PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (see an example) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below. Some articles will have been accepted based in part or entirely on reviews undertaken for other BMJ Group journals. These will be reproduced where possible.

ARTICLE DETAILS

TITLE (PROVISIONAL)	A cohort study comparing cardiovascular risk factors in rural Māori, urban Māori and non-Māori communities in New Zealand
AUTHORS	Vicky A Cameron, Allamanda F Faatoese, Matea W Gillies, Paul J Robertson, Tania M Huria, Rob N Doughty, Gillian A Whalley, A Mark Richards, Richard W Troughton, Karen N Tikao-Mason, J Elisabeth Wells, Ian G Sheerin and Suzanne G Pitama

VERSION 1 - REVIEW

REVIEWER	Associate Professor Fiona Turnbull Co-Director, Cardiovascular Division The George Institute for Global Health Sydney, AustraliaAssociate Professor Fiona Turnbull Co-Director, Cardiovascular Division The George Institute for Global Health Sydney, Australia
REVIEW RETURNED	02/02/2012

GENERAL COMMENTS	The study is interesting, reasonably contemporary and is clearly written. It is also potentially relevant to other countries where significant proportions of the Indigenous population are living outside metropolitan areas. I have the following 3 main comments: 1. The main weakness of the study is that, while the Introduction seems to indicate that the largest life expectancy gaps exist within rural populations (i.e between Maori and non-Maori living in rural areas) the study does not include a non-Maori rural cohort so this comparison is not possible. This is disappointing because the study cannot answer what appear to be the bigger questions: To what extent this life expectancy be explained by cardiovascular disease? Which risk factors contribute to the gap and how do they differ between the Maori and non-Maori populations living in rural areas ? 2. The definitions of 'rural' and urban' are not provided so it is difficult for the reader to get an accurate picture of the groups being compared. Is 'rural' defined by access to health services or are there other geographic criteria for defining rural populations? This is important not only for the internal validity of the study but also for international audiences to gauge how generalisable the findings are to other country settings. Some other aspects of the study also require further explanation for an international audience – for e.g a brief explanation of the organisation of primary health care services in NZ, the electoral roll as the ideal sampling frame, the accuracy of identifying individuals as either Maori or non-Maori, some explanation of 'kaupapa Maori'. The presentation of population density maps or other visual representation of the population may be useful. 3. The authors chose to present single risk factors but an interesting and perhaps more informative approach might have been to

	calculate the absolute cardiovascular risk which could presumably be derived from the variables the authors have collected. The risk equations also consider Indigenous status and New Zealand has been a leader in this area. One limitation not mentioned by the authors is the reasonably poor reliability of single or even two blood pressure measurements to define patients as either hypertensive or normotensive.

REVIEWER	Dr.Srinivas Kondalsamy-Chennakesavan School of Medicine, The University of Queensland Australia Statement of competing interest: None
REVIEW RETURNED	20/02/2012

THE STUDY	The reviewer is not sure if the reported results are applicable to other rural Maori communities. The reviewer would like to know if there are differences in any age-adjusted inferences if the cohorts are stratified by gender.
GENERAL COMMENTS	Major concerns: 1. Participants were identified as being of Maori descent on the electoral roll. Are there any studies evaluating the accuracy of such rolls/self identification among Maoris? 2. Can the authors comment on the results if the study is stratified by gender? 3. In the multivariate model predicting hypertension among rural Maoris, current smoking status seems to exert a protective effect. It requires some explanation in the discussion. Minor concerns: 4. Additional information that is likely to be useful for health services will add value to the study: such as % of previously diagnosed/treated patients with adequate control (blood pressure <140/90, HBA1c <7% etc) 5. International audience will benefit if a detailed comparison is made with other similar Indigenous groups such as native Americans/Canadians

VERSION 1 – AUTHOR RESPONSE

Response to Comments from Reviewers

From the managing editor:
Regarding reviewer Kondalsamy-Chennakesavan's final point - this would certainly be an optional revision as it is outside the scope of the paper and at BMJ Open we try to avoid the form of peer review that requests extra work to be undertaken unless it is essential for the clarity of the paper. In this case it may improve the paper but it was not what you set out to do and the paper can stand alone without that comparison.

Authors' Response: Thank you for your understanding on this point. We agree that a comparison with other indigenous peoples as suggested by Reviewer 2 would be very lengthy (but would make an excellent subject for a Review paper!)

Reviewer: Associate Professor Fiona Turnbull

Co-Director, Cardiovascular Division
The George Institute for Global Health
Sydney, Australia

The study is interesting, reasonably contemporary and is clearly written. It is also potentially relevant to other countries where significant proportions of the Indigenous population are living outside metropolitan areas. I have the following 3 main comments:

1. The main weakness of the study is that, while the Introduction seems to indicate that the largest life expectancy gaps exist within rural populations (i.e between Maori and non-Maori living in rural areas) the study does not include a non-Maori rural cohort so this comparison is not possible. This is disappointing because the study cannot answer what appear to be the bigger questions: To what extent this life expectancy be explained by cardiovascular disease? Which risk factors contribute to the gap and how do they differ between the Maori and non-Maori populations living in rural areas?

Authors' Response:
We appreciate the chance to clarify the objectives of the study and explain the characteristics of the cohorts involved and their reason for inclusion.

Reason for not including a non-Maori rural cohort- The central purpose of the study was not to explore life expectancy gaps between Māori and non-Māori within rural populations. There is a wealth of data in New Zealand national statistics and hospital admission data on the health disparities between Māori and non-Māori, including, on a macro scale, mortality and ischaemic heart disease in rural Māori versus non-Māori. We have removed from the Introduction the statement that "life expectancy for Māori is less than the overall rural population," since it was misleading for the reader. Although in the Introduction we indicated there is a substantial differential in life expectancy between Māori and non-Māori in the rural population, this is no worse than the overall 8-year difference in life expectancy nationally, and it has been well established that cardiovascular disease is the leading cause of death contributing to this. The key point made in the Introduction is that "Rural Māori have [an even] shorter life expectancy than urban Māori," and yet no one had previously looked at risk factors in rural Māori for the past 50 years. Our purpose was to fill a gap in our knowledge about the risk factors that underlie and are contributing to the most severe end of these health disparities at a community level, and how these might vary across the Māori population, between the extremes of low income, ethnically homogeneous, more remote areas compared with less deprived, urbanised, less remote areas.

Moreover, to achieve a matched non-Māori rural sample would have been challenging because of differing demographics between Māori and non-Māori in Wairoa and the small number of non-Māori residing in the district. The age- and gender profiles of non-Māori differ from Māori (younger population profile); to match the Māori sample, we would have needed to sample 1 in every 2 non-Māori 20-29 year-old male and female in the District. Further, non-Māori do not occupy the same income strata as Māori in Wairoa and hence rural non-Māori do not share the same levels of deprivation as rural Māori.

In contrast, in Christchurch, with a large urban population, it was relatively straightforward to recruit samples of non-Māori matched for age and gender to the Māori sample. Socioeconomic discrepancies in these urban cohorts were also not so marked. Therefore, these three samples allowed us, firstly to identify risk factors in common and those that differ between two diverse Māori samples, and secondly to compare concurrent risk factors in a sample of the non-indigenous New Zealand population.

The Introduction has been substantially amended to clarify the underlying objectives of the study, and

are highlighted using Track Changes in the revised manuscript.

2. The definitions of 'rural' and urban' are not provided so it is difficult for the reader to get an accurate picture of the groups being compared. Is 'rural' defined by access to health services or are there other geographic criteria for defining rural populations? This is important not only for the internal validity of the study but also for international audiences to gauge how generalisable the findings are to other country settings. Some other aspects of the study also require further explanation for an international audience – for e.g a brief explanation of the organisation of primary health care services in NZ, the electoral roll as the ideal sampling frame, the accuracy of identifying individuals as either Maori or non-Maori, some explanation of 'kaupapa Maori'. The presentation of population density maps or other visual representation of the population may be useful.

Authors' Response:
Definition of Rural and Urban- We accept the Reviewer's suggestions and have now added a section to the Methods (page 6) to expand the definition of the "rural" and "urban" characteristics of the two regions under study. As described above, these communities are more diverse than just residing in a rural area or not, and we have now placed a greater emphasis on defining these distinctions.

Primary health care services in NZ- A brief explanation of the organisation of primary health care services in NZ, and specifically the administration of the services to each of the localities has now been added under Methods (see revised manuscript, page 6-7).

The electoral roll as the ideal sampling frame- A statement as to why we used the electoral rolls as our sampling frame has been added to the Methods (page 7). NZ electoral rolls have 93.44% enrolment of the eligible population, are updated every 3 years and allowed selection of targeted age and gender samples of Māori and non-Māori descent. While we cannot establish that this was "the ideal" sampling frame, it avoided bias in other methods of sampling, such as by telephone directory, since recent evidence suggest more Māori use cell phones than landlines.

Kaupapa Māori research- A short paragraph describing the purpose and characteristics of kaupapa Māori research methodologies is now included in the Methods under the subheading Participants, pages 7-8.

Presentation of population density maps- We hope that the expanded description of the two localities is now sufficient, and that population density maps do not need to be included.

3. The authors chose to present single risk factors but an interesting and perhaps more informative approach might have been to calculate the absolute cardiovascular risk which could presumably be derived from the variables the authors have collected. The risk equations also consider Indigenous status and New Zealand has been a leader in this area. One limitation not mentioned by the authors is the reasonably poor reliability of single or even two blood pressure measurements to define patients as either hypertensive or normotensive.

Authors Response:
Cardiovascular Risk Scores- We have tentatively included an additional Table 4 with 5-year Cardiovascular Risk Scores, as published in the New Zealand Cardiovascular Risk Guidelines, along with a description of these data in the Results section and interpretation in the Discussion section. The interpretation is complex as the New Zealand Risk Guidelines recommend scores be adjusted upwards by 5% in Māori, making comparisons between ethnic groups challenging, and the performance of the NZ risk assessment equation in predicting five-year CVD events, particularly for Māori, is currently undergoing scrutiny and reconsideration. Nevertheless, the CVD Risk scores show the expected trend of increasing risk scores across the three cohorts from non-Māori, to urban Māori,

to rural Māori in all age and gender categories except 60-65 year-old males, although differences among the cohorts were less than the variation in composite risk factors might have predicted. Because the primary objective of the study was to identify how individual risk factors differed or not across the two Māori samples and in the non-Māori sample, we are uncertain whether combining risk factors into an absolute risk score is informative. We will take the recommendation of the Reviewer and Editor as to whether to include these data (although inclusion of the Table may satisfy a query by Reviewer 2 regarding stratification by gender).

Limitation in defining hypertension- A sentence has been added to the Limitations section (page 26), "The authors recognise that use of two blood pressure measurements in a clinic setting is not a definitive diagnosis of hypertension."

Reviewer: Dr.Srinivas Kondalsamy-Chennakesavan
School of Medicine, The University of Queensland
Australia

Statement of competing interest:
None

The reviewer is not sure if the reported results are applicable to other rural Maori communities.

Authors' Response:
In line with comments made by Reviewer 1, we have now clarified the in the Introduction as to how the selected Māori samples compare with other Maori communities, which we hope to satisfy the Reviewer's query. Our intention was determine how CVD risk factors vary across extremes of the Māori population, between low income, mainly Māori, more remote areas compared with less deprived, urbanised areas. As now stated in the Introduction, almost half the high deprivation residents in areas classified as "Highly Rural/Remote" are Māori. Therefore, we acknowledge the Wairoa Māori cohort may be at an extreme end of the rural Māori spectrum, but it is an extreme shared with a substantial number of rural Māori. We believe our findings will be informative for public health initiatives aiming to improve the most disadvantaged sections of the New Zealand population.

The reviewer would like to know if there are differences in any age-adjusted inferences if the cohorts are stratified by gender.

Authors' Response:
See response to Point 2, below.

Major concerns:

1. Participants were identified as being of Maori descent on the electoral roll. Are there any studies evaluating the accuracy of such rolls/self identification among Maoris?

Authors' Response:
Initial selection for the Māori samples was based on those who identified as being of Māori descent on the electoral roll, but to be eligible for the study all Māori participants had to also self-identify as being of Māori ethnicity at interview. A total of 22 individuals participated in the baseline screening but were excluded from further analysis as they did not fit our strict eligibility criteria for Māori, or vice versa, for non-Māori ethnicity.

2. Can the authors comment on the results if the study is stratified by gender?

Authors' Response:
Inclusion of the new Table 4, showing the estimated CVD Risk Scores by age and gender categories, may go some way to address this query. Risk factors did vary by gender, with Māori females tending to have higher percent body fat and a higher rate of current smoking, while Māori males tended to have higher systolic and diastolic blood pressures and more elevated cholesterol. However, the numbers within the subgroups stratified by gender limited the ability to draw statistically valid conclusions.

3. In the multivariate model predicting hypertension among rural Maoris, current smoking status seems to exert a protective effect. It requires some explanation in the discussion.

Authors' Response:
This is not a new finding and has been referred to as the smoker's paradox. The following passage has been added to the Discussion:
"In our data, the multivariate model predicting hypertension appears to indicate that smoking exerts a protective effect on hypertension in rural Māori. This apparent smoker's paradox, where current smokers have less hypertension or better CVD outcomes than former or never smokers, has been previously reported in the literature 25, 26. It has been suggested that smoking protects against hypertension only in overweight and obese, but not in normal weight individuals, 25 which may explain why it is more evident in the rural cohort."
New References
(25) U. John, C. Meyer, M. Hanke, H. Volzke, A. Schumann. Smoking status, obesity and hypertension in a general population sample: a cross-sectional study. Q J Med 2006; 99:407–415.
(26) G. Weisz. D.A. Cox, E. Garcia, J.E. Tcheng, J.J. Griffin, G. Guagliumi, T.D. Stuckey, B.D. Rutherford, R. Mehran, E. Aymong, A. Lansky, C.L. Grines, G.W. Stone. Impact of smoking status on outcomes of primary coronary intervention for acute myocardial infarction—The smoker's paradox revisited. Am Heart J 2005;150:358-64

Minor concerns:

4. Additional information that is likely to be useful for health services will add value to the study: such as % of previously diagnosed/treated patients with adequate control (blood pressure <140/90, HBA1c <7% etc)

Authors' Response:
This information is quite complex, as "adequate control" targets in the NZ CVD Guidelines vary according to the presence of other co-morbidities eg high-risk categories of known CVD, diabetes or absolute CVD risk >15%. In a previous publication (Faatoese et al., Aust NZ J Public Health. 2011; 35:517-23) we reported the levels of treatment and treatment targets achieved in the rural Wairoa Māori cohort only. In the interests of keeping the current paper as short as possible, we request that we publish the comparison of levels of clinical risk factor management between the rural and urban localities in a separate paper.

5. International audience will benefit if a detailed comparison is made with other similar Indigenous groups such as native Americans/Canadians

Authors' Response:
We would be interested in writing a detailed comparison of Māori health with other indigenous groups. However, such a comparison with other indigenous communities, even if limited to comparable

Western countries (Australian Aborigine, Canadian First Nation People, Native Americans, Alaskan Eskimo, and the many indigenous peoples of South America), would be very extensive. We think this is beyond the scope of the current manuscript.

VERSION 2 – REVIEW

REVIEWER	Srinivas Kondalsamy-Chennakesavan Senior Research Fellow School of Medicine The University of Queensland Australia
REVIEW RETURNED	24/04/2012

The reviewer completed the checklist but made no further comments.

REVIEWER	A/Prof Fiona Turnbull Co-Director, Cardiovascular Division The George Institute University of Sydney, Australia I have no conflicts of interest
REVIEW RETURNED	30/04/2012

GENERAL COMMENTS	The authors have carefully revised the paper in light of the comments and the comparisons of interest are justified. I do think the absolute risk scores are of interest given that they don't really reflect the main findings to the extent expected, particularly the differences between urban and rural Maori. The proportion of patients in each age decile in Table 4 may explain some of this since age is a strong determinant of risk. I would favour retaining this table because it prompts an interesting discussion of the relevance of the current risk charts (obesity is not included in the risk score and the scores may not predict well for younger individuals). However, the authors should also acknowledge some of the inherent limitations in their cohorts which make direct comparisons difficult (see point about age above). These limitations should also be tempered against the statement in the Discussion that "individual risk profiles may be more informative when deciding clinical management"

VERSION 2 – AUTHOR RESPONSE

Thank you again for your invitation to make the minor revision suggested by the Reviewer, which we have now done.

As suggested we have now expanded the Discussion of CVD Risk scores, including acknowledgement that the small differences in age distributions between the rural Māori and the other two cohorts might complicate comparisons of CVD risk scores (page 25). In addition, under Strengths and Limitations we have mentioned this as a limitation of the study (page 27). Track Changes has been used to indicate these changes within the manuscript.

We hope these amendments now satisfy the Reviewer's comments and the revised manuscript is now acceptable for publication in BMJ Open.