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Cardiovascular Disease Risk Factors in Pacific Adolescents: The Auckland High School Heart Survey

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ABSTRACT

Cardiovascular disease is the leading cause of mortality in New Zealand. The most current evidence indicates that the burden of cardiovascular disease is greatest among Maori and Pacific peoples and Pacific peoples have the highest mortality rate for cerebrovascular disease [1]. There is substantial scientific evidence that cardiovascular disease has its origin early in life and that a person's risk of cardiovascular disease is determined by the synergistic effect of all the cardiovascular risk factors over time.

The Auckland High School Heart Survey (AHHS) is an epidemiological survey designed to determine the prevalence of risk factors for cardiovascular disease in an adolescent high school population in New Zealand. It takes a 'lifecourse' and primary prevention approach to reducing the incidence of cardiovascular disease. The aims of the study were to determine cardiovascular risk factor levels in, and compare the cardiovascular and diabetes risk factor levels between, Pacific and European students and the main Pacific communities (Samoan, Cook Islands, Tongan, and Niuean).

The AHHS was a school-based cross-sectional survey of 2,549 adolescent students, across 10 Auckland High Schools. A cluster sampling technique was used to obtain the target of 1000 Pacific participants, to enable Pacific ethnic-specific analysis.

The study specifically aimed to determine ethnic-specific differences in lifestyle, intermediate and outcome variables that have been established as cardiovascular risks. Lifestyle variables included: smoking, alcohol consumption, leisure-time physical activity (LTPA), television exposure and sun exposure. The intermediate variables analysed included: body mass index (BMI), waist to hip ratio (WHR), percentage body fat (PBF) and physical work capacity 170 (PWC170). The outcome variables included: total cholesterol (TC), high density lipoprotein cholesterol (HDLC), ratio of total cholesterol to high density lipoprotein cholesterol (TC:HDLC), low density lipoprotein cholesterol (LDLC), triglycerides (TG), fasting blood glucose (FG), urinary micro albumin (UA), systolic and diastolic blood pressure (SBP & DPB). Demographic variables analysed included: sex, age, ethnic group, school, socio-economic status and growth development and maturation.

The AHHS study results showed that demographic variables were strongly associated with both
intermediate and outcome variables. The findings showed that there were significant ethnic variations between the four main ethnic groups (Pacific, Maori, Asian and European) in risk factors for cardiovascular disease.

Pacific participants had the highest BMI and PBF. Pacific participants had the lowest levels of PWC\textsubscript{170}. With regard to outcome variables, Pacific adolescents had lower levels of TC, HDLC and LDLC compared to Europeans. However, Pacific participants had higher levels of TC:HDLC, FG, TG and DPB.

To a lesser degree, lifestyle variables were also associated with other variables. However, the weaker association was likely due to measurement error. The findings of the AHHS study show that ethnic differences present in the adult population are already established among adolescents [2].

Some significant differences were also found between the Pacific ethnic groups (Samoan, Cook Islands, Tongan and Niuean). Among Pacific participants, Cook Islands participants also had the highest level of adjusted mean PWC\textsubscript{170}. With regard to outcome variables (lipids, fasting glucose and blood pressure), Tongan participants had lower TC, LDLC and TC:HDLC compared to Samoans. However, Tongan participants had significantly higher levels of TG compared to Samoans.

For Pacific participants, Cook Islands participants significantly differed from Samoan in smoking, alcohol consumption and PWC\textsubscript{170}. Cook Islands participants were more likely to have tried smoking for the first time and at an earlier age. They were also more likely to smoke daily and to smoke higher amounts than the other Pacific ethnic groups. Cook Islands participants were more likely to have tried alcohol and at an earlier age. They were also more likely to be drinking alcohol weekly or more often when compared to Samoans.

The AHHS study is one of the first pieces of epidemiological research undertaken in New Zealand that provides evidence that there are significant differences between Pacific ethnic groups for this age group.

The AHHS study was also able to identify the determinant that explains ethnic differences in outcome variables. BMI was the most significant variable in determining the ethnic differences in outcome variables (lipids, blood pressure and fasting glucose). The AHHS study results showed that Pacific participants had the highest BMI levels of all the ethnic groups, followed by
Maori. Television watching was the one lifestyle risk factor that was positively associated with BMI. The most effective variable in terms of decreasing mean difference in BMI was PWC\textsubscript{170}. PWC\textsubscript{170} was significantly lower in Pacific, Asian, and Maori participants compared with European participants. Pacific participants had the lowest levels of PWC\textsubscript{170} compared to all other ethnic groups.

The AHHS findings support early interventions and programmes targeted to adolescents to reduce the incidence of cardiovascular disease. The findings which show that there are significant differences between Pacific ethnic groups for this age group, may warrant some specific public health initiatives being targeted directly to Pacific ethnic-specific groups. In addition, interventions and programmes that target reducing BMI and improving physical fitness should have an impact on a number of important cardiovascular risk factor outcome variables in adolescents, including: blood pressure, lipids and fasting glucose.
DEDICATION

This is dedicated to my parents
Koli Heivakaola and Kasanita Schaaf

who sent me from Tonga
to New Zealand
in 1980
with the hope that
one day
this dream
would be realised
DECLARATION OF ORIGINAL WORK

This research was made by possible by a grant from the Health Research Council of New Zealand. The investigators on the research team were: Dr Robert Scragg, Dr Colin Tukuitonga, Dr Patricia Metcalf and Mr David Schaaf.

I, David Schaaf, have undertaken this research, including: collecting and analysing the data and writing of this thesis. This is all my own original work.
ACKNOWLEDGMENTS

This project evolved from a concern that Pacific peoples' burden from non-communicable diseases - such as diabetes, hypertension and heart disease - appeared to be increasing at an alarming rate. One way to address these types of non-communicable disease is by intervening at a young age to facilitate change. However, there has been a lack of evidence in order to inform intervention work. This survey provides some of the evidence needed, in order to carry out an intervention that will hopefully address the rate of these diseases in the adult population.

The success of this survey was dependent on the Pacific communities of South, Central and West Auckland and the 10 schools that were involved. First and foremost, a big thank you must go out to all three Pacific communities in Auckland, the Principals, the teachers and Board of Trustees of all 10 schools. A very special thank you to all the participants who were prepared to ride a bike on an empty stomach, get pricked with a needle and miss classes to participate in this survey. This survey would not have been possible if it was not for your support. Malo aupito, from the bottom of my heart.

I would also like to acknowledge the contribution of the following people and groups to the survey:

My Supervisors

Associate Professor Robert Keith Rhodes Scragg, the Principal Investigator of the Auckland High School Heart Survey, who gave me the opportunity to work on the survey and has passed on to me his knowledge about epidemiology and public health in General. I have learnt from his experience, his wisdom, his clarity of thoughts, his systematic approach, sound advice and approachable nature. Thank you for your understanding, it has been a difficult journey both physically and mentally but you helped me focus and achieve my goals.

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