UNIVERSITY OF AUCKLAND

Deprivation in Venous Leg Ulceration

HOPE Foundation for Research on Ageing

SCHOLARSHIP IMPACT REPORT

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Thank You and Summary:

Firstly, I would like to express my gratitude to the HOPE Foundation for Research on Ageing for their generous support throughout this research project. The Hope Foundation has been instrumental in enabling us to investigate deprivation in individuals with venous leg ulcers. This study aims to examine the distribution of deprivation using the NZ Deprivation Index (NZDep) and the Indices of Multiple Deprivation (IMD) among trial participants, compared to the general New Zealand population, to determine whether deprivation is linked to venous ulcer healing. This project has been an invaluable opportunity, teaching me a wide range of skills and significantly enhancing my knowledge of this area. The funding provided has enabled us to gather valuable insights and advance important progress in this field. I am incredibly grateful for the chance to pursue this important research with The Hope Foundations support.

Input

The financial resources received to fund scholarship activities included pay installments that allowed me to stop my full-time work over summer and dedicate my time to research.

Research Activity

The tasks performed in response to receiving this financial support included data extraction. The data extraction process involved aggregating data from five historical trials to form one large dataset [1-5]. Paper records dating back to the first trial, which took place in 2000, were pulled from secure storage facilities for data to be collated, including the name and addresses of each participant involved in each trial, accumulating over 1,000 hits.

Further, data was collated from the five trials for each participant, including ulcer area, duration of time to heal, smoking status, history of varicose ulcers, prescribed antihyperlipidemic, history of deep vein thrombosis, and other variables as displayed in Table 1, to assess for further confounding or contributing factors in the occurrence of venous leg ulcers.

Skills around managing data sovereignty and maintain privacy were obtained, including the formulation of a unique alpha numeric identification system. Furthermore, the handling, management, storage, analysis and interpretation of the data was governed in accord with the Charter of Te Mana Raraunga [6].

Data was organised and tidied, involving the removing of duplicates and conducting randomised source checks to ensure continuity of data to minimise the risk of human error that could be introduced. After the data had been tidied, it was formatted and deidentified for geocoding software to be run through it, in order for each participants home address to be converted into a deprivation 'level'.

The deprivation level was quantified using the New Zealand Deprivation Index and the New Zealand Index of Multiple Deprivation (IMD). The New Zealand Deprivation Index provides a deprivation score for small areas of New Zealand,

named 'Statistical Areas', where 1 represents the areas with the least deprived scores and 10 the areas with the most deprived scores [7].The IMD is generated using 29 different indicators obtained from administrative data sources available in the Integrated Data Infrastructure (IDI), the 2018 and 2013 Census, and a range of geospatial data [8-9].

The data was processed using R Script, a platform for running statistical libraries, to convert address information into geospatial data. This data was then correlated with the NZ Deprivation Index and the Indices of Multiple Deprivation. With this information, analyses were conducted to assess whether deprivation was linked to venous ulcer healing.

Research Output(s) and Research Outcome(s)

After exclusion criteria were applied, an analysis of the study's 913 remaining participants showed the following:

Table 1. Participant characteristics by ethnicity

	Māori (N=126) N (%)	Pasifika (N=115) N (%)	Non-Māori non-Pasifika (N=672) N (%)	Total (N=913) N (%)
Age (SD)	51.0 (15.7)	49.3 (14.2)	70.3 (14.5)	65.0 (17.1)
Female	37 (29.4)	45 (39.1)	340 (50.6)	422 (46.2)
Diabetes	17 (13.5)	28 (24.3)	46 (6.8)	91 (10.0)
Smoking status				
Current	44 (34.9)	25 (21.7)	67 (10.0)	136 (14.9)
Ex-smoker	49 (38.9)	33 (28.7)	266 (39.6)	348 (38.1)
Never	33 (26.2)	57 (49.6)	338 (50.2)	428 (46.9)
Missing	-	-	1 (0.1)	1 (0.1)
Margolis index				
0 (Normal)	47 (37.3)	49 (42.6)	278 (41.4)	374 (41.0)
1 (Slow)	53 (42.1)	50 (43.5)	277 (41.4)	380 (41.6)
2 (Slow)	26 (20.6)	16 (13.9)	117 (17.4)	159 (17.4)
Clinical history				
ABI (SD)	1.1 (0.2)	1.1 (0.1)	1.1 (0.2)	1.1 (0.2)
Varicose vein treat	32 (25.4)	23 (20.0)	214 (31.8)	269 (29.5)
DVT	8 (6.3)	8 (7.0)	123 (18.3)	139 (15.2)
Joint replaced	9 (7.1)	5 (4.3)	132 (19.6)	146 (16.0)
Leg fracture	21 (16.7)	11 (9.6)	132 (19.6)	164 (18.0)
Statin use	26 (20.6)	26 (22.6)	137 (20.4)	189 (20.7)
Ulcer history				
Ulcer area*	2.7 (1.1–7.1)	3.2 (1.2 – 6.6)	2.8 (1.1 – 7.8)	2.9 (1.1 – 7.5)
Ulcer duration*	20.5 (10.0 - 50.5)	17.0 (11.0 - 42.0)	20.0 (11.0 – 40.0)	10.0 (20.0 – 40.0)
Healed	75 (59.5)	82 (71.3)	394 (58.6)	551 (60.4)
Days to healing*	81 (38 – 106.8)	83 (41 – 116)	84 (47.3 – 127.8)	84 (43 – 123.5)
Trial participation				
HALT	51 (40.5)	26 (22.6)	277 (41.2)	354 (38.0)
PREPARE	11 (8.7)	10 (8.7)	18 (2.7)	39 (4.3)
Aspirin4VLU	34 (27.0)	47 (40.9)	141 (21.0)	222 (24.3)
Keratin4VLU	16 (12.7)	13 (11.3)	99 (14.7)	128 (14.0)
Factorial4VLU	14 (11.1)	19 (16.5)	137 (20.4)	170 (18.6)

SD = standard deviation. ABI = Ankle-Brachial Index. DVT = Deep Vein Thrombosis.
* = median and interquartile range.

Table 1 compares data extrapolated from the five historical trials by ethnicity. The analysis revealed there to be differences in the mean age, percentages of participants with type two diabetes mellitus, and percentage of those who identify as current smokers when participants were grouped into self-identified ethnicity (Māori, Pasifika, Non-Māori, Non-Māori/Non-Pasifika). The mean age of Māori and Pasifika persons across the trials was younger than that of those Non-Māori/Non-Pasifika, with greater percentages of those Māori and Pasifika persons involved in the trials found to have type two diabetes mellitus and currently smoke than those Non-Māori/Non-Pasifika (see Table 1).

The Margolis Index is a prognostic tool that uses the baseline ulcer size alongside the ulcer duration to assess likelihood of healing within 24 weeks (higher scores indicating a lower likelihood of healing), showed similar results across all ethnicities (see Table 1) [10]. This finding suggests that median ulcer area and duration were comparable among all participants regardless of ethnic identity.

Further, Table 1 showed that percentages of venous leg ulcers that healed were the greatest for Pasifika participants (71.3%) than for both Māori or non-Māori

Table 2. Numbers and percentages of participants with venous leg ulcers by ethnicity within quintiles of the Indices of Multiple Deprivation (minus Health) 2013 and 2018 and the New Zealand Deprivation Index 2013 and 2018.

	Māori (N=126) N (%)	Pasifika (N=115) N (%)	Non-Māori non-Pasifika (N=672) N (%)	Total (N= N (%)
IMD2018				
Quintile 1	2 (1.6)	2 (1.7)	97 (14.4)	101 (11.1)
Quintile 2	8 (6.3)	6 (5.2)	123 (18.3)	137 (15.0)
Quintile 3	11 (8.7)	7 (6.1)	157 (23.4)	175 (19.2)
Quintile 4	30 (23.8)	19 (16.5)	157 (23.4)	206 (22.6)
Quintile 5	75 (59.5)	81 (70.4)	138 (20.5)	294 (32.2)
IMD2013				
Quintile 1	3 (2.4)	1 (0.9)	107 (15.9)	111 (12.2)
Quintile 2	5 (4.0)	3 (2.6)	119 (17.7)	127 (13.9)
Quintile 3	14 (11.1)	8 (7.0)	140 (20.8)	162 (17.7)
Quintile 4	36 (28.6)	20 (17.4)	177 (19.2)	233 (25.5)
Quintile 5	68 (54.0)	83 (72.2)	129 (19.2)	280 (30.7)
NZDep2018				
Quintile 1	6 (4.8)	4 (3.5)	91 (13.5)	101 (11.1)
Quintile 2	3 (2.4)	4 (3.5)	108 (16.1)	115 (12.6)
Quintile 3	15 (11.9)	12 (10.4)	146 (21.7)	173 (18.9)
Quintile 4	23 (18.3)	18 (15.7)	180 (26.8)	221 (24.2)
Quintile 5	79 (62.7)	77 (67.0)	147 (21.9)	303 (33.2)
NZDep2013 *				
Quintile 1	4 (3.2)	3 (2.6)	105 (15.6)	112 (12.3)
Quintile 2	4 (3.2)	6 (5.2)	133 (19.8)	143 (15.7)
Quintile 3	16 (12.7)	11 (9.6)	125 (18.6)	152 (16.6)
Quintile 4	29 (23.0)	17 (14.8)	172 (25.6)	218 (23.9)
Quintile 5	72 (57.1)	78 (67.8)	122 (18.2)	272 (29.8)

IMD = Indices of Multiple Deprivation. NZDep = New Zealand Deprivation Index.
* Sixteen values missing as NZDep2013 did not include a meshblock for those participants' addresses, likely due to the remoteness of the participant's location.

non-Pasifika participants, with similar rates of healing (59.5% and 58.6% respectively). Median days till healing were similar in all groups.

With the home addresses of the participants gathered from the five historical trials, geospatial data analysis methods were applied to categorise each participant into a quintile, a measure of deprivation defined by the 2013 and 2018 New Zealand Deprivation and Indices of Multiple Deprivation (minus health), seen in Table 2.

From the total category in Table 2, it can be seen more people with venous ulcers were in the more deprived quintiles and that the pattern of deprivation was most pronounced in Māori and Pasifika participants. For Non-Māori and Non-Pasifika participants, the pattern was less marked although the greater majority of participants were in the more deprived quintiles (3, 4, and 5). These patterns remained stable no matter which measure of deprivation (NZDep or IMD) or which timepoint (2013 or 2018) was used.
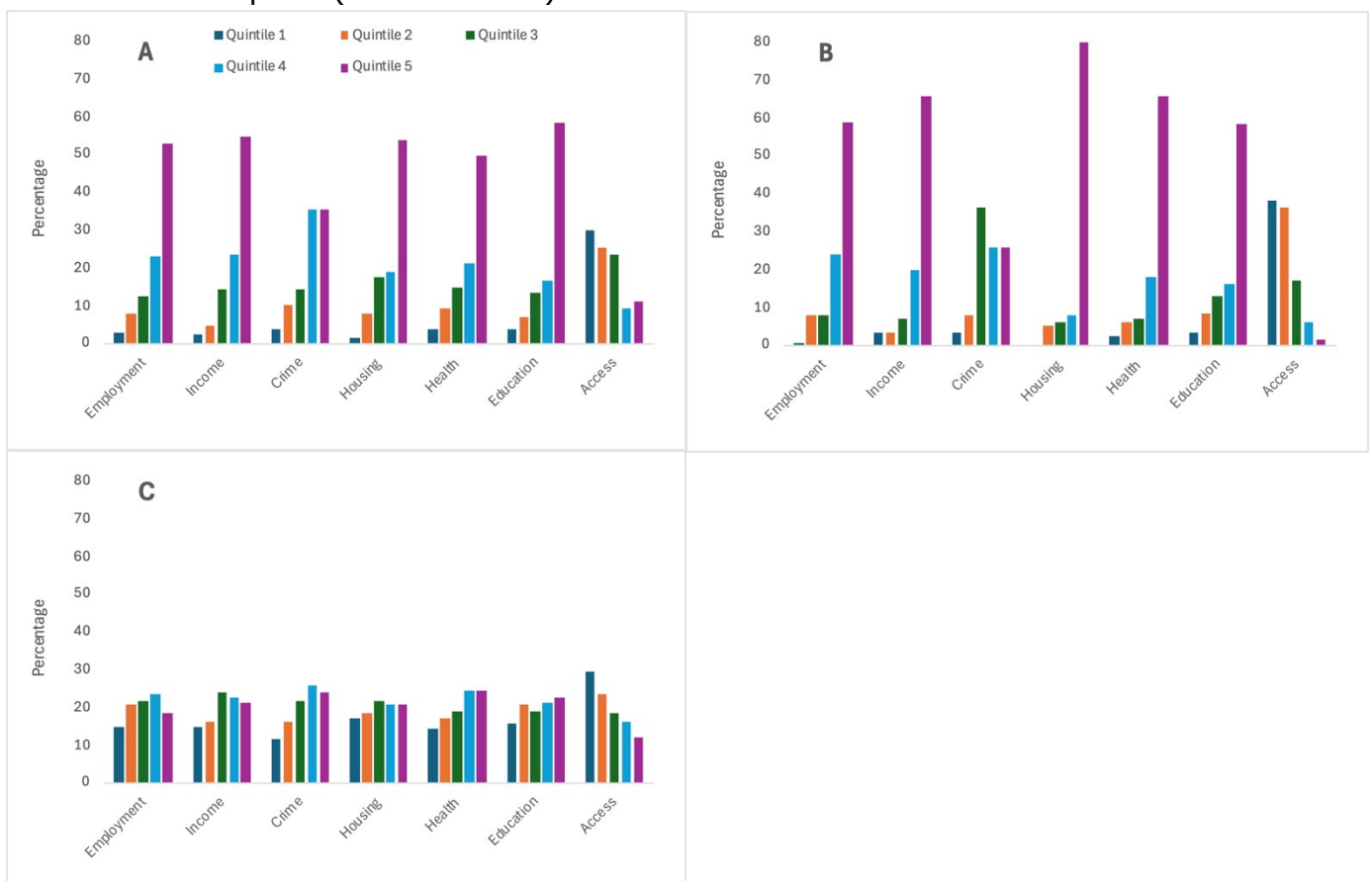

Figure 1. Distribution of exposure to deprivation by quintile for each IMD2018 domain for Māori (A), Pasifika (B), and non-Māori non-Pasifika participants with venous leg ulcers. (Note quintile 1 is the least deprived and quintile 5 is the most deprived).

Examining deprivation across the seven domains for IMD 2018, Figure 1 shows that the pattern of deprivation remains with the majority of Māori and Pasifika falling within the most deprived quintile for employment, income, housing, and education, or two most deprived quintiles for crime. The most deprived quintiles

also had the least access to services in Māori and Pasifika participants. In non-Māori and non-Pasifika persons, the distribution of participants between the six domains (employment, income, crime, housing, health, and education) showed much less variation, although the general pattern observed in Māori and Pasifika was repeated.

Additional statistical analysis was performed to assess the effect of deprivation on the percentage of the participants healed and time to healing across all ethnic groups measured, Māori, Pasifika, and non-Māori and non-Pasifika.

The crude odds ratio showed no association between deprivation and the percentage of the participants healed (OR 1.03, 95%CI 0.94 – 1.14) or when adjusted for age and ethnicity (OR 1.0, 95%CI 0.90 – 1.11). The separate analyses for each ethnic group also showed no associations. No association was observed between deprivation and time to healing (HR 1.01, 95%CI 0.95 – 1.08) or when adjusted for age and ethnicity (HR 0.98, 95%CI 0.95 – 1.05).

These findings showed that although more Māori and Pasifika participants were found to experience deprivation than non-Māori and non-Pasifika, there was no association with deprivation and healing or time to healing.

(Future) Impact

The findings from this study, made possible through the support of the HOPE Foundation, will deliver an important message to clinicians working with venous leg ulcers. They will emphasise that, regardless of important deprivation, individuals with venous leg ulcers who have access to the appropriate and effective treatment within a trial have similar likelihood of healing and achieving the same clinical outcomes as others, irrespective of their level of deprivation.

The findings from this study will inform the preparation of a publication that will be shared and presented to relevant healthcare professionals, including nurses, general practitioners, and district nurses involved in the care of venous leg ulcers. This publication will serve as a valuable resource to guide best practices in wound care, and provide hope to those who suffer from a venous leg ulcer, that their circumstances should not prevent their healing.

Media releases of the studies findings will be made to disciplinary publications, examples being potentially Kaitiaki Nursing New Zealand, NZ Doctor and the NZ Wound Care Society, to inform healthcare providers who have access to these resources of the study's findings.

Access to this information could help foster and maintain optimism in individuals with venous leg ulcers, providing they have access to high compression for treating their venous leg ulcers. Additionally, it can encourage healthcare providers to persist in offering the best treatment options.

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