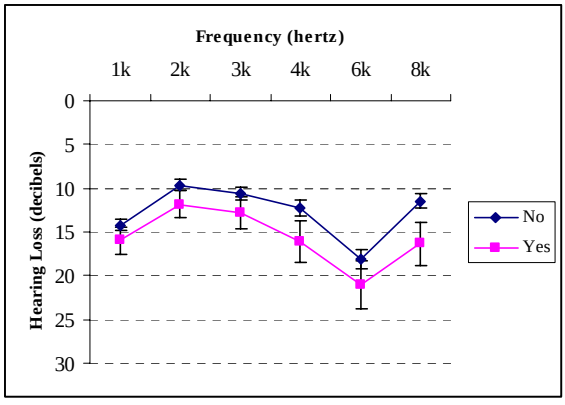



### Left Ear




## B. Telephone

### Right Ear




### Left Ear

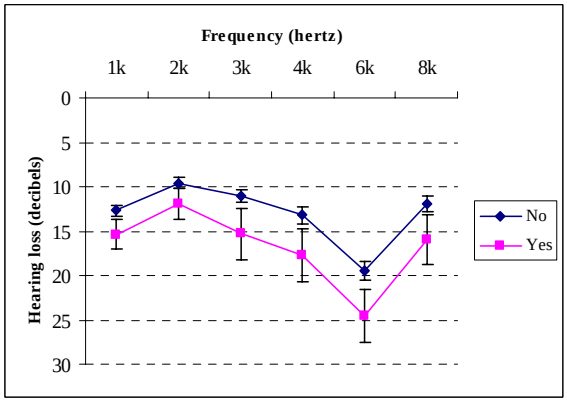
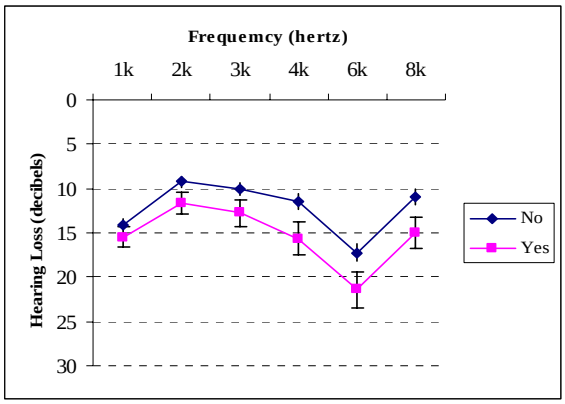


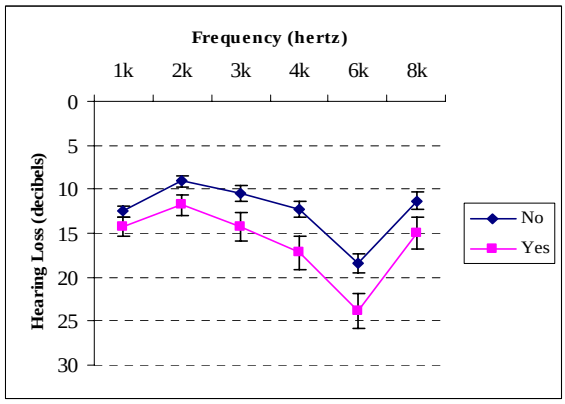
**Figure 5 Hearing screening results by difficulty hearing in selected situations, young adults, agricultural field days 1994-2001 continued.**

## C. Meeting /Conversation

### Right Ear

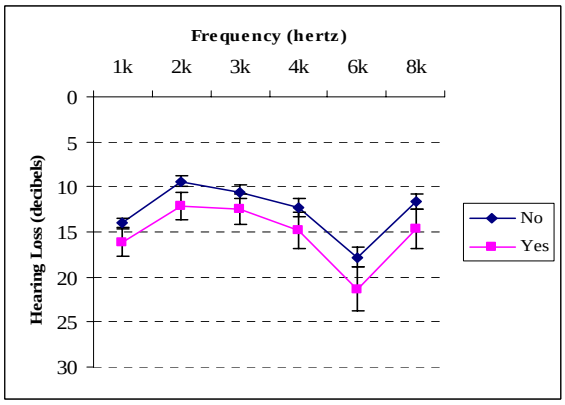



### Left Ear

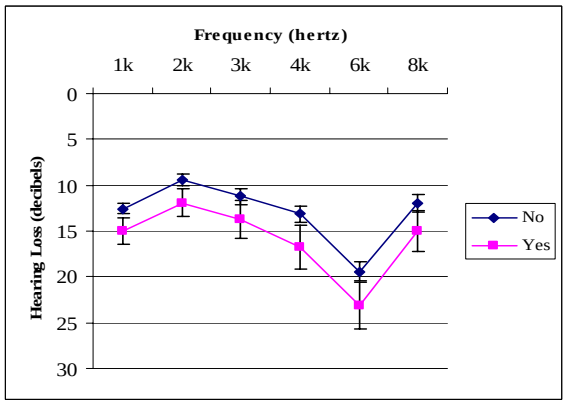



## D. Working environment

### Right Ear

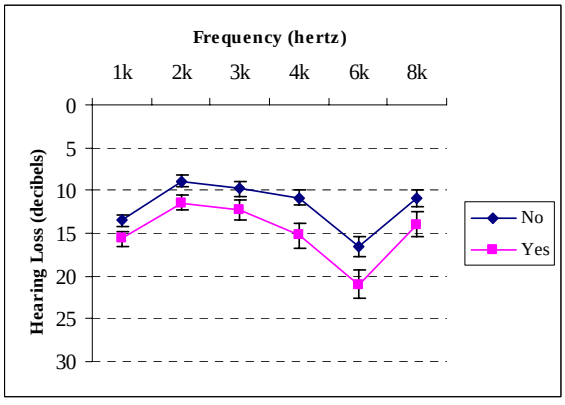



### Left Ear

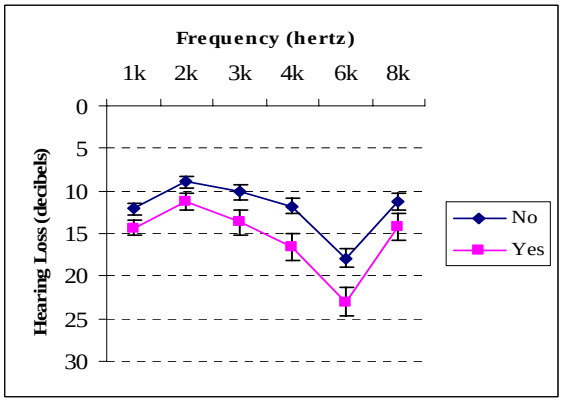



## E. Background Noise

### Right Ear




### Left Ear



The type of personal hearing protectors used was not a predictor of a persons hearing performance, and how often they wore hearing protection was also not a predictor of hearing performance in young adults.

## Recommendation from screening

After people have had the questionnaire completed and their hearing screened, they are then given some recommendations about how to prevent hearing loss. Nearly all (98.8%) of young adults were recommended to use personal hearing protection, 60.0% received recommendations about noise reduction strategies (eg maintenance of equipment), one quarter (25.2%) were referred for further hearing assessments, and 17.9% received information about tinnitus management (Table 11).

**Table 11. Recommendation from hearing screening, young adults, agricultural field days 1994-2001**

| Recommendation | Yes | Percent | No | Percent | Total |
|---|---|---|---|---|---|
| Noise reduction strategies | 485 | 60.0 | 323 | 40.0 | 808 |
| Use of personal hearing protection | 798 | 98.8 | 10 | 1.2 | 808 |
| Tinnitus information / management strategies | 145 | 17.9 | 663 | 82.1 | 808 |
| Refer for further hearing assessment | 204 | 25.2 | 604 | 74.8 | 808 |
| Other Recommendations | 82 | 10.1 | 726 | 89.9 | 808 |

# DISCUSSION

Participants in this study were self selected attendees to the hearing screening program provided at agricultural field days in NSW, Queensland, Victoria and Tasmania. We cannot determine if there is a bias in the results due to the self-selection of participants as we were unable to conduct hearing screenings on non attendees of field days. If bias is present, the repeatability of results and large sample size may reduce the size of this bias, however it is envisaged that the bias would be towards people with a hearing problem and thus over estimate the amount of noise injury. The commodities represented do show signs of being more likely to be from broad acre farms, than from other types of farming enterprises and this may bias the results.

The major finding of this report is that hearing loss from noise exposure is present in young adult farmers and that over 20% suffer from a mild or greater hearing loss. The average hearing loss by two-year age groups shows a statistically significant increase as the young adult ages. This finding is similar to findings by others (Williams et al, 2002; Plakke and Dare, 1992), although it is the first time this age group has been examined separately from all age's agricultural results.

Another significant finding was that those people who answered in the positive to the question, "Presence of hearing loss suggested by family/friends?" were significantly more likely to have a hearing loss than those who answered "no". Also those people who identified themselves as having problems hearing in certain situation were more likely to have a greater hearing loss than those who did not. This may mean that as an encouragement to farmers to have their hearing screened or to gain an indication of hearing loss in the farming community, the following questions could be used as a guide. "Does a friend or family member suggest you may have a hearing loss?" and "Do you have hearing difficulties in any of the following situations?" The situations where young adult farmers were more likely to have difficulty hearing were when background noise is present, in meetings or conversations and in the working environment.

Young adult farmers are exposed to a range of noisy situations on the farm, with the more common situations being workshop tools, chainsaws and firearms. Recreational noise was also a common noise source and was often related to the farming activities, such as shooting and motorcycle riding. No information was collected about how often or for how long young adults were exposed to the noises. Exposure to a particular noise source was not an indicator of hearing loss and this is probably due to the young adult being exposed to many noise sources.

The development of this report was undertaken so that Farmsafe Australia would have a baseline for its 2002-2007 Strategic Plan (Farmsafe Australia, In press). The aim of any baseline is to provide people with some measure on which to compare if their intervention has impacted on a given population.

Goal 4 of the Farmsafe Australia 2002-2007 strategic plan is to reduce the number of young people with noise induced hearing loss by 15% (Farmsafe Australia, In press). For there to be a reduction there has to be a figure for it to be reduced from, thus the baseline. This goal is particularly difficult to measure as there is no consistent hearing screening of young adult farmers undertaken in Australia.

The screening conducted at agricultural field days in NSW is a sample of farmers and if this sample is representative, then there are currently 23.0% of young adult farmers with a noise induced hearing loss in the right ear and 27.9% with noise induced hearing loss in their left ear. A reduction of 15% of young farmers with noised induced hearing loss would mean that the percentage with noise induced hearing loss would be less than or equal to 19.6% in the right ear and less than or equal to 23.7% of young adult farmers surveyed between 2002 and 2007. On a population level, if the target of 15% reduction in hearing loss is to be achieved, then a 2-3dB improvement in hearing results would be needed. Due to the small average amount of hearing loss, it is unlikely that this would be measurable, although it would be achievable.

What may be a better measure would be the uptake in use of hearing protection. One quarter of all young adult farmers did not wear hearing protection at all, although in individual situations this could be as high as 66% (using firearms) and very few young adult farmers wore hearing protection all the time in any given situation. An improvement of 15% in this area for young adults would be a lifelong protection against noise injury as safety habits developed in earlier years are carried throughout life. An increase in the uptake of hearing protection when using firearms would be a major achievement, as noise from a firearm is typically greater than 140dB at the shooter's ear and is known to cause instantaneous damage to a person's hearing (ACAHS, 1997).

The majority (58.5%) of young adults suffered from tinnitus, however 43.8% found that the tinnitus was an annoyance and five young adults had suffered life pattern disturbances because of their tinnitus. This finding is a clear indication that these young adults are being exposed to noise situations that are likely to be causing damage to their hearing. A 15% reduction in the number of young adults with tinnitus would also be a good performance indicator for the reduction of hearing loss.

In conclusion, young adult farmers are already showing signs of noise injury and if noise protection habits are not changed in this age group then we will continue to see a decline in the hearing of farmers. Further work needs to be undertaken to increase the number of young adult farmers wearing hearing protection and wearing that protection all the time when in noisy situations.

# RECOMMENDATIONS

- Continuation of the field day screening program in New South Wales to allow for the monitoring of the hearing status and provision of advice about hearing protection to farmers and farm workers.

- Include the increase in the percentage of personal hearing protection usage as a performance indicator for Farmsafe Australia Strategic Plan 2002-2007

- Include the reduction in the number of young adults reporting tinnitus as a performance indicator for the Farmsafe Australia Strategic Plan 2002-2007

- Include information about hearing difficulties in particular situations and suggested loss by friends/families in any questionnaires about health and safety on farms.

# REVISED GOALS FOR FARMSAFE AUSTRALIA

1. Reduction in the number of young people on farms (aged 15-24 years) with noise induced hearing loss by 15%

   Baseline results show that to end of 2001 for attendees at field days

   30.8% of Males 19.7% of Females

   Have some degree of noise induced hearing loss in their left ear

   The goal by 2007 is for

   26.2% of Males 16.7% of females

   Attendees at field days to have some degree of noise induced hearing loss

2. Reduction in the number of young people on farms who attend field days with: severe noised induced hearing loss to zero; moderate noise induced hearing loss to zero; and by 15% for young people with mild noise induced hearing loss

   Baseline results show that to the end of 2001 for attendees at field days

| | Male | Female |
|---|---|---|
| Normal | 69.2 | 80.3 |
| Mild | 25.5 | 17.4 |
| Moderate | 3.4 | 1.5 |
| Severe | 1.9 | 0.8 |

   The goal by 2007 for field day attendees is

| | Male | Female |
|---|---|---|
| Normal | 78.3 | 85.2 |
| Mild | 21.7 | 14.8 |
| Moderate | 0.0 | 0.0 |
| Severe | 0.0 | 0.0 |

3. Increase the use of personal hearing protection worn by young people on farms by 15% in selected situations

Baseline results show that to end of 2001 for attendees at field days

| Situation | Always % | Sometimes % | Never % |
|---|---|---|---|
| Driving a tractor without cabin | 22.8 | 34.0 | 43.2 |
| Operating a chainsaw | 31.5 | 25.1 | 43.5 |
| Using firearms | 9.7 | 24.7 | 65.7 |
| Using workshop tools | 17.8 | 27.9 | 54.2 |

The goal by 2007 for field day attendees is

| Situation | Always % | Sometimes % | Never % |
|---|---|---|---|
| Driving a tractor without cabin | 26.2 | 39.1 | 34.7 |
| Operating a chainsaw | 36.2 | 28.9 | 34.9 |
| Using firearms | 11.2 | 28.4 | 60.4 |
| Using workshop tools | 20.5 | 32.1 | 47.4 |

4. Reduction in the number of young people on farms reporting tinnitus by 15%.

Baseline results show that to end of 2001 for attendees at field days

58.8% of males (24.5% said that the tinnitus was an annoyance or greater affect) and
57.4% (34.6%) of females had tinnitus

The goal by 2007 for field day attendees is

50.1% (20.8%) of males and
48.8% (29.4%) of females to have tinnitus

# REFERENCES


ABS (1993). *Australian and New Zealand Standard Industrial Classification ANZSIC*. Australian Bureau of Statistics Cat No. 1293.0: Canberra

ACAHS (1997). *Guidance Note 4. Noise on Farms*. Australian Centre for Agricultural Health and Safety (nee Australian Agricultural Health Unit): Moree

Challinor K (1994). *A Staff Training Manual for the NSW Rural Hearing Conservation Program: "How to organise a successful field day"*. Farmsafe NSW: Moree

Coleman R, Challinor K. (1996) *An evaluation of the NSW Rural Hearing Conservation Program - Farmer attitudes, perceptions and suggested improvements*. Australian Centre for Agricultural Health and Safety (nee Australian Agricultural Health Unit): Moree

Dugan E, Kivett VR. (1994). The importance of emotional and social isolation to loneliness among very old rural adults. *Gerontologist* 34:340-346

Farmsafe Australia (In Press). *Farmsafe Australia Strategic Plan 2002-2007*. Farmsafe Australia: Canberra

Farmsafe NSW (1994). *NSW Rural Hearing Conservation Program Strategy*. Farmsafe NSW: Moree

Farmsafe NSW (1994b). *Rural Noise Injury Adjustment and Management Manual*. NSW Rural Hearing Conservation Program, Farmsafe NSW: Moree

Fragar LJ (1996). *Farmsafe Australia. Goals, Targets & Strategy 1996-2001*. ACAHS nee Australian Agricultural Health Unit: Moree

McKellan WH (1995). Hearing impaired families: The social ecology of hearing loss. *Soc Sci Med* 40:1469-1480

Orlans H (1988). Continuing deafness in an unstilled world. *Society* May/June: 32-39

Plakke P, Dare E (1992). Occupational hearing loss in farmers. *Public Health Rep* 107(2):188-92

Williams W, Forby-Atkinson L, Purdy S, Gartshore G (2002). Hearing loss and the farming community. *J Occup Health Safety – Aust NZ* 18(2): 181-186

Williamson JD, Fried LP (1996). Characterization of older adults who attribute functional decrements to "old age". *JAGS* 44():1429-1434

Zwerling C, Sprince NL, Davis CS, Whitten PS, Wallace RR, Heeringa SG (1998). Occupational injuries among older workers with disabilities: A prospective cohort study of the Health and Retirement Survey, 1992-1994. *Am J Public Health* 88: 1691-1695.