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4. THE AUSTRALIAN KOREAN WAR VETERANS' HEALTH STUDY

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4.1 The research team

The study was conducted by researchers from the Monash University Department of Epidemiology and Preventive Medicine, in collaboration with project staff and a contact and recruitment team at the Australian Government Department of Veterans' Affairs (DVA). The Monash University and DVA staff members are listed in Appendix A

4.2 Scientific Advisory Committee

A Scientific Advisory Committee (SAC) was appointed by DVA to oversee the development, conduct and analysis of the study. The SAC met regularly with the Monash researchers and DVA representatives. The SAC members are listed in Appendix B.

4.3 Veterans Consultative Committee

A veterans' Consultative Committee was also appointed by DVA to represent the interests of the veteran community. The Committee consulted with the veteran community in order to provide the study team with advice on all aspects of the study design and conduct and, in turn, fed information back to its constituent members. The Consultative Committee members are listed in Appendix C.

4.4 Study aims

This study aimed to compare the general physical and psychological health of surviving Australian male Korean War veterans with that of a comparison sample of similarly aged, Australian men who lived in Australia at the time of the Korean War but who did not serve in that conflict. More specifically, the study aimed to compare the two populations on measures of current general physical functioning, quality of life including level of life satisfaction, recent hospitalisations, general psychological functioning, anxiety including posttraumatic stress disorder, depression, alcohol disorders and current common medical conditions. Further, the study aimed to investigate the differential health effects within Korean War veterans as a function of several war-related factors, including Service branch, age and level of rank at deployment, duration and era of deployment, and an estimated measure of combat severity.

4.5 Research questions

The study addressed the following research questions:

1. Do surviving male Korean War veterans differ significantly, in their general physical health and functioning, from a comparison population of similarly aged Australian men? Specific comparisons include measures of hospitalisations, self-rated quality of life and life satisfaction, self-rated physical health and reported medical conditions.
2. Do surviving male Korean War veterans differ significantly, in their general psychological health, from a comparison population of similarly aged Australian men? Specific comparisons include indicators of depression, alcohol misuse and anxiety including Posttraumatic Stress Disorder (PTSD).
3. Amongst surviving male Korean War veterans, do war-related factors including Service branch, age at deployment, rank at deployment and severity of combat experience predict differences in general physical health and functioning and general psychological health?

4.6 Study design

The study was a cross-sectional survey of the entire cohort of surviving male Korean War veterans who were residing in Australia, and a smaller comparison sample of similarly aged Australian men who were registered on the Australian Electoral Roll. The study design included two major sources of data:

1. Data collected via a postal questionnaire investigating the health and military experiences of study subjects.
2. Deployment related data collected from the DVA Korean War Nominal Roll.

4.7 Pilot study

A pilot study was conducted in 2002, with the aim of evaluating the efficacy of a larger, cross-sectional survey. A complete report in relation to the design and conduct of the pilot study, including the recommendations arising from its results, is included at Appendix M.

In summary, the pilot study aimed to evaluate the following aspects of the main, cross-sectional survey design:

1. The ability of the main, cross-sectional study to answer the posed research questions.
2. The suitability of the Electoral Roll as a source from which to draw a comparison group for the Korean War veterans.
3. Currency and completeness of address information available for both the Korean War veterans and comparison group.
4. Anticipated participation rates and reasons for refusal.
5. The proportion of recruited comparison group subjects who would be similar to the Korean War veterans in relation to country of birth, or residence in Australia at the time of the Korean War.
6. Any aspects of the proposed study materials which might inhibit study participation or contribute to poor data quality.
7. Any important health concerns of Korean War veterans which might have been missed in the proposed questionnaires.
8. Ease of completion of the questionnaires.

The pilot study included 125 Korean War veterans and 125 age-matched men drawn from the Australian Electoral Roll. Recruitment was carried out by mailed invitation. Subjects received all of the invitation and questionnaire materials proposed for the main study. The pilot study questionnaire included some questions aimed at evaluating the readability of the invitation materials and questionnaire, ease of, and approximate time to, completion, and any omission of health concerns which were of importance to the recipients. Subjects wishing to decline participation were invited to complete a Voluntary Refuser Notification Form which included a question about their reasons for non-participation. Upon receipt of the returned, completed questionnaires from participants, Monash project staff evaluated all sections for completeness and the quality of responses.

In relation to the aims of the pilot study, and to ensure the success of a main study, the following conclusions and recommendations were made:

1. With some straight forward modifications to the existing study protocol, invitation materials and questionnaire content, a main, cross-sectional study would be sufficiently methodologically sound to

- effectively address research questions in relation to the current physical and psychological health of Korean War veterans.
2. The Australian Electoral Roll was a very suitable source from which to draw an appropriate comparison group for a Korean War veterans' health study. A male, age-matched comparison group was easily extracted, Korean War veterans were well represented on the Roll, and address information was very accurate.
 3. Of the recruited comparison group subjects, approximately 18% arrived and settled in Australia after the time of the Korean War, and therefore differed from the Australian Korean War veterans in relation to ethnic background and eligibility to have served in the Australian armed forces at the time of the war. Thus, it was anticipated that a similar percentage would be ineligible for participation in the main study comparison group.
 4. There were some existing inaccuracies in the address information held by DVA in relation to the Korean War veterans and, in anticipation of the main study, a comprehensive address search strategy should be conducted to identify current address details.
 5. Participation rates in the pilot study were 70% for the Korean War veterans and 49% for the comparison group. Non-participation was highest in the comparison group where some subjects mistakenly believed that they were supposed to be Korean War veterans in order to participate. Other reasons for non-participation in both groups included ill-health and old age, with few questionnaires being completed by proxy on behalf of these subjects. Recommendations to minimise non-participation in these groups, and maximise overall participation, included:
 - a. modifying the comparison group invitation package materials to reduce the focus on Korean War veterans and increase the focus on the non-veteran Australian population;
 - b. revising all invitation materials to encourage participation by the very old and very unwell and to encourage participation by proxy;
 - c. improving the overall presentation and packaging of invitation materials; and
 - d. ensuring comprehensive media promotion of the study to the Korean War veteran community and to the general community.
 6. It was anticipated that a main, cross-sectional study could successfully achieve participation rates of 75% in the Korean War veterans' group and 65% in the comparison group.
 7. In order to maximise data quality in the main study, it was recommended that some specific areas of the questionnaire should be revised or replaced where pilot study data quality had been poor; these included the Posttraumatic Stress Disorder Checklist, 12-item Short Form Health Survey, medical conditions questions, and proxy questions.
 8. There were few other aspects of the study materials or design which seemed to be responsible for inhibiting participation in the study, the quality and completeness of questionnaire data was very good in most sections, and the format, level of complexity and coverage of the questionnaires proved to be very acceptable to most respondents, and there were few problems reported.
 9. There were few consistent themes in regard to 'other important health concerns' which were reported to be missing from the content of the existing questionnaire. Some participants reported sight and hearing problems, which are common to aging populations, and these could be considered for inclusion in a main study.

4.8 Study populations

4.8.1 The Korean War veteran study group

Australia's Korean War veterans are defined as all members of the Australian Army, Royal Australian Navy or the Royal Australian Air Force who landed in Korea or who entered the waters surrounding the coast of Korea within a distance of 185 kilometres seaward, including those who were seconded to the Army of the Republic of South Korea, the United States Air Force or Navy, the British Army, Navy or Air Force and any other allied Service; all members of philanthropic organisations; all members of the Australian Forces Overseas Fund and all official entertainers and war correspondents who saw service in Korea between 27 June 1950 and 19 April 1956. These total 17,872 persons listed on the DVA Nominal Roll for that conflict, including 5,769 (32%) Navy, 10,848 (61%) Army and 1,226 (7%) Air Force personnel, 19 members of philanthropic organisations and 10 civilians. The Nominal Roll comprises 17,814 men (99.7%) and 58 women (0.3%).

Minimum eligibility criteria for service with the Australian armed forces in the 1950s included that applicants be:

- aged 18 years or older; and
- an Australian citizen or British subject.

For this health study, the Korean War veterans included in the Korean War veteran study group were those who were:

- male;
- known or assumed to be alive at 1 February 2004; and
- known or assumed to be residing in Australia during the data collection period.

Sex, country of residence and live status were determined from several databases maintained by DVA.

Female Korean War veterans were excluded from the study due to their very small numbers and because health patterns in men and women can be quite different. If data for female veterans was collected and included with the men's data, patterns specific to women would be difficult to identify.

4.8.2 The comparison population

The comparison population was defined with two primary purposes:

1. To identify a sample of men representative of the Australian, elderly male population in regard to age pattern and ethnic background. This sample will be referred to as the *population sample* in this report.
2. To identify a group, drawn from the *population sample* described at point 1 above, similar to the Korean War veterans in regard to age pattern and residence in Australia at the time of the Korea War. It is the health results of this group that will be compared with those of the Korean War veterans, and this group is to be referred to as the *comparison group* in this report.

In accord with the comparison population's two primary purposes, the suitable subjects were defined and identified in two stages.

Stage 1: Defining and identifying the *population sample*

A sample of men representative of the Australian, elderly male population was drawn from a complete extract of men registered on the Australian Electoral Roll at 15 December 2003, aged 65 and above.

Because voting and Electoral Roll registration is compulsory in Australia, the Australian Electoral Roll provides a fairly complete sampling frame of adult Australians. With the exception of an estimated 5% of eligible voters who do not register to vote, and some additional exclusions based on ineligibility to vote (outlined below), the Australian Electoral Roll includes all persons who are:

- alive;
- 18 years of age or older; and
- Australian citizens (or British subjects who were on a Commonwealth of Australia Electoral Roll on 25 January 1984).

Australians classified as ineligible to vote and therefore excluded from the Electoral Roll are:

- people, who by reason of being of unsound mind, are incapable of understanding the nature and significance of enrolment and voting;
- prisoners serving a sentence of five years or more;
- people who have been convicted of treason and not pardoned;
- Australian citizens living permanently overseas who do not have a fixed intention of returning to Australia; and
- any persons who renounce their Australian citizenship.

The Electoral Roll extract included address upon enrolment (except for silent voters whose addresses are removed) and age given in two-year age bands. The Monash Study team selected a random sample of men from the extract to achieve the desired age-distribution and sample size described below at section 4.8.3. From this sample Korean War veterans were identified and removed. The resulting *population sample* was invited to participate in the study.

Stage 2: Defining and identifying the *comparison group*

To identify a group, from the *population sample* described at stage 1 above, similar to the Korean War veterans in regard to age pattern and residence in Australia at the time of the Korea War, the Monash Study team used participant questionnaire responses to identify *population sample* participants who were:

aged at least 18 years old by the year 1955ⁱⁱ ;

AND

Australian born; or

If not Australian born, then first settled in, or a citizen of, Australia by 1955.

Population sample participants meeting these criteria were identified as the study *comparison group*, and it is against this latter group that the health outcomes of the Korean War veteran participants are compared in the Participant Results chapter (Chapter 6) of this report.

4.8.3 Determination of study group sizes

Korean War veteran study group size

The health study was required to include all surviving male Korean War veterans who were residing in Australia during the data collection period. At commencement of the study there were 7,663 male veterans known or assumed to be alive, based on information collected for the Australian Korean War veterans 2003 Mortality Study^[19] and subsequent checks of the Australian Electoral Roll and National Death Registry data. They represented 43% of the total number of male Korean War veterans listed on the Nominal Roll. They excluded some veterans for whom live status was classified as 'unknown' in the Mortality Study,^[19] despite the extensive searches undertaken for that Study.

Of the 7,663 surviving veterans, 51 with overseas residential addresses were excluded from the group. Therefore the final number of eligible Korean War veterans included in the Health Study was 7,612. They represented 42.7% of the total number of male Korean War veterans listed on the Nominal Roll.

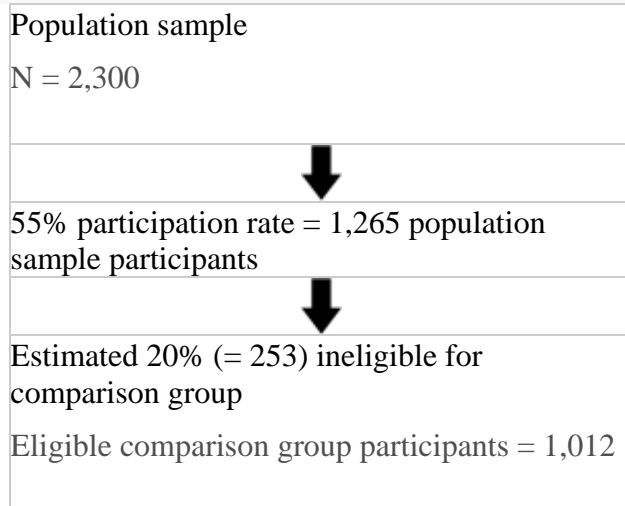
Based on the recruitment results achieved in the pilot study, and the subsequent implementation of the associated recommended strategies for maximising participation, it was estimated that an 80% participation rate would be achievable in the Korean War veteran study group. Based on this estimate, the study would yield approximately 6,090 Korean War veteran participants.

Population sample size

The final population sample size was 3,022. This number was derived from several calculations and considerations according to the following four steps:

A population sample size was required which would yield approximately 1,000 eligible participants who could provide useful, generalisable information about the average Australian male population aged 65 and above. The 2002 pilot study (see Appendix M) resulted in a poor recruitment rate of 49% for the population sample and, of these, approximately 18% did not meet criteria for comparison group selection (for these criteria see section 4.8.2). Whilst it was considered that in the main study the recruitment rate would improve, the number of comparison group subjects expected to participate was based on conservative estimates of a 55% participation rate in the population sample and, amongst those, the exclusion of up to 20% identified as ineligible for inclusion in the comparison group. Using these estimates, it was calculated that the population sample would need to total at least 2,300 subjects to yield 1,000 comparison group participants. This calculation is shown in Figure 1.

Figure 1



1. The age distribution of the Korean War veterans is somewhat different to that of the Australian male population on the Electoral Roll aged 65 and over, and these two populations are shown in 2-year age bands in the 2nd and 4th columns in Table 1. In order that the population sample could be used for its two designated purposes (see 4.8.2), the study required at least 2,300 subjects who matched the age distribution of the surviving Korean War veterans (the number required in each age-band is shown in the 3rd column in Table 1), and at least 2,300 subjects who matched the age distribution of the Australian male population on the Electoral Roll aged 65 and above (shown in the 5th column in Table 1).
2. The largest number from each row of columns 3 and 5 were taken to represent the maximum number of subjects required in each age band, such that the age distribution of the final population sample, and resulting comparison group, could reflect both that of the surviving Korean War veterans, and the Australian male community aged 65 and over. These final numbers for each age band are shown in the 6th (final) column in Table 1.
3. When summed, the final number of population sample subjects required totalled 3,042.
4. Once the 3,042 population sample subjects were randomly selected from the Electoral Roll, the sample was then matched against the Korean War Nominal Roll so that any Korean War veterans in the sample could be identified. This process identified 20 Korean War veterans who were subsequently removed from the sample, leaving a final population sample totalling 3,022 members.

Table 1. Age distribution of the Korean War veterans (KVV), and of the Australian male population aged 65+ on the Electoral Roll, and number of population sample (PS) subjects needed to match these age distributions assuming a minimum of 2,300 subjects required

Age band	% KVV population	Number of PS subjects required to match KVV age distribution	% male 65+ population on Electoral Roll	Number of PS subjects required to match Electoral Roll age distribution	Maximum PS subjects required to match both age distributions
66-67	0.45	10	13.89	319	319
68-69	7.54	173	12.42	286	286
70-71	18.24	420	11.57	266	420
72-73	22.42	516	11.45	263	516
74-75	20.82	479	10.73	247	479
76-77	14.10	324	9.63	221	324
78-79	7.31	168	8.24	189	189
80-81	4.29	99	6.81	157	157
82-83	2.51	58	5.36	123	123
84-85	1.06	24	3.47	80	80
86-87	0.77	18	2.56	59	59
88-89	0.27	6	1.78	41	41
90-91	0.09	2	1.07	25	25
92-93	0.06	1	0.57	13	13
94-95	0.06	1	0.29	7	7
96-97	0.00	0	0.12	3	3
98-99	0.00	0	0.05	1	1
Total	100%	2,299	100%	2,300	3,042

4.9 Contact strategy and recruitment procedures: DVA-based contact and recruitment team

4.9.1 DVA-based contact and recruitment team

- A DVA-based contact and recruitment team was established to:
 - Store and maintain current contact details for the Korean War veteran group and the population sample.
 - Arrange printing, packaging and mailing of invitation packages and follow-up letters.
 - Identify incorrect or incomplete addresses amongst the data set, including recording return-to-senders and undertaking designated search strategies for identifying new contact details where available.
 - Follow-up subjects, who did not respond to the initial mail contact, by sending reminder mailout packages.
 - Respond appropriately to the queries and concerns of eligible subjects who phoned or contacted DVA requesting further information about participating in the study.
 - Mail Korean War commemorative coins to all study respondents.

4.9.2 Contact strategy

Study subjects were contacted via mail only. During the 2002 pilot study, it became apparent that some population sample subjects declined their invitation to participate in the Korean War veterans' Pilot Health Study, because they misunderstood their role as a comparison participant and thought that they had been mistakenly invited as a veteran of the Korean War. To eliminate the potential for this same misunderstanding to occur in the main study, the invitation materials for the population sample were labelled "Survey of Men's Health and Ageing", and it was explained that this Survey was being conducted as part of the Korean War veterans' Health Study. All invitation materials for the Korean War veterans were labelled "Korean War veterans' Health Study".

Preliminary letter

Subjects were initially sent a single page preliminary letter, advising them that the study was commencing and that they would soon receive an invitation package. Korean War veterans received a letter signed by the, then, Minister for Veterans' Affairs, the Honourable Danna Vale (letter shown in Appendix D) whilst the population sample received a letter signed by Associate Professor Malcolm Sim of Monash University (letter shown in Appendix G).

First-invitation package

Subjects were sent a first-invitation package, no earlier than four weeks, and no later than nine weeks, after the preliminary letters were sent.

Invitation packages were mailed in batches of approximately 2,000 per week (1,400 to Korean War veterans and 600 to the population sample) across a period of five weeks.

The first-invitation package for the Korean War veterans contained:

- A personally addressed letter of invitation to participate in the Korean War veterans' Health Study from the Monash University study team (Appendix D).
- A letter of endorsement from the Minister for Veterans' Affairs (Appendix D).
- A letter of endorsement from the chair of the Consultative Committee (Appendix D).
- The Korean War veterans' Health Study Explanatory Statement (Appendix E).
- A Voluntary Refusal Notification Form (Appendix J).
- The Korean War veterans' Health Study participant questionnaire (Appendix F).
- A Reply-paid envelope.
- The first-invitation package for the population sample contained:
 - A personally addressed letter of invitation to participate in the Survey of Men's Health and Ageing from the Monash University study team (Appendix G).
 - A letter of endorsement from the Minister for Veterans' Affairs (Appendix G).
 - The Survey of Men's Health and Ageing Explanatory Statement (Appendix H).
 - A Voluntary Refusal Notification Form (Appendix J).
 - The Survey of Men's Health and Ageing participant questionnaire (Appendix I).
 - A Reply-paid envelope.

First-reminder letter

A first reminder letter was sent to subjects who did not respond to the first-invitation package within three weeks of its dispatch. Such non-responders were defined as those subjects who had not returned their completed questionnaire or Voluntary Refusal Notification Form, and for whom the invitation package had not been returned-to-sender from an incorrect address. The reminder letter was a single page letter from the Monash University study team, and was differently worded for the Korean War veterans' group (Appendix D) and the population sample (Appendix G).

Second-reminder package

A second reminder package was sent to those subjects who did not respond to the first reminder letter within three weeks of its dispatch, and for whom previous invitations had not been returned-to-sender from an incorrect address.

The second reminder package for the Korean War veterans contained:

- A personally addressed letter of reminder from the Monash University study team (Appendix D).
- The Korean War veterans' Health Study Explanatory Statement (Appendix E).
- A Voluntary Refusal Notification Form (Appendix J).
- The Korean War veterans' Health Study participant questionnaire (Appendix F).
- A Reply-paid envelope.

The second reminder package for the population sample contained:

- A personally addressed letter of reminder from the Monash University study team (Appendix G).
- The Survey of Men's Health and Ageing Explanatory Statement (Appendix H).
- A Voluntary Refusal Notification Form (Appendix J).

- The Survey of Men's Health and Ageing participant questionnaire (Appendix I).
- A Reply-paid envelope.

Source of contact details

The initial set of addresses for the Korean War veteran group were drawn from the Korean War veterans' Study Roll compiled by the DVA from Ad hoc Information Systems maintained by DVA. Where individual Korean War veterans could not be matched with the DVA database, their addresses were sought from the Australian Electoral Commission (AEC). The initial set of addresses for the population sample were drawn directly from the Australian electoral roll maintained by the AEC.

Where addresses proved to be incomplete, incorrect or out of date, alternative addresses were sought from such sources as the Health Insurance Commission and the Telstra White Pages directory.

4.9.3 Recruitment outcomes

Upon cessation of the contact and recruitment effort, subjects were classified as belonging to one of the following recruitment outcomes:

Participant: these persons completed, or part completed, and returned their Study consent form and questionnaire.

Refuser: These persons refused participation in the Study by either returning their Voluntary Refusal Notification Form or notifying the recruitment team by phone, email or post.

Overseas: These persons were identified as being overseas for the duration of the study.

Not contactable: The addresses for these subjects proved to be incomplete or incorrect and no alternative addresses could be located.

Non-responder: These persons had not responded to their invitation packages by the time of the study's closure, and the DVA Contact and Recruitment team had not received a 'Return To Sender' or 'Not Known at this Address' notification.

Deceased : There was evidence to suggest that the subject was deceased .

Ineligible: There was evidence to suggest that the person did not meet the eligibility criteria for participation as either a Korean War Veteran group or population sample member (eg the person was found to be female).

4.9.4 Recruitment tracking

A subject tracking procedure and database, designed by the Monash University Study team and written in collaboration with programmers at DVA, was used to manage and monitor the progress of the contact strategy and recruitment procedures. Response and participation rates were monitored at each stage of the contact strategy.

4.9.5 Methods to maximise participation

Strategies employed to maximise participation included:

- Brief introductory letter sent to all subjects, informing them that the study invitation package was pending.
- Letters of endorsement for the Study from the Minister for Veterans' Affairs and the Consultative Forum.
- Contents of the invitation letters and Explanatory Statements individually tailored to the Korean War veteran group and the population sample separately.
- Offer of Mint Issue 2003 Coin, commemorating the 50th anniversary of the signing of the armistice to the Korean War, to all respondents.
- Promotion of the Study via the media including Ministerial press releases in addition to articles within Veteran and Defence-related publications.
- Informed promotion of the Study by the Consultative Forum to the members of the organisations they represent, and networking through the memberships of these organisations.

4.10 Data collection

The data collected throughout the study was derived from several sources, including the self-report questionnaires completed by participants, the Voluntary Refuser Notification Form completed by some refusers, and the DVA Nominal Roll for the Korean War deployment.

4.10.1 Participant questionnaire

Demographic, quality of life and health data were collected via questionnaires which were mailed to all study subjects. Korean War veterans received the Korean War veterans' Health Study (KWVHS) participant questionnaire (Appendix F) whilst the population sample received the Survey of Men's Health and Ageing (SMHA) participant questionnaire (Appendix I).

Instrument selection

Selection of the appropriate questionnaire items and instruments was based on the following considerations:

- Instruments were required which addressed the study research questions; namely instruments which provided indications of physical and psychological functioning, also quality of life and instruments which covered suitable demographic and exposure issues.
- Evidence of instrument validity when used with elderly and Australian populations.
- The availability of Australian normative comparisons and comparisons with previous studies of Korean War or other elderly veterans.

- Appropriateness of questions for an elderly, primarily retired population (eg questions about functionality which relate to the work-place were considered inappropriate).
- Appropriateness of instrument length for completion by an elderly population, with preference given to instruments which were brief.
- As the survey was to be sent via the post, preference was given to instruments which were designed to be self-administered.
- Instruments which performed well in the Korean War veterans' pilot Health Study, or would be expected to perform well, with appropriate modifications, based on results of that study.
- Questions were not required which addressed information which was already available to the researchers. For example, some Korean War deployment information, such as rank at deployment, did not need to be collected from Korean War veterans as this information was available on the DVA Nominal Roll for that conflict. Address and postcode was not requested of the comparison group as this information was provided by the AEC.

Overview of the study questionnaire contents

The study questionnaires were sent by post and were designed to be self-administered in a period of approximately 30 minutes. It was anticipated that participants would complete the questionnaires in their own time, with access to a study free-call number if assistance was required.

The questionnaires included the following sections:

- Informed Consent.
- Contact Details.
- Proxy administration ("Who is completing the questionnaire?").
- Demographic and socioeconomic information.
- Current quality of life measured using the World Health Organisation brief Quality of Life questionnaire.
- Current life satisfaction measured using the Life Satisfaction Scale.
- Number of nights of hospitalisation in the previous year.
- Anxiety and depression symptoms in the past week, measured using the Hospital Anxiety and Depression scale.
- Lifetime tobacco consumption.
- Current alcohol use and history of alcohol-related problems.
- Posttraumatic stress disorder symptoms in the past month, measured using the Posttraumatic Stress Disorder Checklist.
- Military service experience.
- Korean War experience: wounded in action.
- Korean War experience: fever.
- Korean War experience: combat exposure measured using the Combat Exposure Scale.
- Current medical conditions.
- Other health concerns.

These are described in more detail below.

Informed Consent

Page 1 in both the KVVHS and SMHA participant questionnaires.

The Informed Consent Statement was placed inside the questionnaire to ensure its completion and return with the questionnaire data.

Contact Details

Page 2 in both the KVVHS and SMHA participant questionnaires.

Korean War veterans were requested to provide their address and a day-time phone contact. Population sample subjects were requested to provide a day-time phone contact (Monash already had their addresses from the AEC).

Proxy administration ("Who is completing the questionnaire?")

Page 2 in both the KVVHS and SMHA participant questionnaires.

In order to maximise participation by the very old and/or very unwell, the study invitation letters and Informed Consent Statements informed participants that, if necessary, a relative, friend or carer could assist in completing the questionnaire on their behalf. Thus, a section of the questionnaire was designed to identify whether the questionnaire responses were indeed self-reported by the participant, or completed by a proxy (relative, friend or carer). If proxy completed, additional questions identified whether the proxy simply transcribed answers provided by the participant, or provided his/her own answers to the questions on behalf of the participant.

Demographic and socioeconomic information

Questions 1-5 in both the KVVHS and SMHA participant questionnaires.

Demographic and socioeconomic information collected included:

- Date of birth.
- Country of birth.
- (*SMHA questionnaire only*) If not Australian born, year of first settlement in Australia, whether Australian citizenship gained, and year of citizenship.
- Indigenous status.
- Current marital status.
- Highest educational qualification.

Specific demographic and socioeconomic variables were selected for several purposes. The demographic characteristics of date of birth, country of birth and indigenous status are included in the National Minimum Data Set, a core set of data elements agreed by the National Health Information Management Group for mandatory collection and reporting at a national level. ^[111]

Questions referring to date of birth, country of birth, and year of naturalisation and/or settlement in Australia were further designed to be used to determine true eligibility of population sample subjects to be included in the comparison group for comparison with Korean War veterans.

Marital status and educational qualifications were included because they are important predictors of health status.

World Health Organisation brief Quality of Life questionnaire (WHOQOL-Bref)

Questions 6-31 in both the KVVHS and SMHA participant questionnaires.

The WHOQOL-Bref is a self-administered, 26-item, abbreviated version of the 100-item World Health Organisation Quality of Life questionnaire (WHOQOL-100).^[112] The questionnaire was developed by the WHO to measure quality of life; defined as “an individuals’ perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”.^[112] The WHOQOL-Bref contains two individual questions exploring overall self-rated quality of life and satisfaction with health, and 24 questions that explore the four Domains of Physical Health (eg ability to perform activities of daily living and mobility), Psychological health (eg self-esteem, concentration, negative mood, and body image), Social Relationships (eg personal relationships and social support) and the Environment (eg financial resources, transport, safety, and access to information). All questions are asked in relation to the “last two weeks”.

The Domain scores have been shown to demonstrate good discriminant validity (P values ≤ 0.001 for “ill” versus “well” subjects in each Domain), internal consistency (Cronbach’s alpha values ranging from 0.66 for Social Relationships to 0.84 for Physical Health) and test-retest reliability (Pearson’s r ranging from 0.66 to 0.87 for the four Domains).^[113]

The WHOQOL-Bref’s 26 questions comprise question numbers 6 to 31 in both the KVVHS and SMHA participant questionnaires. Therefore, WHOQOL-Bref question 1 corresponds with participant questionnaire question 6, WHOQOL-Bref question 2 corresponds with participant questionnaire question 7, and so on.

The instrument’s 26 questions are answered on a five-point scale from 1-5.^[112] Questions 3, 4 and 26 in the instrument are reverse scored before summation. Final scores are scaled in a positive direction such that higher scores denote higher quality of life.

WHOQOL-Bref question 1, representing overall quality of life, and question 2, representing health satisfaction, are examined separately and have total scores ranging from 1-5.

The four Domains are comprised of the following sets of questions:

Domain 1 Physical Health: questions 3, 4, 10, 15, 16, 17 and 18.

Domain 2 Psychological; questions 5, 6, 7, 11, 19 and 26.

Domain 3 Social Relationships: questions 20, 21 and 22.

Domain 4 Environment: questions 8, 9, 12, 13, 14, 23, 24 and 25.

The mean score of items within each Domain is used to calculate each Domain score. Mean scores are then multiplied by four, giving a total Domain score range of 4-20, in order to make Domain scores comparable with the scores used in the WHOQOL-100.

Where participants fail to provide a response to at least 21 (80%) of the WHOQOL_Bref's 26 questions, they are excluded from scoring. Further, if participants have two or more items missing from Domains 1, 2 or 4, or one or more items missing from Domain 3, the associated Domain scores are not calculated for those individuals.

Life Satisfaction scale

Question 32 in both the KVVHS and SMHA participant questionnaires.

The Life Satisfaction scale, also called the Delighted-Terrible scale, was used to assess satisfaction with life in general. ^[114] It is most commonly used in population settings and was included in the Australian Bureau of Statistics (ABS) 1997 National Survey of Mental Health and Wellbeing ^[56, 115] and in the 2001 National Health Survey (the results for this scale in the latter survey are yet to be published). Test-retest reliability has been reported to be approximately 0.70, with 92% of respondents providing an answer on retest that was identical or immediately adjacent to their previous answer. ^[114] Internal consistency reliabilities have been reported at 0.74 and 0.87 on a sample of chronic mental patients. ^[116] Cummins (1995) reported the scale's performance to be satisfactory in large population-based studies. ^[117]

The scale consists of a single question ("How do you feel about your life as a whole, taking in to account what has happened in the last year and what you expect to happen in the future?") with seven possible responses; 1-delighted; 2-pleased; 3-mostly satisfied; 4-mixed; 5-mostly dissatisfied; 6-unhappy; 7-terrible. Similar to Cummins (1995) ^[117] and Dear et al (2002) ^[115] the raw scores (S) were converted by applying the linear transformation $100(7-S)/6$ and presented as "percent life satisfaction" (PLS). These transformed scores ranged from 0 (zero) to 100 with higher scores representing higher life satisfaction.

From his analysis including studies of life satisfaction from all major geographic regions in the world, Cummins (1998) ^[118] proposed a universal norm of $70 \pm 5\%$ on Likert scale-based measures of life satisfaction. Using the 1997 National Survey of Mental Health and Wellbeing data, Dear et al (2002) ^[115] estimated the mean PLS for the Australian adult population to be 70.4% (95% CI 70.0 – 70.8), with improved life satisfaction being associated with younger age, female sex, tertiary education, good physical and psychological health, moderate alcohol consumption, married or defacto status, and employment.

Hospitalisations

Question 33 in both the KVVHS and SMHA participant questionnaires.

Respondents were asked to estimate the number of nights of hospitalisation in the previous year.

Hospital Anxiety and Depression (HAD) scale

Questions 34-47 in both the KVVHS and SMHA participant questionnaires.

The HAD scale is a brief 14 item self-rating measure of anxiety and depression. ^[119] It has been widely used since its development in 1983. A recent review of 747 studies that used the HAD scale suggested that it performed well in assessing symptom severity and caseness of anxiety disorders and depression in both somatic, psychiatric and primary care patients and in the general population. ^[120] The HAD scale's psychometric properties are considered quite good in terms of factor structure, intercorrelation, homogeneity and internal consistency. ^[121] Using a sample which included 11,957 subjects aged 60-89, Mykeltun et al (2001) reported good Cronbach's alpha scores of 0.75 (depression subscale) and 0.82 (anxiety subscale) for subjects aged 60 – 79 years, and 0.73 (depression subscale) and 0.81 (anxiety subscale) for subjects aged 80 years or more. ^[121] With an Australian sample, Clarke et al (1993) found the depression subscale to have 95% specificity and 40% sensitivity to detect DSM-III-R depression using an empirically determined optimal cut-off score of 11 or more, and 92% specificity and 71% sensitivity to detect DSM-III-R major depression using a cut-off score of 10 or more. ^[122]

The HAD scale's 14 questions comprise question numbers 34 to 47 in both the KVVHS and SMHA participant questionnaires. Therefore, HAD scale question 1 corresponds with participant questionnaire question 34, HAD scale question 2 corresponds with participant questionnaire question 35, and so on.

The HAD scale's 14 questions are answered on a four-point scale from 0-3. The scale's questions 1, 3, 5, 6, 8, 10, 11 and 13 are reverse scored before summation. Total scores range from 0-42. The anxiety subscale comprises questions 1, 3, 5, 7, 9, 11 and 13. The depression subscale comprises questions 2, 4, 6, 8, 10, 12 and 14. The scale's developers, Zigmond & Snaith (1983), determined that a score below eight, on both the depression subscale and the anxiety subscale, defined non-cases, scores from eight to 10 defined borderline cases, and scores equalling 11 or above defined cases experiencing clinically significant depression and anxiety respectively. ^[119]

Tobacco consumption

Questions 48-48e- in both the KVVHS and SMHA participant questionnaires.

Tobacco smoking, reported as being "responsible for the greatest burden on the health of Australians", has been associated with diseases including cardiovascular diseases, cancers, emphysema, stroke and thrombosis. ^[123]

The participant questionnaire included six questions about the consumption of cigarettes, cigars and tobacco, and responses to these were used to determine:

- Smoking status: Ever smoker vs former smoker vs never/occasional smoker.
- Total number of years smoked.
- Approximate average number of cigarettes or cigars, or amount of rolled tobacco, smoked per year of smoking.
- Cumulative amount of smoking in 'pack-years'.

It was assumed that one pack contained 20 cigarettes, that one cigar was equivalent to three cigarettes, and that one gram of tobacco (0.035 of an ounce) was equivalent to two cigarettes. Pack years were calculated as total

number of cigarettes (or equivalent) \div 20 \div 365. One pack year would be equivalent to smoking one pack of 20 cigarettes per day for one year. A person who smoked an average of 16 cigarettes per day for a duration of 12 years (the equivalent of 70,080 cigarettes) would receive a pack years score of 9.6 (i.e. $70,080 \div 20 \div 365 = 9.6$).

There are limitations to interpretation of this data. A longer questionnaire would be required, with multiple smoking start dates and quit dates, if the investigators were to very accurately calculate pack years of cigarette consumption.

Alcohol Use

Questions 49-57 in both the KVVHS and SMHA participant questionnaires.

Alcohol use questions were drawn from the Alcohol Use Disorders Identification Test (AUDIT),^[125] from the Australian Diabetes, Obesity and Lifestyle Study^[126] and from the CAGE questionnaire.^[60, 127] These several, brief instruments were used in an effort to broadly assess both past and current alcohol use in this elderly group. Reid et al (2003) suggested that the use of an individual measure may fail to detect many older adults with important alcohol exposures, having found only modest agreement between five alcohol measures, and recommended that a combination of measures be used when obtaining alcohol histories in older persons.^[49]

The AUDIT scale was developed by the WHO as a screening instrument for current hazardous and harmful alcohol consumption.^[125] The first three alcohol consumption questions from this scale were used in our study questionnaire. These have been referred to as the AUDIT-C^[128] which has been shown to perform equally as well as the AUDIT ($p=0.83$) for detection of either heavy drinking and/or active alcohol abuse (area under receiver operating characteristic curve measured as 0.81) in a sample of 447 male general medical patients (83% aged 80 and over). The AUDIT-C's three questions, each with five possible responses, are each scored on a scale of 0-4. The three individual scores are then summed such that possible AUDIT-C scores range from 0-12, with higher scores representing greater levels of drinking. Bush et al (1998) recommended using a cut-off score of three or more to detect problem drinkers, this threshold being highly sensitive, detecting 90% of subjects with active alcohol abuse and 98% of patients with heavy drinking. This threshold, however, had rather low specificity of 60%. For a more specific test, a cut-off of four or more was recommended, which detected 86% of subjects with heavy drinking and/or active alcohol abuse, with a specificity of 72%. Rumpf et al (2002)^[129] and Aertgeerts et al (2001)^[130] also recommend the AUDIT-C as an efficient screening instrument in male subjects. In their studies, however, they recommend a cut-off score of five or more as providing the optimal combination of sensitivity, 88% and 78% in their studies respectively, and specificity, 81% and 75% in their studies respectively, for detecting alcohol dependence or abuse.

In our questionnaire we also included two questions drawn from the Australian Diabetes, Obesity and Lifestyle Study.^[126] These were selected for their evaluation of whether the respondent considers that he has ever been a 'heavy' drinker or whether the respondent has ever been treated for alcoholism or a drinking problem.

Finally, the four-item CAGE (Cut-down, Annoyed by criticism, Guilty about drinking, Eye-opener drinks) questionnaire^[127, 131] was included to evaluate the existence of alcohol related problems indicative of dependence and/or abuse, across the respondent's lifetime. Responses to the CAGE's four questions are simply scored, with a

score of one (1) given for a YES response and zero (0) given for a NO response. Studies which have assessed the instrument's sensitivity and specificity to detect heavy drinking and drinking problems in the general population, in general hospitals, and in older patients, have produced mixed results.^[132-134] Bush et al (1987)^[135] recommended the CAGE as a simple, sensitive and specific screening test for alcohol abusers in a sample of 518 hospital patients. The authors reported sensitivity and specificity to be 85% and 89% respectively, at a cut-off score of one or more affirmative response. A cut-off score of two or more is most commonly used, and some studies have also found this threshold to have good sensitivity (eg 84%,^[131] 75-85%,^[136] 74%^[137]) and specificity (eg 95%,^[131] 86-96%,^[136] 91%^[137]). However, other studies have reported lower diagnostic performance of the CAGE.^[130, 132, 134]

Posttraumatic Stress Disorder Checklist (PCL)

Questions 58-75 in both the KVVHS and SMHA participant questionnaires.

The PCL^[138, 139] is a self-report rating scale for assessing the seventeen DSM-IV symptoms of PTSD. In investigations of its reliability, validity, and diagnostic utility,^[138, 139] it is shown to have excellent test-retest reliability over a 2-3 day period and high internal consistency for each of the three groups of items corresponding to the DSM-IV symptom clusters as well as for the full 17-item scale. Further, the PCL correlates strongly with other measures of PTSD, such as the Clinician Administered PTSD Scale,^[139] Mississippi Scale and the Impact of Event Scale, and also correlates moderately with level of combat exposure.^[138]

Since it was not developed until 1993, few studies of older veterans have used the PCL. However some data are available in relation to Australian Vietnam veterans,^[140] Australian Gulf War veterans,^[100] US peacekeeping missions,^[141, 142] several groups of US Gulf War veterans,^[107, 143] as well as many civilian groups.^[139, 144, 145]

Three versions of the PCL are available, although the differences are very minor. The PCL-M is a military version and questions refer to *"a stressful military experience"*. Our study uses the PCL-S, which is a non-military version that can be referenced to any specific traumatic event; questions refer to *"the stressful experience"*. The third version, the PCL-C is a general civilian version that is not linked to a specific event; the questions refer to *"a stressful experience from the past"*. The scoring is the same for all three versions.

Each of the 17 symptom items has five possible responses simply coded 1-2-3-4-5. A total score is computed by adding the scores from the 17 items, therefore possible total scores range from 17 to 85. Used as a continuous measure, the PCL has good diagnostic utility. In Australian Vietnam War combat veterans a cut-off of 45, or 50, on the PCL were both shown to be good predictors of a PTSD diagnosis with 97% sensitivity.^[146]

The original stem question to the PCL-S was modified for the purpose of the Korean War veterans' Health Study participant questionnaires. This was due to the poor performance of this item in the Korean War veterans' Pilot Health Study (Appendix M) and similar poor performance when this item was used in the Australian Gulf War veterans' Health Study. The original stem question read as follows;

"Below is a list of problems and complaints that people sometimes have in response to stressful life experiences.

Please consider the event in your life that you found most stressful or upsetting. Read the list of problems and complaints below and indicate how much you have been bothered by each problem or complaint in the past month in relation to that stressful experience.

The event you experienced wasin.....”

In our questionnaires, the more detailed, revised stem question reads;

“Below and on the next page is a list of problems and complaints that people sometimes have in response to stressful life experiences. We would like you to consider the event in your life that you found the most stressful or upsetting. Please nominate an event even if you don't think you have experienced anything particularly stressful or important.

Once you have nominated an event in the space provided below, please read the list of problems and complaints and indicate how much you have been bothered by each problem or complaint in the PAST MONTH in relation to your nominated stressful event. If you have not been bothered by a particular problem or complaint, simply tick the 'Not at all' option available to you.

The event in your life which you found the most stressful or upsetting was (please just nominate ONE event) in what year.....?”

Military service experience

Korean War veterans only: questions 76-79 KVVHS participant questionnaire.

These questions sought general information in relation to the military career of the Korean War veterans, including:

- The year of first full-time service with the Australian armed forces.
- Total duration, in years, of full-time service with the Australian armed forces, including National Service but not including service in Citizen Military or Reservist Forces.
- Highest rank achieved during their military career.
- Deployments to other major conflicts; including World War II 1939 – 1945; Malayan Emergency 1950 – 1960; Borneo/Malaysian Confrontation, Indonesia 1963 - 1966; Vietnam War 1962 – 1973; or participation in the British Commonwealth Occupation Force in Japan 1946 – 1952. A brief description of each of these conflicts is provided in Appendix K.

Comparison group only: questions 76-78 SMHA participant questionnaire

These questions sought general information in relation to any military career of the population sample participants, including:

- Whether ever served as a member of Australian armed forces or as an enlisted member of the armed forces of another country, not including service in Citizen Military or Reservist Forces.

- If served with Australian armed forces; year of first service and total duration of service.
- If served as an enlisted member of overseas armed forces; total duration of service.
- Highest rank achieved in military career.
- Any deployments to major conflicts.

Korean War experience: Fever

Korean War veterans only: question 80 KVVHS participant questionnaire.

This question investigated whether the Korean War veteran participants were ever told they had haemorrhagic fever, malaria or other fever, during the Korean conflict or as a result of the Korean conflict.

Korean War experience: Wounded in action

Korean War veterans only: question 81 KVVHS participant questionnaire.

This question investigated whether the veteran was ever wounded in action during the Korean War and, if so, the type of evacuation required for his worst injury. Veterans who reported being wounded were asked to select an evacuation type, for their worst injury, from the following categories:

- Evacuated to a Regimental Aid Post, first aid post, sick bay or field ambulance, and then returned to unit/ship/squadron.
- Evacuated to a local field hospital or hospital ship and then returned to your unit/ship/squadron.
- Evacuated to a hospital in Japan and then returned to your unit/ship/squadron.
- Evacuated to a hospital in Japan and then on to Australia for further medical attention.

It was assumed that each increase in category of evacuation, from item 1 through to item 4 above, was likely (though not always) to represent an increase in injury severity.

Korean War experience: Combat Exposure Scale

Korean War veterans only: questions 82-88 KVVHS participant questionnaire.

The Combat Exposure Scale (CES) ^[147] questions were asked exclusively in relation to the Korean conflict. The comparison group did not receive these questions. The CES is a widely used measure of combat exposure in war veterans. [36, 37, 39, 41, 47, 53, 54, 148]

The CES's seven questions comprise questions 82 to 88 in the KVVHS participant questionnaire. Therefore, CES question 1 corresponds with KVVHS participant questionnaire question 82, CES question 2 corresponds with participant questionnaire question 83, and so on.

The seven questions each offer five possible response options, which are initially scored as 1-2-3-4-5 from left to right. These initial, raw scores are then given a severity weighting according the following transformations:

For CES questions 1, 6 and 7; subtract 1 from the raw score; then multiply by 2.

For questions 2 and 5; subtract 1 from the raw score.

For question 3; subtract 1 from the raw score and multiply by 2, or if the raw score is a 5, subtract 2 before multiplying by 2.

For question 4; subtract 1 from the raw score, or if the raw score is a 5, subtract 2.

The transformed scores for each of the seven questions are then summed to give a final score ranging from 0 to 41. The final score may be broken down into six categories ranging from no combat and light to heavy combat. CES scores of 0 are categorised as 'no combat' exposure; scores of 1-8 are categorised as 'light'; 9-16 'light-moderate'; 17-24 'moderate'; 25-32 'moderate-heavy'; and 33-41 'heavy'.^[53]

In an Australian study of 277 Vietnam War veterans^[72] the breakdown of scores was light 17%; light-moderate 18%; moderate 39%; moderate-heavy 20%; and heavy 8%, suggesting a near-normal distribution among this veteran group.

Current medical conditions

Questions 89a-89o in the KVVHS participant questionnaire and questions 79a-79o in the SMHA participant questionnaire.

Subjects were asked to report whether they currently had one or more of the following chronic medical conditions: asthma, high blood pressure, stroke (or after-effects of stroke), heart attack or angina, rapid or irregular heart beat, liver disease, arthritis, kidney disease, diabetes, melanoma, other skin cancer, other cancer (not skin), stomach or duodenal ulcer, partial or complete blindness (not corrected by glasses) and partial or complete deafness.

The selection of the medical conditions to be included was based on several considerations. Selected conditions were primarily those reported as prevalent in Australian men aged 75+ years, based on data from the ABS 1999 "Older people: a Social Report"^[149] and 2001 National Health Survey.^[150] Further, self-report of specific conditions including asthma, high blood pressure, arthritis, kidney disease, diabetes, and stomach or duodenal ulcer was included in the ABS 1997 Survey of Mental Health and Well-being in Adults.^[56] Stroke (or after effects of stroke), heart attack or angina, and rapid or irregular heart beat were included in the ABS 2001 National Health Survey.^[151] Liver disease was included as a single measure of this system. Partial or complete blindness and/or deafness were among those medical conditions most frequently reported by Korean War veterans as 'other health concerns' in the 2002 pilot study (Appendix M). Finally, even though cancer incidence in Korean War veterans was the subject of an extensive recent investigation^[20] it was considered inappropriate to exclude cancer conditions from the major medical conditions section of the Health Study questionnaire, thus the inclusion of the items melanoma, other skin cancer and other cancer.

Other health concerns

Page 16 in the KVVHS participant questionnaire and page 14 in the SMHA participant questionnaire.

Respondents were asked an open question about any other important health concerns they wished to tell the investigators about.

4.10.2 Voluntary Refuser Notification Form

The complete Voluntary Refuser Notification Form is shown at Appendix J. Subjects wishing to decline participation in the study were offered the option of completing three brief questions on the Form in relation to their current health and any reasons for not participating. These included two health questions which were also in the participant questionnaire. They were:

- The second individual question from the WHOQOL-Bref representing satisfaction with health (*question 7 in both the KVVHS and SMHA questionnaires*). The item has a total score ranging from 1 to 5.
- The Life Satisfaction scale (*question 32 in both the KVVHS and SMHA participant questionnaires*). The scale's seven possible responses are scored 1-7, with the raw score (S) then converted by applying the linear transformation $100(7-S)/6$ and presented as "percent life satisfaction" (PLS).

The third question on the Voluntary Refuser Notification Form was an enquiry as to the subject's reasons for declining participation. Subjects could select all that applied of the following listed reasons:

- You are too busy.
- You are not well enough.
- You don't think the study applies to you.
- The questionnaire is too long.
- You are not interested in participating in a health study.
- Another reason.

Where subjects selected "another reason", they were provided with text space and asked to specify the reason.

4.10.3 Korean War deployment data from the DVA Korean War Nominal Roll

Data drawn from the DVA Korean War Nominal Roll were used to categorise Korean War veterans according to:

- **Service branch** during the Korean War; Navy, Army or Air Force.
- **Highest rank** during Korean War service; officer, non-commissioned officer, or enlisted rank.
- **Era of first Korean War deployment**; categories being the 'mobile phase' of the Korean War (approximated to be first deployed in the period 29 June 1950 to 30 June 1951), the 'static phase' of the Korean War (approximated to be first deployed in the period 1 July 1951 to 26 July 1953), or 'after armistice' (first deployed on or after the signing of the armistice on 27 July 1953).
- **Number of Korean War tours/deployments**.
- **Total duration of deployment in days**; the total number of days each individual was deployed, across one or more tours in Korea.

Using data available from the DVA Korean War Nominal Roll, in combination with data self-reported in the participant questionnaire, it was possible to further categorise Korean War veterans according to:

- **Age** in years at first Korean War deployment.
- **Years of previous service** with Australian armed forces, at time of first Korean War deployment.

Because only a small total number of Australian Korean War veterans were taken prisoner of war (POW) during Korea (n=29), the number of POWs estimated to participate in the study was too small for any useful investigation of the long-term health effects of this war experience. Therefore, the study team did not include POW status amongst the data drawn from DVA records.

4.11 Data quality, confidentiality and storage

4.11.1 Pre testing of study materials to ensure maximal participation and maximal data quality

The study materials were pre-tested in several ways at various stages during the development of the study.

The original pilot study materials, including the invitation packages, formal explanatory statement, consent form and participant questionnaire, were circulated to members of the Study Scientific Advisory Committee and Consultative Committee for their review and comments.

Subsequently a group of ten Korean War veterans were invited to form a focus group chaired by members of the Monash Study team. The purpose of this group was to assess the study materials in relation to:

- the suitability of the invitation package for attracting the study populations toward participation;
- the readability and comprehensiveness of the study explanatory statement and consent forms;
- the suitability of the participant questionnaire design in relation to its length, readability and ease of completion; and
- the relevance of the questions in the participant questionnaire for the study populations.

As described earlier in section 4.7, all study materials and procedures were then piloted in a study of 250 subjects. The extent to which questionnaire items were fully and accurately completed by pilot study respondents was assessed. Pilot study respondents were also asked to provide comments on the format, level of complexity and coverage of the participant questionnaire items, and these were reported to be very acceptable by most subjects with few problems identified. Some revisions to the format of individual items within the questionnaire were implemented by the study team as a result of the pilot study. Similarly, some adjustments to the mailout materials and recruitment protocol were also made as a consequence of information drawn from the results of the pilot study.

The revised study materials were subsequently re-circulated to the Scientific Advisory Committee and Consultative Committee for their review and approval for inclusion in the main study. Finally, all materials were submitted to the Monash University and DVA Human Research Ethics Committees for their review and approval.

4.11.2 Missing questionnaire data

Phone follow-up of study participants was conducted where specific fields of data were missing from their returned participant questionnaires.

In particular, phone follow-up was conducted when:

- sufficient responses were missing from the smoking questions rendering it not possible to calculate pack years of cigarette consumption;
- more than 20% of responses were missing from the WHOQOL-Bref, HAD scale or PCL; or
- whole sections of the questionnaire, such as complete pages, were blank and presumed missed by the respondent.

4.11.3 Data entry and cleaning

Data entry was undertaken by Datatime Services Pty Ltd, predominantly using electronic data capture (data scanning) technology for all tick-box fields in the questionnaires, and manual keyboard data entry for text fields. Careful checking of the questionnaire responses by the Monash study team, upon receipt of the questionnaires and prior to the data capture processing by Datatime, ensured that the self-reported data was as clear and unambiguous as possible prior to data entry.

Upon return of the entered data from Datatime, the Monash study team tested the accuracy of the data entry by manually checking the data entered for 50 Korean War veteran and 50 comparison group participant questionnaires. Detected errors were classed as either text field errors (data that was manually entered) or tick-box errors (data that was electronically scanned and coded).

The electronic data was then subjected to a series of statistical checks to detect invalid, inconsistent or outlying results. This included range checks for participant's age at time of questionnaire completion, or at time of war deployment, and checks for questionnaire responses within the ranges allowed by individual instruments.

4.11.4 Methods to ensure privacy of study data

Upon completion of the processing of the data at Monash University all identifying information such as participants' names, signatures and address details were separated from the remaining self-reported questionnaire data, and from the DVA-provided deployment data. This deidentification process was undertaken for both the paper-based questionnaire data and any electronic data.

Paper-based questionnaire data was stored with a unique identifying code attached and kept in locked filing cabinets. Paper-based identifying information was stored equally securely but separately from the remainder of the questionnaire.

Electronic and paper-based data were accessed only by approved Monash University staff. All such staff were required to sign a confidentiality agreement protecting the security of any data they processed. All electronic files stored on Monash University computer networks were password protected.

4.11.5 Storage of data

Monash University will keep copies of the data for the seven year period required under the National Health and Medical Research Council guidelines for epidemiological research.

4.12 Statistical analysis

Statistical analyses and data transformations were predominantly performed using the Statistical Package for the Social Sciences (SPSS) version 11.5 software package, with some specified analyses performed using Stata version 8.0.

4.12.1 Weighting of comparison group results

Weighting factors were applied to the results of the comparison group participants to correct for the difference in age distribution between these participants and the participating Korean War veterans which resulted from the sampling strategy. To calculate the value of the weighting factor to be applied to the results of each comparison group participant, the frequencies of Korean War veteran and comparison group participants in five-year age bands between 65 and 99 years (65-69, 70-74, 75-79, 80-84, 85-89, 90-94, 95-99) were calculated. For each comparison group participant within an age band, the value of the weighting factor equalled the number of Korean War veteran participants in that age band, as a fraction of the total number of Korean War veteran participants, divided by the number of comparison group participants in that age band, as a fraction of the total number of comparison group participants.

For example, if there were 200 Korean War veteran participants in the 65-69 year age band, of a total of 6,000 Korean War veteran participants, and 100 comparison group participants in the 65-69 year age band, of a total of 1,500 comparison group participants, then the weighting factor to be applied to the results of each of these 100 comparison group participants would be equal to $200/6000 \div 100/1500 = 0.5$

4.12.2 Comparison of Korean War veterans and the comparison group

The statistical analyses included the cross-sectional comparison of the Korean War veterans and comparison group with respect to several health outcomes.

Differences between the two groups on health outcomes measured on dichotomous (eg cases vs. non-cases), ordinal (eg 'never', 'monthly', 'weekly'), or categorical (multinomial) scales (eg 'married', 'widower', 'single, never married') were firstly presented as prevalence percentages, after applying the weighting factors to the results of the comparison group participants. The group differences were then quantified using non-weighted, but age adjusted, prevalence odds ratios.

Odds ratios and their confidence intervals ^[154] and significance tests were obtained using binary logistic regression ^[155] for dichotomous health outcomes, multinomial logistic regression for categorical health outcomes, and ordinal regression for ordinal scaled outcomes, all performed using SPSS version 11.5. Korean War veteran versus comparison group odds ratios were first estimated after accounting for current age (labelled 'age adj. OR') and secondly estimated after accounting for the additional potential confounding factors of highest education, current marital status, and country of birth, as well as current age (labelled 'multivariate (multiv.) adj. OR').

The odds of a particular symptom or health outcome may be defined as the number of persons who have the particular outcome present (eg depression), divided by the number of persons who do not have that particular outcome present. ^[156] An odds ratio (labelled OR in the tables) is therefore defined in this study as the odds of

having an outcome or symptom present in one group (in this case the Korean War veterans) divided by the odds of having that outcome or symptom present in another group (in this case the comparison group).

An odds ratio may range in value from zero to infinity. In terms of the present study, an odds ratio that is larger than one occurs when the odds of having a particular outcome present are higher in the Korean War veterans than in the comparison group; in this situation the prevalence of the condition is also greater in the Korean War veterans. An odds ratio that is less than one has the reverse interpretation. An odds ratio equalling one would indicate that the Korean War and comparison groups had equal odds and prevalence of an outcome.

Continuous outcomes, and sums of dichotomous or Likert scaled items (eg total score on each of the WHOQOL-Bref domains) were initially compared between groups using descriptive statistics (eg typically mean and standard deviation (SD) scores) after applying the weighting factor to the results of the comparison group participants. Differences between unweighted means were then analysed using multiple linear regression^[157] performed using Stata version 8.0, first adjusting for current age (labelled 'age adj mean diff') and subsequently adjusting for the additional potential confounding factors of highest education, current marital status, and country of birth, as well as current age (labelled 'multiv. adj mean diff'). If distributional assumptions were not satisfied then median regression^[158] was performed which models the median of the distribution of the outcome rather than the mean (or equivalently minimises the sum of the absolute value of the residuals). Confidence intervals and significance tests for median regression parameters were computed using 1,000 bootstrap^[159] replications.

4.12.3 Investigation for any association between Korean War deployment characteristics and health in Korean War veterans

More detailed comparisons of health outcomes across subgroups of Korean War veterans were performed, utilising the Korean War deployment characteristics of highest rank during the Korean War (officer; non-commissioned officer; enlisted rank), Service branch (Navy; Army; Air Force), age at deployment (<=20; 21-25; 26-30; >=31 years), years of previous military service experience at deployment (<1 year; 1 to < 4 years; 4 or more years), total duration of deployment (< 6 months; 6 to 12 months; > 12 months), whether wounded in action during Korea (No; Yes, evacuation types 1 or 2; Yes, evacuation types 3 or 4), era first deployed (mobile phase; static phase; after armistice) and Combat Exposure Scale score (none; light; light-moderate; moderate; moderate-heavy; heavy).

Differences across subgroups of each deployment characteristic were modeled using binary logistic regression for dichotomous health outcomes performed using SPSS version 11.5, and linear regression for continuous outcomes performed using Stata version 8.0. Odds ratios (OR), or mean differences (mean diff), and their associated 95% confidence intervals (95% CI) and significance tests were first obtained using raw symptom/outcome counts, and then calculated with adjustment for the potential confounding factors of current age, highest education, current marital status, and country of birth (labelled 'adj OR' or 'adj mean diff'). In the regressions modelling differences across subgroups of Combat Exposure Scale score and wounded in action category, the two deployment characteristics of rank and Service branch at Korea were entered as additional covariates.

In relation to the deployment characteristics (exposures) of highest rank, age at deployment, years of previous service, duration of deployment, whether wounded in action, and combat exposure, the existence and magnitude

of response trends in symptom/outcome prevalence across exposure categories were also computed, using the exposure categories as linear variables in the regressions.

4.12.4 Covariates

When entered as covariates in the regressions current age, education, marital status, country of birth, and rank and Service branch during the Korean War, were each entered as categorical variables. Unless otherwise specified in the results tables, current age as a covariate was entered as five categories (65-69; 70-74; 75-79; 80-84; 85+ years), highest education as four categories (primary; any secondary up to grade 10; grades 11 or 12 or certificate; diploma or university), marital status as four categories (married or defacto; widowed; divorced or separated; single, never married), country of birth as two categories (Australia; other), rank as three categories (officer; non-commissioned officer; enlisted rank) and Service branch as three categories (Navy; Army; Air Force).

4.12.5 Interpreting tables in the results chapters

The following guide to interpreting tables in the results chapters is provided for the lay reader who may be unfamiliar with interpreting statistical analysis results.

The results of the statistical analyses comparing the Korean War veterans with the comparison group, and comparing subgroups of veterans across different Korean War deployment characteristics, are predominantly shown in tables accompanied by summary text in Chapters 6 and 7 respectively.

Differences between the Korean War veterans and the comparison group, or differences between subgroups of veterans, are typically presented in tables using odds ratios, mean (or median) differences, dose response slopes, and their 95% confidence intervals and P values. Some examples of these are presented in hypothetical tables below along with a guide to their interpretation.

Examples

Example Table 1. Prevalence of condition A in Korean War veterans and the comparison group

	Korean War veterans N=6,122		Comparison group N=1,510		Age adj OR*	Multiv. adj OR [†]	95% CI	P value
			weighted					
	n	(%)	n	(%)				
Condition A	1,009	(16.5)	170	(11.2)	1.75	1.69	1.41- 2.03	<0.001

In Example Table 1, 6,122 Korean War veterans and 1,510 comparison group subjects answered the section of the questionnaire pertaining to a health condition labelled "Condition A". Of those, 16.5% of the Korean War veterans and 11.2% of the comparison group (after applying a weighting factor, as described in section 4.12.1) were found to have condition A.

The value of the age adjusted odds ratio (age adj OR) means that Korean War veterans were 1.75 times more likely than the comparison group to have Condition A, after controlling for age differences between the two groups.

Other factors (called covariates), such as education, country of birth and marital status, can also differ between the two groups, and it can be important to control for differences such as these. The value of the multivariate adjusted odds ratio (multiv. adj OR) means that Korean War veterans were 1.69 times more likely than the comparison group to have Condition A, after controlling for multiple covariates.

The observed odds ratios are derived from the results of the 6,122 Korean War veterans and 1,510 comparison group subjects who participated in the study and who answered this section of the questionnaire. If more, or fewer, or different subjects had participated in the study, the resulting odds ratios are likely to differ from those shown in Example Table 1. Therefore, a 95% confidence interval (CI) is calculated to indicate a range of values within which the true odds ratio is likely to fall, 95% of the time. In Example Table 1 the 95% CI is calculated around the multiv. adj OR, and the values indicate that Korean War veterans are likely to be somewhere between 1.41 and 2.03 times more likely than the comparison group to have Condition A.

The probability (P) value is a measure of whether the observed difference between the two groups, in Condition A, was likely to have occurred by chance. A P value of less than or equal to 0.05 is conventionally regarded as being 'statistically significant' and means that there is a less than or equal to one in twenty (5%) probability of the result occurring by chance. In Example Table 1, the P value of <0.001 is highly statistically significant and indicates that there was a less than one in 100 (1%) chance that the difference between the Korean War veterans and the comparison group in Condition A was observed by chance.

In summary, the results presented in Example Table 1 could be described as showing that Korean War veterans were approximately 1.7 times more likely than the comparison group to have Condition A, and that this difference was statistically significant and unlikely to have occurred by chance.

Note, if the odds ratio and its entire confidence interval were below one (1) (eg adj OR=0.51, 95% CI 0.25 – 0.78) then this would mean that Korean War veterans were less likely than the comparison group to have Condition A. Alternatively, if the 95% CI were to include the value one (1) in its range (eg adj OR=1.49, 95% CI 0.81 – 2.13) then this would mean that the Korean War veterans were no more likely to have Condition A (i.e. the two groups were the same). This latter result would usually be accompanied by a large, non-significant P value greater than 0.05.

Example Table 2. Mean scores on Scale B for Korean War veterans and the comparison group

	Korean War veterans N=6,062		Comparison group N=1,506		Age adj mean diff*	Multiv. adj mean diff †	95% CI	P value
	weighted							
	Mean	(SD)	Mean	(SD)				
Scale B	55.81	(21.75)	68.96	(19.15)	-12.77	-12.03	- 13.27, -10.79	<0.001

Example Table 2 shows that 6,062 Korean War veterans recorded an average (mean) score of 55.81 on Scale B, whilst 1,506 comparison group subjects recorded an average score of 68.96. The standard deviation (SD) values are an indication of the scatter of individual group members scores around the group mean.

The value of the age adjusted mean difference (age adj mean diff) means that the Korean War veterans scored, on average, 12.77 points lower on Scale B than the comparison group, after age differences between the two groups were statistically controlled for. After controlling for additional important factors (covariates), which might differ between the two groups, the value of the multivariate adjusted mean difference (multiv. adj mean diff) means that the difference between the two groups on Scale B is 12.03 points, with Korean War veterans lower on the scale.

As explained in Example Table 1, the magnitude (or size) of the difference in average Scale B scores between groups may have varied if more, or fewer, or different subjects had participated. The 95% CI values in Example Table 2 indicate that the true multivariate adjusted mean difference between the Korean War veterans and comparison group is likely to lie somewhere between 13.27 and 10.79 points on Scale B (again with Korean War veterans lower on the scale).

The difference between the two groups on Scale B is shown to be statistically significant (i.e. the P value is smaller than 0.05). In this example there is a less than one in 100 (1%) chance of the result having occurred by chance.

Note, if the mean difference and its entire confidence interval were above zero (0) (eg adj mean diff=12.03, 95% CI 10.79-13.27) then this would indicate that the average Scale B score was higher for the Korean War veterans than for the comparison group. Alternatively, if the 95% CI were to include the value zero (0) in its range (eg adj mean diff=5.5, 95% CI -2.57, 10.68) then this would indicate that the difference in average scores on Scale B may equal 0, indicating no difference between the two groups. This latter result would usually be accompanied by a large, non-significant P value greater than 0.05.

Sometimes, particularly when dealing with large study groups, a statistically significant P value, and a 95% CI which excludes zero, arise even when the difference in average scores between two groups is very small and unlikely to represent a meaningful or important difference. Cohen (1988) recommends calculating 'effect' sizes to estimate whether a mean difference between groups represents a large, medium or small difference. A large effect size is defined by Cohen as a mean score difference equalling 0.8 of the average standard deviation of the groups combined (pooled standard deviation), a medium effect size is defined as a mean difference equalling 0.5 of the pooled standard deviation, and a small effect size is defined as a mean difference equalling 0.2 of the pooled standard deviation.

In Example Table 2, the pooled standard deviation value is estimated to approximately equal 20 (part way between the Korean War veterans SD value of 21.75 and the comparison group SD value of 19.15). The difference, between the Korean War veterans and the comparison group, of 12.03 points in their averaged scores on Scale B, represents a difference of approximately 0.6 of the estimated pooled standard deviation. This would be interpreted as a medium effect size. Combined with a CI which clearly excludes zero, and a statistically significant P value, this difference between groups on Scale B would usually be considered an important or meaningful difference.

In summary, the results presented in Example Table 2 could be described as showing that Korean War veterans scored on average 12 points lower on Scale B than the comparison group, that this was likely to represent a meaningful difference on Scale B, and that the observed difference was statistically significant and unlikely to have occurred by chance.

Example Table 3. Mean Scale C scores for Korean War veterans across categories of age at deployment

		Scale C					
Korean War veterans		Mean	(SD)	Mean diff	Adj mean diff	95% CI	P value
Age at deployment							
<= 20	(N=1,371)	12.66	(3.47)	0.00	0.00	-	0.347 †
21-25	(N=3,380)	13.04	(3.34)	0.37	0.17	-0.07, 0.41	
26-30	(N=1,035)	13.56	(3.17)	0.90	0.34	-0.04, 0.72	
>= 31	(N=246)	14.04	(3.17)	1.37	0.43	-0.32, 1.18	
Categorical dose response †		-	-	0.45	0.16	-0.01, 0.34	0.072

Example Table 3 shows the mean scores on Scale C for veterans subgrouped in to categories of age at time of deployment to the Korean War. For example, 1,371 veterans who were aged 20 years or younger at deployment recorded an average score of 12.66 on Scale C, while 246 veterans who were aged 31 years or older recorded an average score of 14.04. In this Table the youngest age group is set as the reference group (category) against which the other age groups are compared.

The adjusted mean difference (adj mean diff) values show that, after statistical adjustment for covariates, veterans aged 21-25 scored on average 0.17 points higher on Scale C, veterans aged 26-30 scored on average 0.34 points higher, and veterans aged 31 or older scored on average 0.43 points higher, on Scale C compared with veterans aged 20 or younger. The 95% CIs show a range of values in which the true difference in average Scale C scores, between the subgroups of veterans, is likely to fall 95% of the time. In each case in this example the 95% CIs include zero in their range; this means that the difference in average Scale C scores, between each older category of veterans compared with the youngest category of veterans, may equal zero, meaning no difference on Scale C between age categories.

In Example Table 3 there are two types of test used, each giving rise to a P value. The first P value (labelled with a †) is obtained from an overall test which measures whether any of the adjusted mean differences, for each older age category of veterans compared with the younger category, are likely to differ from zero by chance. The large observed P value of 0.347 indicates that the mean differences do not statistically significantly differ from zero; i.e. the differences that were observed in average Scale C scores between categories of veterans may have occurred by chance alone.

The second P value is obtained from a test to see whether there is a 'dose response' relationship between age category and average scores on Scale C; that is, to see whether there is an expected increase or decrease in average Scale C score per increase in age category. The dose response values (shown in the bottom row in Example Table 3) indicate that for each increase in age category (from ≤ 20 , to 21-25, to 26-30, to ≥ 31) there is an expected increase in average Scale C score of 0.45 points, or 0.16 points after statistical adjustment for covariates. The associated 95% CI includes zero in its range, which means that the expected difference in average Scale C score, per increase in age category, may equal zero, thereby indicating no increase or decrease in average Scale C score (or no dose response relationship). The large P value accompanying these results, confirms that the observed difference in average Scale C score, per increase in age category, was not statistically significant and may have occurred by chance alone.

As described at Example Table 2, an 'effect' size can be calculated to estimate whether a difference between groups, in mean scores on a scale, represents a large, medium or small difference. In Example Table 3, the pooled standard deviation is likely to approximately equal 3.2. The adjusted mean difference of 0.43 points on Scale C between veterans aged 20 or younger, and veterans aged 31 or older, equals approximately 0.13 of the pooled standard deviation. This would be defined by Cohen (1988) as a small effect size, and could be interpreted as representing a small, or possibly unimportant, difference on Scale C between these groups.

In summary, the results presented in Example Table 3 could be described as showing that, whilst veterans who were older at deployment tended to score slightly higher on Scale C than veterans who were younger at deployment, these differences were small, not statistically significant, and possibly occurred by chance. The conclusion is that there is no difference in average Scale C score between veterans who were older at deployment compared with veterans who were younger.

As described in the previous examples, note that if the 95% CIs around the adjusted mean differences had been fully above, or fully below, zero, then this would mean that the average Scale C scores did differ between the youngest, versus the older, age categories, or per change in age category.

4.13 Ethics Committees

The study was approved by the following Ethics Committees:

- The Monash University Standing Committee on Ethics in Research Involving Humans.
- The Department of Veterans' Affairs Human Research Ethics Committee.

Letters of endorsement from each of these Committees are provided at Appendix L.