Review of Biostatistics

in the

Faculty of Medical and Health Sciences

The University of Auckland

February 2008

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List of acronyms and abbreviations

ADHB:	Auckland District Health Board
BC:	Biostatistics Centre (FMHS)
BCA:	Biostatistics Collaboration of Australia
CTNZ:	Cancer Trials New Zealand
CTRU:	Clinical Trials Research Unit
CTRUBS:	CTRU Biostatisticians
DMAC:	Data Management & Analysis Centre, University of Adelaide
DOS:	Department of Statistics, Faculty of Science
DVC	Deputy Vice Chancellor
FMHS:	Faculty of Medical and Health Sciences
FMHSBS	Faculty of Medical and Health Sciences Biostatisticians
FOS:	Faculty of Science
HOD:	Head of Department
HOS:	Head of School
HRC:	Health Research Council (NZ)
MOH:	Ministry of Health
MRC:	Medical Research Council (NZ)
PBRF:	Performance Based Research Funding
SOM:	School of Medicine, FMHS
SOMS:	School of Medical Science, FMHS
SOPH:	School of Population Health, FMHS
UA:	University of Auckland
WCS:	Waikato Clinical School (UA)
WDHB:	Waikato District Health Board

Terms of reference

The terms of reference were drafted by the Head of the School of Population Health in consultation with the Deputy Dean, Faculty of Medical and Health Sciences, and agreed to by the members of the Review Panel:

The purpose of the review is to advise the Dean of the Faculty on:

1. *the extent to which the needs for biostatistical consulting and support in the Faculty are met by the present arrangements*
2. *how to make best use of current resources within the Faculty, and where there are gaps, how these might be remedied*
3. *how to strengthen links with biostatistical groups outside the Faculty*
4. *steps to be taken to ensure the long term viability of the biostatistical consulting service, including succession planning and funding*
5. *how to support the training and continuing professional development of consulting biostatisticians*
6. *how to turn the interactions between consulting, teaching and research to best advantage*

Review Panel

The panel consisted of an internal reviewer:

Professor Innes Asher, Head of the Department of Paediatrics, School of Medicine, Faculty of Medical and Health Sciences, The University of Auckland.

and an external reviewer:

Professor Philip Ryan, Professor of Health Research and Director of the Data Management & Analysis Centre, Discipline of Public Health, School of Population Health and Clinical Practice, Faculty of Health Sciences, University of Adelaide.

The panel was briefed by, and reported to:

Professor Ian Reid, Deputy Dean, Faculty of Medical and Health Sciences, The University of Auckland.

and

Professor Alistair Woodward, Head of the School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland.

The review panel received administrative assistance from:

Larissa Nears, Faculty of Medical and Health Sciences, The University of Auckland.

and

Va Strong, Department of Paediatrics, School of Medicine, Faculty of Medical and Health Sciences, The University of Auckland.

Review Process

Following agreement on the terms of reference and appointment of the Review Panel, the Deputy Dean sought written and/or oral submissions from all staff within the Faculty of Medical and Health Sciences, including the Clinical Schools and connected DHBs, and from the Department of Statistics, Faculty of Science. Written submissions were received from 39 staff/stakeholders (Appendix A), and face to face interviews were held with 29 (Appendix B).

The Review Panel spent two days (February 13 and 14) interviewing stakeholders at the Tamaki and Grafton campuses (see Appendix C). The Panel spent a third day, February 15, writing an initial draft report that was presented to the Deputy Dean, FMHS, and to the Head of the School of Population Health.

The final Report was delivered to the Deputy Dean on 27 March 2008.

The Review Panel wishes to thank staff of the Faculty of Medical and Health Sciences, and all those contributing to the work of this Review.

Executive Summary

The Review Panel found that current biostatistics resources in the Faculty, notwithstanding the very high quality of advice being given by highly valued consultants, to be fragmented, under-resourced, inadequately managed, and is unable to fulfill the Faculty's potential to realize its', and the University's, strategic goals.

The Panel found there is universal support - at least from those aware of its existence - for a biostatistical service, though there were many, sometimes conflicting, ideas from stakeholders as to how that should be constituted and the service delivered.

In its recommendations, the Panel took into account the needs of the Faculty and the wider University to maintain and lift their research profile, the wide variety of research interests of FMHS staff and students, the geographical dispersal of the Faculty, the needs of the statisticians for status commensurate with their value and for professional development opportunities, the pivotal role of the Department of Statistics, and the viability of the service in the longer term.

The Panel took the view, given the Faculty's research profile, and the working horizon of the current consulting statisticians, that no time should be wasted in overhauling the system.

Our principal recommendation is that a Biostatistics Centre be instituted within the Faculty with a strong academic flavour and senior academic (preferably Professorial) leadership. The Director of the Centre would report to the Dean or A/Dean (Research). The term "Centre" does not necessarily imply a single location. Rather the Centre, as initially conceived, would provide a disciplinary home for all the statistical resources of the Faculty (and interested parties outside the Faculty), and an administrative home for the existing FMHS statisticians and any new appointments. The Review Panel sees the Biostatistics Centre as a step towards a possible physical centre, but *if the Faculty secures the right leadership* then the Biostatistics Centre and its activities should evolve appropriately to serve the Faculty's needs. It may be that the Centre becomes part of a larger, University wide structure, as some submissions advised. However, the Panel's view is that the Faculty should first address its own, proximal needs, and satisfy the more prevalent wish for FMHS research staff to feel ownership of their statistical service.

The Faculty should, from the outset, engage with

1. the Department of Statistics, a primary source of both expertise and future staff, and a recipient of research substrate provided by FMHS.
2. the Auckland District Health Board as a source of funding for shared staff to enhance the research profile of all parties.
3. the Deputy Vice Chancellor (Research) to discuss access to the University's share of the PBRF as a source of start-up funding for the Centre

List of Recommendations

R1. That the existing statistical service be re-constituted and expanded to provide an effective resource to meet the Faculty's and University's strategic research objectives. We recommend the formation of a Biostatistics Centre [BC] within the Faculty [FMHS].

R2. That Faculty appoints a Director of the BC with professorial rank (perhaps at fractional time in the first instance and potentially a joint appointment with Statistics) reflecting that the BC is conceived of as an academic entity and that, as one function of the BC, consulting on research is itself an academic activity.

The succeeding recommendations follow from the two principal recommendations above.

R3. That the BC be located within FMHS, with the Director reporting to the Dean or the A/Dean (Research).

R4. That the BC provides, in the first instance, a disciplinary home to all statisticians working within the Faculty, and a structured forum for statisticians outside the Faculty (especially those in the Department of Statistics) with an interest in biostatistics to interact with the FMHS.

R5. That the three existing FMHS statisticians be members of the BC, reporting to the Director.

R6. That consulting services provided by the BC are more appropriately distributed between the Tamaki and Grafton campuses, at least by conducting substantial, regular, well publicised consulting sessions at the Grafton site, but preferably by full time presence at both major sites.

R7. That consideration be given to regular "outreach clinics" at FMHS clinical academic sites such as South Auckland, Waitematā, Waikato and Northland, in order to service existing research and foster the research climate at these sites.

R8. That consideration be given to providing a permanent contract for Mr Gamble from the BC so that Mr Gamble's valuable contribution to the Faculty can be maintained. (The process should allow immediate and preferential buy-back of his time by his existing funding sources, so their research programs are not compromised.)

R9. That statisticians within the Clinical Trials Research Unit, and other statisticians employed on external grants are made honorary members of the BC.

R10. That the Faculty use all its influence to ensure that plans of the Deputy Vice Chancellor (Research) to recruit biostatistical expertise in the area of bioinformatics/microarray analysis are brought to fruition at the earliest possible time; the Review Panel does not recommend that the Faculty of Medical and Health Sciences attempts its own recruitment.

R11. That the Director of the BC, in collaboration with researchers, develops strategies to help support new analytical techniques that are required for highly specialized research, especially in the medical sciences areas.

R12. That the BC, *adequately resourced*, takes responsibility for limited training of FMHS researchers and research students (perhaps as an induction event) in basic biostatistics and study design, as one strategy to lift the overall expertise in the Faculty and to facilitate efficient subsequent consultations.

R13. That FMHS engage constructively with the Department of Statistics and take the greatest care not to adversely impact on the position of that Department, a source of very substantial expertise in biostatistics for FMHS and whose graduates are likely to be the principal pool of future employees of the BC.

R14. That FMHS, via the Centre for Biostatistics, in collaboration with DOS, further consider opportunities presented by the BCA.

R15. That the BC be adequately funded and staffed to not just provide a consulting service to its expected client base but to ensure its long term viability as an academic unit.

R16. That free consulting to all FMHS research staff and students be limited to a set number of hours per project and/or per journal article or per thesis, and that if such a limit is reached the researcher or thesis supervisor should fund the excess at cost from their own research funds.

R17. That FMHS mandates every research application have a funding line to cover support for statistics and data management (or specifically justify why this is not required).

R18. That funding to initiate and maintain the BC be sourced from: existing funding to the FMHS statisticians, with additional specific funding lines from full cost recovery grants, and from funds accruing via the PBRF mechanism to the Office of the Vice Chancellor/Deputy Vice Chancellor (Research) and to the Faculty.

R19. That the Faculty explores, as a matter of priority, the possibility of financial contribution by the ADHB to underpin further statistical resource in the Centre, so that the Centre may provide service to researchers in the ADHB, enhance the research profile of both Faculty and ADHB, and avoid confusion over eligibility of access.

R20. That a web-based database be written to enable the Centre's statisticians, wherever they are located, to record the details of each occasion of consulting service and that the structure and fields of the database reflect the *agreed* minimum data set required by the Faculty Research office and other stakeholders.

R21. That staffing of the BC, and hence its funding, reflects the urgent need for succession planning in view of the current staff profile.

R22. That the Director of the BC institutes a staff development program specific to the needs of the biostatisticians (the program should complement whatever staff development processes may already be in place for those statisticians still sited within other administrative units).

Report of the Review Panel

We have keyed our discussion and recommendations, for the most part, to the terms of reference for the Review.

ToR 1.	*the extent to which the needs for biostatistical consulting and support in the Faculty are met by the present arrangements*

ToR 2.	*how to make best use of current resources within the Faculty, and where there are gaps, how these might be remedied*

FHMS requires a biostatistical resource to meet its strategic objectives and those of the University of Auckland (Appendices A and B)). There was unanimity from all interviewees that the FMHS should have a biostatistical resource which is freely accessible and sustainable. biostatistical resource is an integral part of research, and a core part of FMHS. An increased, sustainable, Faculty funded unit was sought by most.

The FHMS employs about 460 academic staff. In 2007 FMHS taught 474 research students: (203 doctoral students, 155 master students, 26 honours students and 90 summer students). Thus there is an academic workforce of about 1000 people. Of these a large proportion need statistical analyses for their teaching and research work, and also statistical input at the design stage. In 2007, there were 377 research grant applications processed by the Faculty Research Office, of which 99 were "full cost recovery".

The Faculty employs three biostatistical consultants (Alistair Stewart, Elizabeth Robinson, Joanna Stewart) (FMHSBS) operating from the Department of Epidemiology and Biostatistics at Tamaki campus. The panel found that their service was of very high quality, and, with rare exceptions, very highly valued by staff across the Faculty. Many staff expressed their appreciation of the statisticians' patience and helpful attitude, and especially their grasping of the research content area, not just the statistical issues. Several submissions commented on their expertise with study design and the general research process, as well as the analysis of data at the end of study.

But there were problems. Without undertaking a formal survey of staff we cannot be sure of the extent of lack of awareness of the service, but our very strong impression is that there is ground to be made up here. As well, ease of access to the FMHSBS was variable – a function of the separation of Tamaki and Grafton campuses. While a majority of regular users had found ways to overcome the separation (possibly due to self-selection), there were sufficient submissions from Grafton-based staff complaining of the situation to indicate this was a significant problem. The majority of staff offices are at Grafton, the offices of all the FMHSBS are at Tamaki. The University shuttle does not directly connect the two sites. This arrangement does not work well.

The skill set of the FMHSBS is broad, and they enhance it as they can, but as they themselves put it, they are all cut from the same cloth. There are, inevitably, gaps, among them some of the techniques used in the social and psychological sciences, and in some of the newer, highly specialized applications used especially in the School of Medical Sciences. Put as a clinical analogy, one could not expect three general physicians, however competent, to provide a specialized service for every patient in a teaching hospital.

In a general sense, the caliber and quantum of research and the organization of the Faculty appear to be of a high level and what one would expect of a University of this size and stature, but there is little or no organization of biostatistics as a Faculty research resource. The fragmentation (reflected in Appendix F) of resources, and their inadequacy in terms of FTEs, is a threat to the research output of the Faculty.

Perhaps most disturbingly, there is no effective academic leadership: no one, as far as we can ascertain, has taken up the role of championing this area, as has happened in other universities across the world. There will be no real progress until this void is filled.

Accordingly, we recommend:

R1: That the existing statistical service be re-constituted and expanded to provide an effective resource to meet the Faculty and University strategic research objectives. We recommend the formation of a Biostatistics Centre [BC] within the Faculty.

R2: That Faculty appoints a Director of the BC with Professorial rank (perhaps at fractional time in the first instance and potentially a joint appointment with Statistics) reflecting that the BC is conceived of as an academic entity and that, as one function of the BC, consulting on research is itself an academic activity.

The latter recommendation is absolutely crucial. The Panel's view is that if the right person is appointed as Director the development of the BC and the scope of its functions will evolve in ways appropriate to the needs of the FMHS. It is therefore not necessary to be too prescriptive at this stage about the organization of the BC, though we offer recommendations (below) for consideration.

We received advice from numerous stakeholders that separation of the statistical resources from the Faculty, say into the FOS Department of Statistics, would be counter-productive, and indeed that, within the Faculty, separation of statisticians from their research groups or Departments would not be acceptable. So a separate Department of Biostatistics, either within FMHS or FOS would not, at least for the present, sit at all well with many of the research staff in FMHS. On the other hand the current system is manifestly not achieving the Faculty objectives. A completely "virtual centre" is a possibility, but we prefer something more tangible, and an organizational structure that could, with the right leadership, evolve in appropriate directions. We recommend:

R3: That the BC be located within FMHS, with the Director reporting to the Dean or the A/Dean (Research).

R4: That the BC provides, in the first instance, a disciplinary home to all statisticians working within the Faculty, and a structured forum for statisticians outside the Faculty (especially those in the Department of Statistics) with an interest in biostatistics to interact with the FMHS.

The disciplinary home need not be the physical location nor the administrative unit for a particular statistician, but it must nurture the statistician's professional development. The founding of the BC, with its Director, may or may not be a step in the direction of a full-fledged section/department of biostatistics, but it is a necessary step to remedy the current situation.

We found too that staff from Schools other than SOPH were less likely to be aware of the statistics service, and more likely to think that the statisticians were better attuned to the needs of Population Health than to the types of research in their Schools, even if this was not the experience of other users in those Schools. We recommend:

R5: That the three existing FMHS statisticians be members of the BC, reporting to the Director.

There may well be administrative issues to consider with a BC reporting directly to the Dean or A/Dean and not through a School. The Panel notes however that the current administrative arrangements have not yielded a good enough result, that the resource should be - and seen to be - Faculty-wide, and that this is a very important, strategic research resource to get right, and without delay.

Most clinical campuses of the FMHS expressed a need for biostatistical support, and a desire for collaboration with FMHS, and these views should be given due consideration.

With respect to the deployment of consulting resources across the campuses, we recommend:

R6: That consulting services provided by the BC are more appropriately distributed between the Tamaki and Grafton campuses, at least by conducting substantial, regular, well publicised consulting sessions at the Grafton site, but preferably by full time presence at both major sites.

R7: That consideration be given to regular "outreach clinics" at FMHS clinical academic sites such as South Auckland, Waikato and Northland, in order to service existing research and foster the research climate at these sites.

Of course a larger, better funded BC could broker senior student placements from SOPH or DOS for project work/internships at the distant sites. A motivated, energetic Director would wish to consider these options for servicing without delay.

The Panel was also impressed by the high regard in which Greg Gamble was held by many researchers. Mr Gamble currently works for three research groups in the School of Medicine

(among multiple other calls on his time) and for some time has "stitched together" funding for his own position through UniServices. Mr Gamble is overworked, undermanaged, and inadequately mentored. In fact his situation is a microcosm of the larger picture. We recommend:

R8: That consideration be given to providing a permanent contract for Mr Gamble from the BC so that Mr Gamble's valuable contribution to the Faculty can be maintained. (The process should allow immediate and preferential buy-back of his time by his existing funding sources, so their research programs are not compromised.)

There is valuable statistical resource within the Clinical Trials Research Unit (CTRU) based at SOPH. They currently have 6 fulltime statisticians. However this resource is largely inaccessible to researchers within FMHS (outside of CTRU) as their consulting time is charged out at full cost recovery. They are employed as general staff, and have no academic pathway, or career development despite the two most senior members having an MSc and PhD respectively. They wish to have stronger links with other statisticians in FMHS and undertake wider consulting roles.

There are at least 14 other statisticians employed on external research grants, based mainly at Grafton, and they have no formal links with other statisticians in FMHS.

R9: That statisticians within the Clinical Trials Research Unit, and other statisticians employed on external grants are made honorary members of the BC.

With respect to some of the gaps in the service, we have noted above that areas in medical sciences were particularly at risk. We do not have all the answers to this, at least not in the short term, as the availability of appropriately trained statisticians nation- (even world-) wide is problematic. However, the Deputy Vice Chancellor (DVC) for Research is well aware of the issues, and sees the need to address them on a University-wide basis. We recommend:

R10: That the Faculty use all its influence to ensure that plans of the DVC (Research) to recruit biostatistical expertise in the area of bioinformatics/microarray analysis are brought to fruition at the earliest possible time; the Review Panel does not recommend that the Faculty of Medical and Health Sciences attempts its own recruitment.

R11: That the Director of the BC, in collaboration with researchers, develops strategies to help support new analytical techniques that are required for highly specialized research, especially in the medical sciences areas.

Another gap mentioned by stakeholders was the provision of basic and continuing training of (non-statistician) research staff in FMHS. We note that the Department of Epidemiology and Biostatistics teaches postgraduate coursework subject in Biostatistics in which we assume research staff could enrol. These courses will of course not be short or focused enough for the purposes of many staff. Should the BC take responsibility for such training? This is not easy to answer. On the one hand, experienced consultants such as the ones at FHMS are in an ideal position to give workshops and short courses as in-service training to research staff. By

building up the basic expertise of researchers, subsequent consultations would be expected to be at a higher level and thus more efficient. On the other hand, preparation and delivery of this training must be subtracted from the consulting time. If the course does not fulfill the needs of the researcher he or she will still need consulting time. Ultimately the Director of the BC should determine the priority given to such exercises, taking into account the number of potential trainees, the resources available and the likely "cost benefit" ratio. Cautiously, we recommend:

R12: That the BC, *adequately resourced*, take responsibility for limited training of FMHS researchers and research students (perhaps as an induction event) in basic biostatistics and study design, as one strategy to lift the overall expertise in the Faculty and to facilitate efficient subsequent consultations.

Finally, there is a variety of statistical packages used across the Faculty, and inevitably, some people even used Excel and other "non-statistics" packages for statistical purposes. Some submitters wished for recommendations from the Review panel. Long experience demonstrates that a policy seeking to restrict researchers and statisticians to a single package is doomed to failure. First, if there were a perfect package, or one that satisfied, say, 95% of the users 95% of the time, then we would have a Word or Excel situation where capture of the market was virtually complete. This is not the case with statistics programs. Second, it must be admitted that there may be various reasons, some irrational, to one's allegiance to a specific statistics program, but for some this allegiance is unshakeable, and best left undisturbed. While this panel lacks the courage to formally recommend a single statistical package for cross-Faculty support, we suggest that since Stata and SAS are dominant players in the biostatistics arena, are very well supported, have solid algorithms and (mostly) consistent syntax, that either or both should be considered for site-licensing, and staff *encouraged* to use them.

ToR 3. how to strengthen links with biostatistical groups outside the Faculty

The principal group is the Department of Statistics in the Faculty of Science. There are approximately 5 statisticians in the DOS with a central interest in biostatistics. Relations between the FMHS consulting statisticians, the statisticians in the CTRU and the DOS statisticians are very good.

The DOS sees that one solution to the problems of the FMHS is the formation of a University-wide service, presumably centred in DOS. The Panel does not see this fully satisfying the research needs of FMHS or probably, on the basis of submissions from FMHS staff, the "identity" needs at the School or Department level in FMHS. Against this, it is quite counter to the Faculty's own interests to weaken the overall position of the DOS by further fragmentation across the University. The Panel has recommended a Faculty-centred approach, based on its assessment of the likely research gains and satisfaction of the research groups, but it is not a clear cut case, especially when there is already good cooperation between DOS and FMHS. We have already suggested that appropriate senior leadership for the FMHS BC might come from an existing staff member in DOS. Further we recommend:

R13: That FMHS engage constructively with the Department of Statistics and take the greatest care not to adversely impact on the position of that Department, a source of very substantial expertise in biostatistics for FMHS and whose graduates are likely to be the principal pool of future employees of the BC.

There may well be enhanced opportunities from a developing BC for DOS to (i) assist in in-service training within FMHS, (ii) jointly arrange local, national and international workshops, (iii) send senior students to FMHS research groups for project work (iv) jointly supervise research theses, and (v) provide their graduates with career paths within the clinical, medical science and population health fields.

The Panel did not undertake a detailed investigation of biostatistics training or teaching at the University. [We are aware that the Department of Epidemiology and Biostatistics in SOPH teaches 5 courses at postgraduate level, at least 2 of which are primarily statistical, the others with content requiring statistics. But it is likely these courses would not satisfy students whose career focus was to become a practicing biostatistician.] Links with biostatistics groups outside the Faculty can be made through teaching as well as research. A model that has worked well in Australia is the Biostatistics Collaboration of Australia (BCA), a partnership of leading universities that cooperate to teach postgraduate courses by distance education across the country (see www.bca.edu.au). In at least one of the partner universities, the contribution to the program comes jointly from the disciplines of public health and mathematical statistics (in separate Faculties) under a very amicable cost and profit share arrangement. We recommend:

R14: That FMHS, via the BC, in collaboration with DoS, further consider opportunities presented by the BCA.

ToR 4.	*steps to be taken to ensure the long term viability of the biostatistical consulting service, including succession planning and funding*

The Panel considers the best insurance for viability is the appointment of an appropriate academic Director. Also, we recommend:

R15: That the BC be adequately funded and staffed to not just provide a consulting service to its expected client base but to ensure its long term viability as an academic unit.

That is to say, funding should provide for an attractive, long term position for the Director, for administrative assistance to deal with the logistics surrounding consulting appointments, for the consulting statisticians themselves, for adequate opportunities for staff training and development, and for growth. The Panel considers that the existing statistical resources, most particularly the three FMHSBS, Greg Gamble, John Thompson and others are fully occupied, and that – especially if FMHS staff are better informed of the need for, and existence of, statistical advice – *further appointments will need to be made*. An opportunity to do this may arise from the Faculty's connection with the District Health Boards, which we discuss later.

The Panel considers that for its institution and long term viability further funding, that is, above the funding currently allocated to the three statisticians will need to be found for the BC. We have already indicated that a senior Director will need to be appointed, and that Mr Gamble should be given the opportunity to become a member of the BC. We will discuss the implications for staffing of succession planning later. To some extent this funding will mean a shift in priorities within the Faculty.

A "free to the end user" service cannot be viable if unlimited access is granted. [It may well be, as has happened already at the University, as in other places, that larger scale users of statistical resources requires an intermediate or long term deployment of statistician time. A possible approach to achieving this is outlined in Appendix H]. The Faculty Research Office should ensure that researchers are in the best possible position to fund statistician time beyond the cap.

When a research grant specifically includes a budget line for significant fractional statistician time - as the Panel hopes will become the norm - then that budget should be allocated for its stated purpose. In our view, the most efficient way for this to be done is that the Principal Investigators of the research group should discuss their needs with the Director of the BC who will then allocate appropriate time from the pool of resources. (Optimally, of course, this will have been done at the time of the application). The research group gets dedicated statistician time from a statistician with the best "fit" of skills, and the group also gets some assurance that the BC will "back up" the nominated statistician in the event of illness, leave or misadventure. The BC gets a pool of funds to increase the human resources available and new research work to develop the staff. In other universities, the Faculty or University Research branch covers a "basal" consulting load from its central funds (arising from the research quantum) and also acts as a "bank" for employing statisticians across the peaks and troughs of the cycles of research income. For example at the University of Adelaide [see Appendix H], the Executive Dean permits, and guarantees the funding for, the Data Management & Analysis Centre to employ statisticians on at least two year contracts, even if the assured funding horizon is less than one year. In 15 years, the "bank" has never been required to actually make good its surety. We might confidently expect the University of Auckland, with its diverse and successful research programs, to operate similarly, although in this case a judicious priming of the resource pump would seem to be indicated.

We recommend:

R16: That free consulting to all FMHS research staff and students be limited to a set number of hours per project and/or per journal article or per thesis, and that if such a limit is reached the researcher or thesis supervisor should fund the excess at cost from their own research funds.

R17: That FMHS mandates every research application have a funding line to cover support for statistics and data management (or specifically justify why this is not required).

Overheads from full cost recovery grants (such as those from HRC) provide 114% on salaries, and this might appear to be a source of funding for the BC. However, the Panel was informed

that these overheads subsidise the grants from charitable organisations (which do not allow for overheads), and thus there may be little flexibility with this funding.

The Panel considered sources of funding external to the Faculty. The Performance Based Research Funding is allocated at several levels of the University and reflects the research quantum. As a healthy biostatistics centre, servicing the research needs of the university's premier research Faculty, must be in the interests of the University as a whole, the Faculty should be in a strong position to claim some of the PBRF funds at the University (VC or DVC) level. Indeed, we are advised by the DVC Research that the argument has never been put, so little time should be wasted in putting it. We recommend:

R18: That funding to initiate and maintain the BC be sourced from: existing funding to the FMHS statisticians, with additional specific funding lines from full cost recovery grants, and from funds accruing via the PBRF mechanism to the Office of the Vice Chancellor/Deputy Vice Chancellor (Research) and to the Faculty.

The Panel received a submission from the Auckland District Health Board indicating an urgent need for further biostatistical resource for their researchers, a wish to collaborate with FMHS, and, implicitly, that funding would be available. It would make sense for the FMHS and the ADHB to collaborate and for the BC to be the mechanism for delivery of these services. We recommend:

R19: That the Faculty explores, as a matter of priority, the possibility of financial contribution by the ADHB to underpin further statistical resource in the BC, so that the BC may provide service to researchers in the ADHB, enhance the research profile of both Faculty and ADHB, and avoid confusion over eligibility of access.

Other potential sources of funding for the BC could include:

- consulting on commercial research administered through UniServices fully costed at commercial rates
- hosting workshops at full fees for external attendees (but subsidised for UA students/staff); as we indicated previously, this would best be done in collaboration with the DOS
- the development of commercially viable statistical applications (e.g. software, online workshops, etc.)

These activities cannot however be considered as substitutes for more assured funding streams. They are, in our view, not part of the core mission of the BC – support for, and engagement in, the research activities of the FMHS. They may develop as the BC matures. In any case, they would themselves require extra resources to initiate.

It is likely that there will be multiple funding sources for the BC and similarly complex service-client relationships. It is our experience that University bureaucracies require ever more detailed accounting for time and resource expenditure. If there are caps on services, potentially multiple tiers of charging different types of clients, and "outplacing" of statisticians

from the BC for fractional FTEs to research groups, it is almost inevitable that both regular and *ad hoc* reports of service delivery will be required by various levels of the system. It would be good to avoid all this, but should it be required, as is likely, then we recommend:

R20: That a web-based database be written to enable the BC statisticians, wherever they are located, to record the details of each occasion of consulting service and that the structure and fields of the database reflect the *agreed* minimum data set required by the Faculty Research office and other stakeholders.

(While such a task initially *appears* onerous, experience shows that it is very easily adopted by statisticians and takes very little effort to fulfill.)

The current core resource for statistical consulting in the Faculty is the group of three biostatisticians: Alistair Stewart, Joanne Stewart and Elizabeth Robinson. Several submissions, including those from the statisticians themselves, pointed out the limited working life horizon of these three. One might expect retirement to occur within the next 10 years, perhaps earlier, and as a "cohort". This situation must be addressed. The University and Faculty have invested very substantial resources over the years in these three and the return on that investment is not only the consulting service but the knowledge and experience accumulated over the many person-years of service. This investment is in jeopardy unless transfer of knowledge and experience occurs, and such transfers take time. Succession planning would be a primary responsibility of the new Director. A plan would involve both the staffing profile of the BC, including the introduction of new, younger staff, and in the up-skilling of existing resources in the research groups. There are funding implications for the time required for knowledge transfer. We suggest specific fractional time should be allocated both from the existing statisticians to train the new staff and from the new staff to absorb content knowledge by carefully targeted placements in research groups. Great care must be taken in not overloading the staff, so the staffing profile and its funding must accommodate this time. The consequences of not funding this process will be dire indeed. In summary, we recommend:

R21: That staffing of the BC, and hence its funding, reflects the urgent need for succession planning in view of the current staff profile.

ToR 5. how to support the training and continuing professional development of consulting biostatisticians

The formation of the BC and appointment of its Director provide the foundation for training and staff development. The structure should raise the profile of the biostatisticians and enhance their own sense of value as academics. Current processes are inadequate. Strategies to achieve staff development have already been discussed in previous sections of this Report. They include:

- mentoring by the Director and by other senior members of staff
- regular meetings of the BC staff; problem solving sessions; journal club
- specific funding for attendance at local, national and overseas conferences

- involvement of BC biostatisticians in providing in-service education to FHMS staff
- cooperation with Department of Statistics in holding workshops for local, national, international audiences

In summary, we recommend:

R22: That the Director of the BC institutes a staff development program specific to the needs of the biostatisticians (the program should complement whatever staff development processes may already be in place for those statisticians still sited within other administrative units).

ToR 6. how to turn the interactions between consulting, teaching and research to best advantage

The key to achieving this goal is the same for a biostatistics group as it would be for any group practicing a discipline within a University: give it a mission, give it good leadership, fund it adequately and ensure it has the best chance of being recognized for its academic work. The latter is crucial. The Panel views consulting on research as part of the research process and hence it *is* research. This is especially true when the consultant becomes a longer term contributor to the project. Further, the consulting process is a teaching process, most often two-way: the consultant advises on statistics, research design etc, but is him/herself taught content; invariably this content knowledge is used subsequently by the statistician to better advise the next client in this area.

Addendum: the "no cost option"

The Panel has been asked to provide an outline of actions that the Faculty could take to improve the statistics service given a scenario wherein no extra funding would be available.

The Panel strongly believes that real and sustained improvement cannot be achieved under such conditions. The neglect of development of the service over the years has presumably "saved" money, which should now be spent. Further delay will only make an unsatisfactory situation worse, and this in an era where research productivity is becoming ever more crucial for the university sector.

The evidence supporting our contention can be summarized thus:

- The current staff are working at or near capacity
- The current staff will reach retirement age at about the same time, and that time is not too far off
- Not all areas of the Faculty are receiving adequate service
- There is no academic leadership in evidence

How to fix this without reasonable new investment is likely a matter of alchemy.

However, the Panel offers the following, with little hope, and no expectation, that the day of reckoning can long be put off:

Option A (conservative)

Situate at least one of the statisticians at the Grafton site – or an FTE split over the three statisticians such that there is a 9-5 presence at Grafton. This would separate the existing FMHSBS, thus reducing their efficiency and their opportunities for collegial relationships. On the one hand this option may seem to serve the needs of the Grafton site better, but it is likely to have an undermining effect on the existing overstretched and under-supported resource.

Implement an apprentice-style "statistician-in-training" program to work with (rotate among) the current three statisticians to facilitate knowledge transfer. One might conceive of, say, two part-time posts being made available to first class Honours or Masters graduates, while they undertake further professional study in biostatistics either at Auckland or from the BCA. The costs would be in the time spent by the three consultants (with necessarily some diminution in service) and in the employment of the young statistician(s). The latter is inescapable, though perhaps not overly burdensome, and might well be offset by either (i) PhD income from the "apprentices" themselves, either during or subsequent to their employment term; and /or (ii) income from extra research/.PhD completions that might accrue from the extra resource, at least after the new staff become productive.

The option addresses, in an unsatisfactory way, two of the main problems facing the service, and is likely to be unsustainable in the long term.

Option B (radical)

Turn the problem over to the Department of Statistics. That is to say, turn the current funding stream for the three consultants over to DOS and in return ask that DOS provide at least the same level of services as is currently given and that DOS take over the responsibility for organization, academic leadership, staff development and succession planning. DOS may be willing to do this, given it fits in with its own plans for expansion and a University-wide role. Economies of scale might allow a cost-free, or low cost, transaction between the FMHS and the DOS. The University might even be willing to help fund part of the deal. FMHS might need to negotiate with DOS on division of research income.

The change in "ownership" of the FMHSBS is likely to be a large blow to them, and a loss of vast experience and expertise to the FMHS which will not be guaranteed to be available to FMHS in the same way. If FMHS is unwilling to resource the development of its own service, it becomes a real option.

List of Appendices

Appendix A: The University of Auckland Strategic Plan 2005-2012

Note: Objectives which will be addressed by provision of a high quality sustainable biostatistical resource are highlighted in boxes.

International Standing

OBJECTIVE 1:

Establish The University of Auckland, New Zealand's premier research university, as a peer of the world's leading autonomous universities through association and collaboration, and by an active presence in the international academic community.

OBJECTIVE 2:

Create a distinctive international educational experience for our students, in Auckland and overseas.

Research and Creative Work

OBJECTIVE 3:

Achieve a PBRF ratio of A:B:C:R rated researchers working at the University of 20:50:22:8 through the development of a high quality research environment.

OBJECTIVE 4:

Achieve 800 masters and 500 doctoral completions per annum through the development of an international quality graduate programme.

OBJECTIVE 5:

Provide enhanced support for research activities by doubling external research income to $270m per annum.

OBJECTIVE 6:

Develop large-scale research institutes of excellence.

Teaching and Learning

OBJECTIVE 7:

Achieve a high quality student body with an annual growth rate of equivalent full-time students of 1 per cent. This student body to be composed as follows: 78 per cent in undergraduate, 12 per cent in taught postgraduate and 10 per cent in research postgraduate programmes.

Appendix A: The University of Auckland Strategic Plan 2005-2012 (continued)

OBJECTIVE 8:

Create a curriculum meeting the highest standards of excellence across the University.

OBJECTIVE 9:

Create and maintain an outstanding teaching and learning environment.

Te Tiriti o Waitangi / The Treaty of Waitangi

OBJECTIVE 10:

Fulfil the responsibilities and obligations of the University under Te Tiriti o Waitangi.

Community Engagement

OBJECTIVE 11:

Develop effective partnerships with the University's local, national and international communities.

OBJECTIVE 12:

Engage alumni and friends in mutually supportive and productive relationships.

Excellent People

OBJECTIVE 13:

Recruit and retain a high-quality staff and student body, striving to create equal opportunities for all those of ability to succeed in a university of high international standing.

OBJECTIVE 14:

Create and promote a student environment that is welcoming, enjoyable and stimulating, encouraging students to reach their full potential within a climate of academic excellence.

OBJECTIVE 15:

Create a culture that encourages academic and general staff to reach their full potential.

Appendix A: The University of Auckland Strategic Plan 2005-2012 (continued)

Resourcing and Organising for Quality

OBJECTIVE 16:

Safeguard the long-term viability and autonomy of The University of Auckland through excellent financial management.

OBJECTIVE 17:

Increase and diversify the University's revenue.

OBJECTIVE 18:

Provide an infrastructure that supports teaching, learning, research, and community engagement of the highest quality.

OBJECTIVE 19:

Promote governance and management practices consistent with the mission and values of The University of Auckland.

OBJECTIVE 20:

Operate planning and review processes that drive achievement of the University's strategic objectives.

Appendix B: FMHS Strategic Plan 2005-2012

Note: Objectives which will be addressed by provision of a high quality sustainable biostatistical resource are highlighted in boxes.

Our priorities and goals for core activities:

1. Attract, develop and retain a high quality diverse staff to ensure we have a staff profile that meets our changing needs.
2. Emphasize the value of leadership, and identify and develop leadership potential.
3. Recognise the special relationship we have with Mäori under the Treaty of Waitangi.
4. Provide physical resources and infrastructure that supports teaching, learning, research and community engagement and is of the highest quality.
5. Maximise revenue gathering and ensure resource allocation is transparent, sustainable and aligned with priorities.
6. Develop and implement a risk management framework.

Our priorities and goals to achieve excellence in teaching:

7. Graduate students who are educated to meet the needs of our communities.
8. Continue with our commitment to increasing the representation of Mäori in the health workforce through access to our programmes.
9. Deliver relevant, high quality, research led programmes that are fit for purpose, responsive, and appropriately delivered.
10. Value and encourage diversity in our students, and recruit appropriately from underrepresented and international groups.
11. Support the teaching and learning goals of the Faculty through an effective academic governance structure.
12. Support teaching and learning with appropriate facilities, staff and student support and resources aligned with priorities.

Our priorities and goals to achieve excellence in research:

13. Produce high quality ethical research that is disseminated to society, and translated into improved health outcomes for our communities.
14. Recruit and develop research students of the highest calibre.

Appendix B: FMHS Strategic Plan 2005-2012 (continued)

15. Build and maintain productive relationships with our acknowledged stakeholders.
16. Build and maintain productive and collaborative research groups and pursue and maintain national and international alliances.
17. Support and enable research through effective research governance.
18. Provide the necessary facilities and equipment to enhance research capacity.

Our priorities and goals to achieve excellence in service:

19. Recognise the value and role of service, including service within the wider University, and ensure the level of service is appropriate, sustainable and balanced against the needs of teaching and research.
20. Use the service commitment of our staff to positively address issues of inequalities in health outcomes and access to health care.

Appendix C: List of those providing written submissions or feedback (alphabetical by surname)

Note: some submissions were multi-authored by more than one of the named people.

Name	Title	Department/ Discipline	School	Faculty/Institution
Bruce BAGULEY	Professor and Co-Director	Auckland Cancer Society Research Centre	SOMS	FMHS
Phil CROSIER	Associate Professor	Molecular Medicine & Pathology	SOMS	FMHS
Michael DAVIS	A/Professor	Occupational Medicine	SOM	FMHS
Noel DAWSON	Senior Lecturer	Physiology	SOMS	FMHS
Iain DOHERTY	Director	Learning Technology Unit		FMHS
Alison FORBES	Principal Pharmacist			ADHB
John FRASER	Professor, Head of School		SOMS	FMHS
Greg GAMBLE	Honorary Research Fellow	Department of Medicine	SOM	FMHS
Gail GILLIES	Research Manager	Starship Children's Research Centre		ADHB
Alistair GUNN	Professor	Physiology	SOMS	FMHS
Gayl HUMPHREY	Research Manager			ADHB
Yannan JIANG	Senior statistician	Clinical Trials Research Unit	SOPH	FMHS
Maggie KALEV	Research Fellow	Molecular Medicine & Pathology	SOMS	FMHS
Judy KILPATRICK	Associate Professor, Head of Department	Nursing	School of Nursing	FMHS
Geoff KRISSANSEN	A/Prof	Molecular Medicine & Pathology	SOMS	FMHS
Rob KYDD	Professor, Head of Department	Psychological Medicine	SOM	FMHS
Ross LAWRENSON	Professor, Head of School	WCS	WCS	FMHS
Diana LENNON	Professor	Community Paediatrics	SOM	FMHS
Anne-Thea MCGILL	Senior Lecturer	General Practice and Primary Care	SOPH	FMHS
Brian MCKENNA	A/Professor, Director	Centre for Mental Health Research	School of Nursing	FMHS
Alan MERRY	Professor, Head of Department	Anaesthesiology	SOM	FMHS

Appendix C: List of those providing written submissions or feedback (continued)

Name	Title	Department/ Discipline	School	Faculty/Institution
Ed MITCHELL	Professor	Paediatrics, Child Health Research	SOM	FMHS
Kathy MOUNTJOY	Senior Research Fellow	Physiology	SOMS	FMHS
Louise NICHOLSON	A/Professor	Anatomy with Radiology	SOMS	FMHS
Harry REA	Professor, Head of School	Medicine	South Auckland Clinical School	FMHS
Ian REID	Professor, Deputy Dean			FMHS
Karen ROACH	Chief Executive			Northland District Health Board
Elizabeth ROBINSON	Research Fellow			FMHS
John SHAW	Professor, Head of School	Pharmacy	School of Pharmacy	FMHS
Alistair STEWART	Senior Research Fellow			FMHS
Joanna STEWART	Research Fellow			FMHS
Peter STONE	Professor, Head of Department	O&G	SOM	FMHS
Chris TRIGGS	Professor and Head of Department	Statistics		FOS
Steve VANDER HOORN	Manager, Biostatistical team	CTRU	SOPH	FMHS
Andy WEARN	Senior Lecturer & Director	Clinical Skills Resource Centre		FMHS
Jenny WELLER	A/Professor	Centre for Medical & Health Sciences Education		FMHS
John WINDSOR	Professor, Head of Department	Surgery	SOM	FMHS
Alastair WOODWARD	Professor, Head of School	Population Health	SOPH	FMHS
Kathryn WOAD	Research Fellow	Oncology	SOMS	FMHS

Appendix D: List of interviewees (in order of interview)

Name	Title	Department/ Discipline	School	Faculty/Institution
Alastair Woodward	Professor, Head of School	SOPH	SOPH	FMHS
Ian Reid	Professor, Deputy Dean,	FMHS	FMHS	FMHS
Alistair Stewart	Senior Research Fellow	Epidemiology & Biostatistics	SOPH (funded by FMHS)	FMHS
Joanna Stewart	Research Fellow	Epidemiology & Biostatistics	SOPH (funded by FMHS)	FMHS
Elizabeth Robinson	Research Fellow	Epidemiology & Biostatistics	SOPH (funded by FMHS)	FMHS
Rod Jackson	Professor, Head of Department	Epidemiology & Biostatistics	SOPH	FMHS
Steve Vander Hoorn	Manager, Biostatistical team	CTRU	SOPH	FMHS
Yannin Jiang	Senior statistician	CTRU	SOPH	FMHS
Bruce Arroll	Professor, Head of Department	General Practice & Primary Health Care	SOPH	FMHS
Peter Adams	Associate Professor, Head of Department	Social & Community Health	SOPH	FMHS
Shanthi Ameratunga	Associate Professor	Epidemiology & Biostatistics	SOPH	FMHS
Janie Sheridan	Associate Professor	Pharmacy	School of Pharmacy	FMHS

Appendix D: List of interviewees (continued)

Name	Title	Department/ Discipline	School	Faculty/Institution
Roger Marshall	Associate Professor	Epidemiology & Biostatistics	SOPH	FMHS
Cris Print	Associate Professor	Molecular Medicine & Pathology	SOMS	FMHS
Roger Booth	Associate Professor	Molecular Medicine & Pathology	SOMS	FMHS
Chris Triggs	Professor, Head of Department	Statistics		FOS
Chris Wild	Professor	Statistics		FOS
Robert Doughty	Associate Professor	Medicine	SOM	FMHS
John Thompson	Senior Research Fellow	Paediatrics	SOM	FMHS
Greg Gamble	Honorary Research Fellow	Medicine	SOM	FMHS
Dorit Naot	Senior Research Fellow	Medicine	SOM	FMHS
Peter Stone	Professor, Head of Department	Obstetrics & Gynaecology	SOM	FMHS
Des Gorman	Professor, Head of School		SOM	FMHS
Lynn Ferguson	Professor, Head of Discipline	Nutrition	SOMS	FMHS
Mike Findlay	Professor	Oncology	SOMS	FMHS
Brett Cowan	Honorary Associate Professor	Biomedical Science	SOMS	FMHS
Tadd Clayton	Data Manager, ISAAC	Paediatrics	SOM	FMHS
Jane Harding	Professor, Acting Deputy VC Research		Liggins Institute	Liggins Institute & the Vice Chancellor's office
Louise Nicholson	Associate Professor, Associate Dean, Research	Anatomy	SOMS	FMHS

Appendix E: Schedule of Review Panel

Wednesday 13th February 2008	
0830-0930	Ian Reid, Deputy Dean Alistair Woodward, Head of School of Population Health **Meet in Ian Reid's Office, Level 6 ECom House, 3 Ferncroft St, Grafton**
0930-1000	Travel to Tamaki
School of Population Health, Tamaki (Room: 730-338)	
1000-1100	Alistair Stewart, Joanna Stewart, Elizabeth Robinson, FMHS, (Tamaki) statisticians
1100-1200	Steve Vander Hoorn & Yannan Jiang (Clinical Trials Research Unit)
1200-1300	Lunch
1300-1330	Bruce Arroll, HoD, General Practice & Primary Health Care
1330-1400	Peter Adams and Shanthi Ameratunga (School of Population Health)
1400 -1420	Janie Sheridan, Pharmacy
1420-1440	Roger Marshall, Assoc.Prof.Biostats, Epidemiology and Biostatistics (SOPH)
1440-1510	Tour of facilities at Tamaki
	Afternoon spent considering written submissions. Catch up with Alistair Woodward at end of afternoon
Thursday 14th February 2008	
Level 12 Auckland City Hospital Support Building (Room: 599-12044)	
0830-0900	Roger Booth and Cris Print, School of Medical Sciences
0900-1000	Chris Triggs (HoD) and Chris Wild (Department of Statistics, Faculty of Science)
1000-1030	Break
1030-1050	Robert Doughty, Department of Medicine
1050-1110	John Thompson, Statistician, Department of Paediatrics
1110-1130	Greg Gamble, Statistician, Department of Medicine
1130-1150	Dorit Naot, Department of Medicine
1150-1240	Lunch
1240-1300	Peter Stone, HoD, O&G
1300-1330	Des Gorman, HoS, School of Medicine
1330-1350	Lynn Ferguson, Department of Nutrition
1350-1430	Tour of facilities on Auckland Hospital and Grafton Campuses
1430-1450	Brett Cowan, Centre for Advanced MRI
1450-1600	Break
1600-1630	Jane Harding, Liggins Institute and DVC Research
1630-1700	Ian Reid, FMHS
Friday 15th February 2008	
Level 12 Auckland City Hospital Support Building (Room: 599-12044)	
0900-0930	Louise Nicholson, A/Dean (Research) FMHS
0930-1630	Writing draft Report

Appendix F: Statistical support identified

a) Biostatisticians working in FMHS as reported to the Review Panel*

Note: This may not be complete*

NAMES OF STAFF	FTE	FUNDING SOURCE	WHERE LOCATED	COMMENTS
Xenia CHEN	1 FTE	HRC	CTRU, SOPH	Statistician
Tadd CLAYTON	1 FTE	BUPA Foundation	Department of Paediatrics	Employed by Innes Asher as ISAAC Data Manager. Does statistical analyses under direction of Alistair Stewart
Gaelle DUTU	part time	Waikato Clinical School (WCS)	WCS	
Greg GAMBLE	1 FTE	External research grants	Department of Medicine	Three main funders
Vicki HINDER	0.8 FTE	Cancer Trials NZ	Molecular Medicine & Pathology	Employed by Professor Mike Findlay
Yannan JIANG	1 FTE	HRC, MoH, ACC, external consulting	CTRU, SOPH	Senior statistical
Grace JOSHY	1 FTE	WCS	WDHB	Statistical advice on diabetes projects
Ray LIN	1 FTE	HRC	CTRU, SOPH	Statistician
Mike LIU	1 FTE	HRC	CTRU, SOPH	Statistician
Roger MARSHALL	1 FTE	SOPH	Epidemiology and biostatistics, SOPH	Associate Professor, teaches postgraduate papers in statistics
Patricia METCALF	1 FTE	Joint with DOS and external grants	Statistics and SOPH	Works for 2 employers

Appendix F: Statistical support identified (continued)

a) Biostatisticians working in FMHS as reported to the Review Panel (continued)

NAMES OF STAFF	FTE	FUNDING SOURCE	WHERE LOCATED	COMMENTS
Simon MOYES	1FTE	External grant	General Practice & Primary Health Care, SOPH	Employed by Bruce Arroll
Varsha PARAG	1 FTE	HRC	CTRU, SOPH	Statistician
Kanchana PEREIRA	1 FTE	External research grants	Department of Medicine	Statistician. Employed by Rob Doughty.
Katrina POPPY	1 FTE	External research grants	Department of Medicine	Doing PhD jointly with Chris Triggs.
Peter REED	part time	MoH	Waikato Clinical School	Project Energise short term. Also works for ADHB.
Elizabeth ROBINSON	1 FTE	FMHS	Epidemiology and biostatistics, SOPH	Research Fellow
Alistair STEWART	1 FTE	FMHS	Epidemiology and biostatistics, SOPH	Senior Research Fellow
Joanna STEWART	1 FTE	FMHS	Epidemiology and biostatistics, SOPH	Research Fellow
John THOMPSON	1 FTE	CHRF & Department of Paediatrics	Department of Paediatrics, SOM	MSc Statistics, PhD Epidemiology, part of package of Chair of Child Health Research (Ed Mitchell).
Stephen VANDER HOORN	1 FTE	HRC, MoH, ACC,, external consulting	CTRU, SOPH	Manager of statistical team at CTRU
Dug YEO HAN	1 FTE	External grants	Nutrition	Nutrogenomics, employed by Lynne Ferguson

Appendix F: Statistical support identified (continued)

b) Other sources of biostatistical advice used by FMHS staff and students as reported to the Review Panel*

Note: This may not be complete*

NAMES OF STAFF	WHERE LOCATED	EMPLOYER	COMMENTS
Joanne BARNES	SPharmacy	FMHS Staff	Not employed for statistical advice
Sharon BROWNING	Statistics, FOS	FOS staff	
Chris FRAMPTON	University of Canterbury, Christchurch	University of Canterbury	Used by Anaesthetics, SOM
Alan LEE	Statistics, FOS	FOS staff	
Denis LOISELLE	Physiology, SMS	FMHS Staff	Senior Lecturer, teaches postgraduate paper in Experimental design.
Renate MEYER	Statistics, FOS	FOS staff	
Lindsay PLANK	Department of Surgery, SOM	Department & HRC	Associate Professor, statistician role not in job description
Cristin (Cris) PRINT	Molecular Medicine & Pathology, SMS	FMHS Staff	Associate Professor. Not a statistician
Lyn SALDER	ACH, ADHB	ADHB	Physician, used by O&G SOM
Alistair SCOTT	Statistics, FOS	FOS staff	
David SCOTT	Statistics, FOS	FOS staff	
Katrina SHARPLES	University of Otago, Dunedin	University of Otago	CTNZ co-author, used By CTNZ Bruce Baguely
Chris WILDE	Statistics, FOS	FOS staff	

Appendix F: Statistical support identified (continued)

c) Statisticians employed by ADHB as reported to the Review Panel*

Note: This may not be complete*

NAMES OF STAFF	FTE	FUNDING SOURCE	WHERE LOCATED	COMMENTS
?name(s)	1FTE	GLH Research and Education Fund	Green Lane Clinical Centre	
Peter REED	0.5 FTE	Starship Foundation	Starship Children's Health	Also works for WCS
Various		Fee	ADHB Research office	Unmet need additional 1.5 FTE

Appendix G: Summary of submissions to the Review

The Review Panel's distillation and assessment of the submissions it received are given in the main Report and in the Recommendations. This Appendix gives a summary of *some* of the *information* and *opinions* the Panel received from staff, either in written submissions or at interview, but there is no attempt here to provide analysis or evaluation. Requests for access to the full written submissions should be directed to the Deputy Dean, FMHS.

Faculty Biostatisticians (FMHSBS) in the Department of Epidemiology and Biostatistics: Alistair Stewart Senior Research Fellow, Elizabeth Robinson Research Fellow, Joanna Stewart Research Fellow. Professor Rod Jackson, Head of Department, is committed to hosting them. Being housed at SOPH suits them well, for the natural linkages, collegiality, and it acts as a "gate" to restrict completely open door access which would swamp them.

The history of these long-serving staff is described in their written submission. For about 10 years they were funded by the MRC and later the HRCNZ, servicing all medical and health research in the upper part of the North Island. The brief has narrowed since the UA took over the funding in 2001, and now is restricted to working within FMHS. The three incumbent biostatisticians have always understood that they were a Faculty resource and have worked as such with no priority given to a particular School or Department. Their funding was from SOPH budget when that School opened, but from 2007 has been from FMHS central budget. They believe that their brief is to enhance the quality and overall integrity of the research output from the Faculty.

The group operates a management system where all requests for a consultation are accepted by the biostatistician most able to meet with them in a timely manner. If a considerable time input will be required for the work, any delay is discussed with the client. One of the members will prioritise work on that project if there is a deadline such as a research proposal to a granting body or a conference abstract. If further expertise is required, the researcher is directed to these resources. This include recommending that the researcher to employ a statistician who will work solely on their study, usually in consultation with one of FMHSBS.

They are not aware of the needs of those not seeking their help. Work is mainly for FMHS. The time spent for each Faculty varies, and varies over time. Of all the Schools, the SOM appears to be proportionately the largest user of their time. External reviews suggest that there is research emanating from FMHS that would have benefited from biostatistical input. There are researchers in the Faculty who either choose not to consult with them or are unaware of the expertise available. Some only come for help when they have papers or applications rejected.

One of the FMHSBS sits on the FMHS Research Office panels, giving advice to researchers on full cost recovery research before the application is submitted. This process is well received,

but it is is not compulsory, and thus some grant applications are submitted without statistical review.

They have very good links with the Science Faculty DOS and the medical biostatisticians in the other Universities and Clinical Schools in New Zealand, and some links with biostatisticians elsewhere. These links have arisen through the long time they have been working in the field, and need protection in succession planning.

The FHMS BS are very concerned that there is succession planning. They are all of a similar age and will retire at similar times. If it is planned to replace them on retirement with junior statisticians, then this should start soon so that there is good overlap during which time their experience can be passed on. If it is planned to employ biostatisticians with extensive experience then this overlap is not so important. However the pool of experienced consultant biostatisticians, particularly in the medical field, is not large.

Their continuing education has been inadequate in recent years, due to lack of time and funding, and this needs to be rectified. For a continuing high quality service it will be necessary that all future recruits to the group should have the opportunity to continue advancing their knowledge. The advances in biostatistical knowledge over the last 30 years have been enormous and there is no reason to believe this will not continue.

The boundaries between consulting, teaching and research are seamless. Consulting itself is research and teaching. It is hoped that all the clients learn some more about study design and biostatistics during their contact with them. Many of the clients are masters and doctoral students and they are given detailed support throughout their research. They wish to see PhD students at the beginning of their work. Perhaps the only difference in the consulting procedure with students doing formal qualifications is that the FMHSBS expect them to do more and to think more about their research. In addition to this consulting, they are supervisors and co-supervisors and advisors of several PhD theses, but no direct funding is passed on to their service.

The review panel received feedback that the FMHSBS are highly regarded by the majority of their consumers, who receive excellent, helpful and timely service. They are perceived as having a high academic standard, in that their advice stands up well in international peer review literature. They are keen and, where resources allow, able to address new areas of statistics. They have a strong service commitment, are available, accommodating, professional, helpful and user friendly. Those who have access them highly value that they are “free’ and accessible.

However, there is no proper management structure. They are administered within the Department of Epidemiology and Biostatistics which house them, but FMHS pays for them and expects them to provide service for the whole Faculty. However many FMHS do not know about them, or believe they are not allowed to consult with them as they appear to belong to SOPH, or do not recognise that they need statistical advice, or find them too far away (there is no shuttle between FMHS and Tāmaki). People who have existing relationships with FMHSBS, or who are resident in SOPH, are advantaged in access. It appears that SOM uses

the highest proportion of their time compared with other Schools. In addition to obvious users in FMHS, they are often asked for statistical advice by hospital registrars and honorary consultant staff who work with FMHS staff, and seek clarification about this access.

Their workload is too large for their FTE, and thus it appears that more resource is needed to to meet the needs of FMHS. Although they are technically eligible for academic sabbatical, their workload and lack of proper management structure for statistical consulting in the Faculty means that taking sabbatical is not realistic under the current arrangements. This is a problem, because, not withstanding their good collegial relationships with other statisticians, they feel isolated from regular contact with others in their discipline. They do not have a continuing education relationship with other statisticians in the FMHS including CTRU, and have little time no time for their own CME.

Some research projects are granted part-time salary for one of these statisticians. There is no current mechanism to buy out their time – we understand that the money goes to the FMHS or School bottom line.

Clinical Trials Research Unit CTRU

CTRU is based at the School of Population Health at the University of Auckland. All CTRU research and services are managed through Auckland UniServices Limited. CTRU is funded from external research grants administered through Uniservices – mainly the HRC, with other external funds from ACC, MoH, WHO, other NZ universities, World Bank etc. CTRU employ several statisticians (CTRUBS) from these sources of funding

The current CTRUBS staff (all fulltime) are: Stephen Vander Hoorn (MSc), manager of biostatistics team, Yannan Jiang (PhD) senior statistician, Varsha Parag, Ray Lin, Xenia Chen, Mike Liu. All are appointed as general staff, rather than academic staff. Stephen and Yannan both undertake external consulting. They have no provision to develop academically in their job structure. They teach on courses in the DOS, and have very good collegial relationships with that Department.

The CTRUBS require full cost recovery for consultations over one hour long, and thus are unavailable to most staff and students. They have a team of 6 biostatisticians who provide a service across all projects carried out by the unit as well as internal statistical support for the CTRU staff. Currently, the largest funding source to the unit comes from the HRC but there is also some capacity for external statistical consulting. The team has also recently started to develop a biostatistics workshop program.

CRTUBS see the opportunity to liaise with FMHS staff and Liggins for joint clinical trials. CTRUBS receive many requests from staff and Masters and PhD students within the FHMS as well as from other faculties at the university, for statistical advice, analysis, assistance with databases and statistical packages, as well as support on grant applications. Although CTRUBS would be willing to provide this service, they have no funding to support it. They will give up to one hour free advice. Clear direction on where staff and students should go for this advice is sought.

CTRUBS believe that there is a need to develop a better environment for consulting statisticians within the Faculty. CTRUBS would prefer the idea that a statistical consulting centre for the wider university be established, rather than just FMHS, as this would be more exciting. Statistical consulting would be considered as the main business objective of the centre. This centre could be responsible for setting up and facilitating seminars and workshops for the Faculty, statisticians within the Faculty as well as the wider NZ biostatistics community. Statistics students could take on consulting projects as part of their MSc projects. Students with an interest in statistics at the PhD level could also be employed to carry out either supervision of these Masters students or provide internal/external consulting.

CTRUBS want a stronger relationship with other biostatisticians in FMHS and DOS. In addition, financial support is needed for statisticians to attend and present at other workshops/conferences. They believe that there is little CME funding, and they do not attend international conferences or courses. Travel grants and other funding could be sought by the consultants themselves.

Workshops provide opportunity for teaching and potentially added to the current syllabus at DOS and FMHS. Every year the CTRUBS and the DOS run two day professional development workshops for biostatisticians with or two overseas experts. These workshops are based on a full cost recovery formula and are well attended, but there is no administrative support for this activity. The 2008 workshop, taking place at the end of February currently has over 80 enrolments.

Department of Epidemiology and Biostatistics

This Department is headed by Professor Rod Jackson, and hosts the FMHSBS. They teach undergraduate medical and health sciences students: POPLHLTH 111: Population Health (Professor Rod Jackson, Associate Professor Shanthi Ameratunga, Dr Daniel Exeter, Dr Susan Morton), about 900 students.

Associate Professor Roger Marshall (PhD Statistics) teaches two postgraduate courses in FMHS:

POPLHTH 706: Statistics in Health Science 1 (Associate Professor Roger Marshall) 20-25 students

POPLHTH 707: Statistics in Health Science 2 (Associate Professor Roger Marshall) 3-5 students

For the DPH/MPH he introduces epidemiology and biostatistics, 50-60 students

Associate Professor Marshall also teaches and one postgraduate courses in DOS. He has a strong relationship with both FMHSBS and DOS academic staff.

Other postgraduate papers with statistical content taught by this Department include:

POPLHTH 708: Epidemiology: (Professor Robert Scragg & Associate Professor Roger Marshall) 25-30 students

POPLHTH 709: Clinical Epidemiology & Evidence-based health Care (Sue Wells and Professor Rod Jackson) 25-35 students

POPLHTH 716: Foundations in Public Health, the one compulsory paper in the DPH/MPH (Roger Marshall).

In SOMS, Dr Denis Loiselle, Senior Lecturer in Physiology teaches the postgraduate course MEDSCI 725 *Experimental Design,* for students of Physiology enrolled in BSc(Hons), PGDipSci or MSc but open to any postgraduate student (annual enrolment of around 20), covering statistical inference, the t-tests, analysis of variance and covariance, non-parametric equivalents, regression, repeated measures, and statistical power. Dr Loiselle is frequently asked by ex-students for statistical advice for the masters and PhDs, but refers them to the FMHSBS.

Other statisticians in FMHS

There are several statisticians working within FMHS, but these are mainly on individual research grants, but some are members of staff (see Appendix D). Grant-funded statistical support can be a problem because there is usually a burst of activity at the beginning of the project, and a huge fulltime workload at the end of the study, with little work in between.

Greg Gamble. Masters in Psychology. He used to have permanent position doing statistics as Scientific Officer employed by ADHB but this position was disestablished many years ago. Since then, he has been employed on externally funded research grants, and now is employed by three research groups, soon to become four. His office is in the Bone Research Group in FMHS, Grafton. In addition provides statistical clinics for the Centre for Clinical Research and effectiveness practice (CCRep) at Middlemore hospital one half day a month. Mr Gamble receives numerous requests for help from colleagues for whom he used to be funded to provide support, and who now have no statistical support. It is very difficult to maintain boundaries consistent with his funding base. He is concerned about his lack of tenure despite his many years of service to the University.

School of Population Health is well served by FHMSBS, but recognises the points raised above (see FMHSBS)

School of Medicine. Although SOM are the greatest users of FMHSBS, it was submitted that some BS staff should be housed within SOM to support the needs of staff and students. More funding is required to support this area. Most, but not all SOM staff, felt that FMHSBS met their needs in terms of timeliness, expertise and being proactive.

A/Prof Rob Doughty (cardiovascular research) has “masses of data”, including imaging data, but little statistical resource to make use of it. A previous Research Fellow is now doing a PhD jointly with DOS. It was seen to be hard to raise enough money for statisticians to realise all the opportunities on research projects.

John Thompson MSc Statistics, PhD Epidemiology, is employed by Child Health Research Foundation (CHRF) and the Department of Paediatrics to support the Chair in Child Health. He has strong links with FMHS and DOS.

Tadd Clayton MSc Geog & Environmental Science, DPH, is employed full time by the International Study of Asthma and Allergies in Childhood (ISAAC) in the Dept of Paediatrics; he performs statistical analyses under the supervision of Alistair Stewart.

Submissions pointed out the lack of cohesion among statisticians and frustrations with processes and opportunities for continuing education.

School of Medical Sciences. This school has very little statistical resource of its own. Statistical requirements for some cellular and molecular research are simple. However this is changing, and more rigorous analyses are called for. There was a belief that some staff did not know that they had a need for statistical input, and thus their grant applications and papers may be unsuccessful. Several staff were well served by FMHSBS, especially those with clinical collaborations. This School felt the loss of Mik Black as the key UA expert on microarray analysis. Associate Professor Cris Print provides some statistical advice within the School in an informal and *ad hoc* way. John Fraser is expert in Bioinformatics, and part of the Bioinformatics Institute in the Department of Engineering. Sharon Browning of the DOS has provided some support to SOMS, but mainly supports the School of Biological Sciences in the Faculty of Science, and thus has little time left for FMHS. The research programme Nutrogenomics NZ employs its own fulltime statistician, Dug Yeo Han. Cancer Trials New Zealand has just employed a statistician 0.8 FTE (Vicki Hinder).

The Panel repeatedly heard that having FMHSBS on site at the Grafton campus would be helpful. It did not help that the University shuttle bus did not stop at the Auckland Hospital/FHMS site.

School of Pharmacy. Staff provide only basic statistical advice to students - e.g. in Pharmacy all undergraduate students undertake a Research Dissertation and they have a few lectures from staff as well as some individual assistance. Some staff employ research assistants with biostatistical skills (eg Joanne Barnes). Most staff use the FMHSBS for undergraduate, postgraduate and personal research support. They are continually praised for their assistance but staff is aware they are under pressure. Also requests tend to be a bit *ad hoc* and most staff is not really sure what they are entitled to. All staff would like more access both in terms of study design and analysis, but there does not seem to be a clear process. It seems to be a question of striking up a good relationship with one of the biostatisticians, and as most Pharmacy staff are based at Grafton this is very difficult sometimes. Overwhelmingly, staff supported access to biostatistical services, and would like more access. It would be very helpful indeed if there was a clear process or allocation, and that would be helped if there were biostatisticians available at Grafton. One staff member raised the need to have FMHS support for SPSS, as the FMHS use Stata and SAS. Site licences require clarification.

School of Nursing's submission was that their position and needs were similar to those of the School of Pharmacy.

Liggins Institute. This independent research institute has no statistical service of its own. It has 100 staff, and 60-70 postgraduate students. They are served by FMHSBS and find their expert advice valuable. As with SOMS, it was felt that there may be unrecognised need for statistical support. About 70% undertake work that requires basic statistics, and the remainder undertake trials with animals which are larger and more complex. Array analyses are done in collaboration with the University of Otago or Ag Research. Occasional work is done with CTRU for clinical trials.

Department of Statistics – The Department is led by Professor Chris Triggs (HoD). About 25% of tenured staff are biostatisticians, including Professor Chris Wilde (leader of the academic discipline of Biostatistics), Professor Alistair Scott, Professor Alan Lee, Associate Professor David Scott, Dr Renate Meyer, Dr Patricia Metcalf, and Dr Sharon Browning (genetic epidemiologist). Professor Mik Black has been recruited by the University of Otago. He was known for his skills in microarray analyses, and was the only person identified within the University of Auckland with such skills. DOS does not have a servicing role to FMHS.

Several staff members in the Department of Statistics have a long history of collaboration and co-supervision of PhD students with some individuals and groups in the FMHS. In addition many of graduates, particularly those with MSc in Medical Statistics, seek employment in the health research sector. It is in the Department's interest to provide appropriate training for these graduates, but also to work to ensure an expanding demand for their services and to help to provide satisfying careers. However because the Department of Statistics is part of the Faculty of Science, not FMHS, it has no collective leadership role to the discipline; all collaboration is at an individual level. The Department was formally reviewed in November 2007. While the review committee's report has yet to be released one of its strong recommendations is to build a strong Statistical Consulting Service.

DOS teach the Masters in Medical Statistics degree. DOS is the largest provider of statisticians and potential statisticians to FMHS. They support an apprenticeship model for their graduates to learn Biostatistics for the FMHS DOS prefers a Centre for the University rather than a Centre for FMHS, although acknowledge the funding models pose difficulties for the former.

Other statistical collaborations

Although the Review Panel did not receive submissions from them, we were made aware that some statistical resources were to be found in:

- Bioengineering Institute (FMHS and Faculty of Engineering)
- The Horticulture and Food Research Institute of New Zealand Limited ("Hort Research") is engaged in transgenic research with SOMS

Special techniques

Several teams are applying expression profiling in biomedical research. The analysis of expression profiling (microarray) data is currently not well met since the key person in DOS, Dr Mik Black moved to the University of Otago. Without this, FMHS researchers have to send samples to East Coast of Australia or USA (unsatisfactory). Cris Print (SOMS) assists some groups. Functional MRI (SOMS) needs biostatistical support with appropriate expertise.

District Health Boards (DHB) associated with the University of Auckland.

ADHB

There is no formal relationship between the FMHS and the ADHB Research Offices.
The majority (over 95%) of research undertaken within the ADHB is biomedical, especially clinical trials. The organisation's aim is to encourage research and to do this statistical support is essential. The only permanent biostatistician support consists of 1.0FTE employed by the Green Lane Hospital Research and Education Fund, primarily supporting the former Green Lane Hospital research teams.

The Research Office and Children's Research Centre have charitable funding from the Starship Foundation for a 0.5 FTE biostatistician to work with Starship and other ADHB researchers who are undertaking research with children, young people and their families. The Research Office also has a number of statisticians who can be contracted to assist researchers undertake analyses for a fee.

There is no direct support for other ADHB researchers or for clinical audit or managerial research that are outside of the above areas. Some researchers have sufficient statistical expertise and the relevant software to undertake their own analyses. Others are able to utilise the support of the Faculty's statisticians as they are enrolled in, or support, a particular course or programme.

The ADHB annual research budget is approximately $1.7 M with over 500 active projects and 60 direct FTE research staff.

The National Ethics Committee approved research projects undertaken within the ADHB includes about 250 Industry Sponsored non-ACC covered projects (mainly multi-centre clinical trials), where statistical analysis is provided by the sponsor. There are approximately 100 investigator initiated studies of varying complexity which in general have a funding stream in which statistical support is also covered (e.g. HRC, Collaborative Centre grants). Then there are a number of simple observational type projects (often registrar led audits) where relatively simple statistics are appropriate or may not be used if at all. Support for these researchers, if needed, is *ad hoc* and often dependent on the skills and availability of colleagues. There is an increasing number of substantial projects including investigator initiated controlled interventional trials where there is a lack of formal statistical input into the design or support for the analyses.

Based on the current activity and emerging growth, it is estimated that at least 3.0FTE would ultimately be needed to support ADHB research activity over the next two years.

Closer synergy between the FMHS and ADHB in respect of clinical and, other health related research is a desired long-term goal of both organisations. The sharing of a biostatistical resource should be viewed as a natural element of this relationship. The advantage of a shared relationship would provide a pool of expertise available to both organisations. As a consequence it would presumably attract and retain a suitably qualified biostatistician workforce and attract and retain skilled researchers.

The Waikato Clinical School (WCS) (with Waikato District Health Board, WDHB) has been developing its research capacity in order to respond to the Faculty and University strategic goals of increasing research income and opportunities for postgraduate study. Much of this has been initiated by the WDHB who sees an increase in research capacity as aiding their strategic objectives of attracting and retaining high quality staff, and having an organisation that values innovation.

Biostatistical support is needed in the preparation of funding applications for research for the analysis of the results of original research to support the research ideas and projects of postgraduate students, to support summer studentship projects, and to support other local research within the WDHB or by general practitioners. The biostatistics service encourages the interaction between clinicians and academics, fosters clinical research and builds opportunities for attracting clinical staff into postgraduate programs.

WCS has three bio-statisticians:
Mrs Gaelle Dutu – MSc currently research fellow in biostatistics funded by the WCS professionally supervised by Alistair Stewart, to provide statistical advice to medical researchers from WCS or WDHB, analyses of prepared data sets, supervise statistical analyses by other researchers, produce appropriate tables, figures and written reports and work collaboratively with other researchers within projects. Mrs Dutu also works part time for Te Pou, the National Centre of Mental Health Research, Information and Workforce Development and has links with University of Waikato Department of Statistics.

Dr Peter Reed, PhD is a biostatistician who lives in Rotorua. He provides a statistics consultancy. He has had a number of short term contracts with the Department of Paediatrics, and is currently employed part time on a short term contract from MOH to support the analysis of Project Energise, a large randomised controlled trial of lifestyle interventions for school children which was initiated by the WDHB.

Mrs Grace Joshy, a research fellow in diabetes has an MSc in statistics from India and has been working at Waikato since 2004. She is currently employed full time as a Research Fellow in diabetes by the WCS with funding from the WDHB and links with FMHSBS. Her role includes providing epidemiological and statistical advice to WDHB staff for projects on the prevention or management of diabetes.

Statistical support for the Te Wai O Rona (Diabetes Prevention Strategy) was provided by Dr Greg Gamble from the Department of Medicine but this contract ceased at the end of 2007.

Waikato has 10 doctoral students. In addition, 3 general practitioners and 30 Waikato nurses undertake postgraduate study through the University of Auckland. The WCS also has strong links with AgResearch at Ruakura who have in house statistical services, but these have not been accessed recently. The support of training and continuing professional development for consulting biostatisticians in WCS depends heavily on the expertise of FMHSBS. Local staff provides timely and accessible statistics consulting, to develop their own academic profile in biostatistics whilst having expert support for professional development and access to high quality teaching through the FMHSBS.

Northland DHB
There are professional and ethical imperatives for strengthening the relationship between the University of Auckland's bio statistical consulting service and small, rural, high needs DHBs, such as Northland District Health Board (Northland DHB).

It is very difficult for people engaging in research, and clinical research in particular (such as service registrars), to obtain expert biostatistical input in Northland. The consequences are that potential researchers leave for more research-friendly environments in cities and relevant Northland-based research is undertaken relatively rarely, although there is high need for research to improve health outcomes.

Northland DHB does not employ a biostatistician and perceives professional isolation and the lack of a career path in a small DHB are blocks to this proceeding. Strategies such as scholarships, summer jobs, internships, secondments and other mechanisms that would attract biostatisticians to working in and with the Northland environment could be considered.

Appendix H: Biostatistical support at the University of Adelaide

This Appendix was included at the request of the Deputy Dean FHMS. It gives an outline of biostatistical support in the Faculty of Health Sciences (FHS) at the University of Adelaide, South Australia. While there are many other approaches to the problem of provision of these services, there are sufficient parallels between the University of Adelaide and the University of Auckland to suggest a consideration of Adelaide's system may be worthwhile. The approach Adelaide has taken has *not* solved all the problems, far from it, but it has had some success on a number of fronts.

The parallels between the respective Faculties include:

- Similar size, teaching programs, and breadth of research interests
- Similar organization into Schools and Departments/Disciplines (although Adelaide's FHS also includes Schools of (non-medical) Psychology and Dentistry)
- Geographical dispersion (even within Departments, let alone Schools)
- Historically, statistical expertise has mainly resided in the School of Population Health or its Community Health/Public Health antecedents
- A Department of (mathematical) Statistics located in another Faculty and the "silo effect"
- Limited resources – both in terms of funding and of well trained biostatisticians available to recruit
- The need to support new, highly specialized areas of statistics, in particular, analysis of microarray experiments, that are not the province of most statisticians
- Problems of retention of experienced staff in the academic sector, when better paying jobs exist in the private sector and in government service. Adelaide is also seen as a provincial centre and suffers with respect to the lure of the larger east coast centres.

Historically, meaning the 80s and early to mid 90s, staff of FHS either did not bother overmuch with statistics, did it themselves or availed themselves in an *ad hoc* fashion of whatever (very limited) resources they could ferret out. (It should be noted that the Department of Statistics at Adelaide was a strong Department until the early 90s when it was effectively almost destroyed by shortsighted University administration.)

In 1993 a small group of FHS staff (n = 4) founded the Data Management & Analysis Centre (DMAC) within the Department of Public Health, as a vehicle for conducting the 2nd Australian National Blood Pressure Study, a large multicentre RCT, under the auspices of the High Blood Pressure Research Council of Australia. DMAC has since grown to almost 40 staff (~ 30 FTE), including 12 statisticians and 6 programmers. Only the Director and Deputy Director (both statisticians) are on the Faculty establishment (and they have full time teaching and administration loads aside from DMAC; their positions are not funded in any relation to

their work in DMAC); the remaining staff are all on soft money, funded from the projects DMAC attracts. As it turns out, no member of the staff has ever left because of lack of funds to support a renewal of contract.

It might be important to understand DMAC's ethos. While it must support itself, it has a very strong commitment to health research funded in the public sector. It does not often seek private industry commercial contracts and recognizes that researchers undertaking projects funded from NHMRC, ARC, NHF etc are unlikely to be flush with funds. Its fee structure reflects this.

DMAC began providing consulting services to staff in the FHS in the mid 1990s, and those staff appreciated the stability of the statistical workforce, the medical as well as statistical knowledge of the DMAC staff, and the moderate rates. Since it was not economical to charge back for brief consultations, the first 30 minutes, often 60 minutes, was generally free. Researchers also came to DMAC because of its integrated systems for study management, data management, and statistical analysis.

In 2001 the Faculty Research Committee committed funding (from its share of Research Infrastructure Block Grants, Research Training Scheme, and bequests) for 1.3 FTE statisticians to provide limited free service to PhD students, staff publishing peer-reviewed papers with the University of Adelaide as the attributed institution, or preparing a grant administered through the University. DMAC was asked to provide the majority of this service since it was doing this work anyway, it had a critical mass of statisticians, and could provide mentoring and staff development. (A longstanding arrangement with a non-DMAC private statistician was maintained at 0.3 FTE at one of the distant teaching hospitals). The limit was set at about 10-15 hours per project (although depending on workload, sometimes up to 20 hours was permitted). Prior to the limit being reached, the client (or supervisor in the case of a PhD student) was advised to see the Director DMAC to discuss the possible transition to a fee for service model (with no loss of continuity, since DMAC staff would provide this). The DMAC statisticians keep a database recording the delivery of service details for each half hour. While this sounds tedious, it is surprising how well it works, presumably because, of all people, statisticians cannot abide missing data. After closure of every project, the client is asked to fill out a satisfaction questionnaire and return it to the Faculty Research Committee. Feedback has been virtually universally favourable.

Questions that are probably relevant to the University of Auckland FMHS

What about hospital clinical staff?

The Faculty, its major teaching hospital (Royal Adelaide Hospital (RAH)), and the research intensive state pathology facility, the Institute of Medical and Veterinary Science (IMVS), are co-located and staff often have joint appointments. Sorting out who was eligible for support from the free FHS stats service was a nightmare for DMAC staff. Recently this has been solved: the RAH and the IMVS provide a lump sum to the FHS Research Committee each year for DMAC to provide support via the FHS mechanism. We no longer have to worry if the surgical registrar of the RAH seeking advice is doing so for an affiliate member of FHS staff or

for his/her own research project. If s/he is a RAH staff member then s/he's eligible. It also cuts down on nuisance-level billing.

How is the geographical dispersion handled?
A DMAC statistician spends a fixed proportion of her time at the Womens and Childrens Hospital (a 15 minute walk from the main FHS campus/Royal Adelaide Hospital site). She is a senior PhD statistician chosen for her experience in both epidemiology and psychology – two areas of demand at the site. Mainly, FHS staff don't mind coming over to DMAC since we are close to all the major FHS buildings. If this were not the case, the system would probably not be viable for our clients. See below for further discussion of "out-placing" our resources.

How can 1.3 FTE statisticians funded by the Faculty provide a comprehensive service to all areas?
They can't. There is a cap on utilization of the resource (see above). Also, many of the major research groups don't use the service, or just use it for their PhD students and short term consulting, and not for extended projects. But, and this is crucial, they tend to use DMAC's statistics division in one of two other ways: either fee-for-project or purchasing a DMAC statistician fractional time for an extended period. In the latter case, the statistician will often sit in the research group. In some instances the same statistician has been associated with a research group for many years, accruing deep content knowledge. But they are still DMAC staff, and DMAC looks after their professional development. As a general rule, the purchaser agrees:

(i) that the member of staff will attend the weekly DMAC statistical division meetings;
(ii) to pay DMAC for all costs of employment for the FTE used *plus* 10%
(iii) to permit, and pay during, leave of absence (pro rata for the FTE) for DMAC approved conferences, stats seminars etc
(iv) to contribute to the ongoing education of the statistician – e.g. attendance at conferences relevant to the content area.
(v) to include the statistician in authorship of papers when justified on the usual grounds

Examples: DMAC statisticians staff (and, for their fractional time, sit at) the Australian and New Zealand Dialysis and Transplant (ANZDATA) registry at the Queen Elizabeth Hospital; the Perinatal Trials Unit at the Womens and Childrens Hospital; the Department of General Practice; the Centre for Military and Veterans Health; and the School of Pharmacy at the University of South Australia.

The Research Committee of the Faculty has indicated that it is prepared to increase funding for further statistical resources if that becomes indicated.

Do some FHS researchers use non-DMAC resources?
Yes, but with respect to long term employment of their own statisticians, given the shortage of statisticians, the difficulty of recruitment, and the professional isolation, this often ends badly. A number of researchers employ their own "data analysts", but would also usually consult with the DMAC statisticians under the Faculty mechanism.

Is there still under-utilisation of statistical resources in FHS?
Almost certainly, though this is diminishing over time. The Faculty service is a major menu item of the FHS research web page. Since the service is free to PhD students, supervisors don't hesitate to recommend it to their students. DMAC itself is so well known that even if a researcher or student doesn't know about the Faculty service, they will contact DMAC "generically" and then be pleasantly surprised that there is a free service.

Do we provide support for bio-informatics/ micro-array analysis?
No. This is provided by the Department of Statistics, to some extent. There is a need for more resources here, but DMAC has no plans to provide this.

Do we provide in-service training courses to staff and PhD students?
No. We are not resourced to do this. The academics in DMAC already have over-full teaching loads. Many PhD students (and some staff) take the introductory and advanced biostatistics courses that the Deputy Director and Director of DMAC teach as part of their normal academic roles within the School's Master of Public Health program. There is also something of a prejudice among the statisticians that teaching a general course might raise the overall statistical knowledge of a larger group of people, but would very rarely address the particular needs of any individual – who will then take up extra time getting the advice they really needed in the first place. There is no real evidence base for or against this prejudice.

How do we provide professional development?
We take this *very* seriously. It is one way of retaining staff, it adds immeasurably to our reputation as an employer, and it boosts our expertise.

- There is a weekly (compulsory) meeting at which each statistician presents one or more analytic/methodological problems they are currently encountering for general discussion.
- There is a monthly journal club. It is embedded into the stats meeting so it has virtually 100% attendance.
- Each statistician has the opportunity of at least one paid stats conference/short course attendance per year (or FTE year). Some, on long term "lease" to research areas may also be funded by the research group to attend a content area conference associated with a project.
- Statisticians are encouraged to enroll in cognitively related courses at Adelaide, for example the MPH course(s) in epidemiology or health economics. DMAC funds enrolment either in whole or in part.
- Junior statisticians are seated next to a senior statistician. Senior statisticians take junior statisticians with them on consultations. On large projects, the FTE allocated is split between a senior and a junior statistician, so that knowledge transfer is facilitated (and the project has coverage in the event of illness or leave etc).
- It is made absolutely clear to more senior statisticians that DMAC is *inter alia* a training facility and that mentoring junior biostatisticians is one of their primary roles, not an afterthought or nuisance. The Director, Deputy Director, and Head of Division lead by example.

- The Director has a very substantial statistics library and members of the Stats Division may borrow books at any time without asking permission (as long as the book is kept on DMAC property).
- DMAC provides statisticians with contracts for terms longer than the notional funding source for their employment allows (so a year's assured funding can lead to a two or three year contract). This is by special arrangement with the Dean, and follows from our track record of never asking the Faculty for financial assistance.
- The University of Adelaide is a member of the Biostatistics Collaboration of Australia, but effectively it is a DMAC operation. The University could not be a member except for the existence of DMAC. The Director and Deputy Director of DMAC teach the core unit in RCTs to the collaborating universities and a young (but not *first* year out) DMAC statistician is given a fractional junior academic appointment to assist with the teaching. They are thus trained in RCTs, exposed to the BCA (they sit in on Teaching Committee teleconferences), get to put an academic teaching role on their CV, and interact with a large range of postgraduate students, many of whom are very expert in their own field. [The junior statistician is not just given the tedious role of marking assignments: this is shared task.]

How do we fund all this?

- The Director and the (non-academic) Heads of DMAC's three divisions (Operations and Data Management, Statistics, and Programming and IT) work very, very hard and thereby to some extent subsidise DMAC's operation. This might well not work with differently minded or motivated staff.
- We charge a 10% fee on top of costs for any long term statistical resource. Nobody complains – it remains to be seen what would happen if this margin increased.
- We charge below commercial, but still reasonable, margins on our non-statistical work, especially our study management and data management systems, which are state of the art.
- We have several large and reasonably assured long term projects (funded ultimately from the government sector) that provide a reasonably healthy margin.
- DMAC gets to recover at least some of the fees for its contribution to the BCA teaching program and this funds a fractional time academic appointment for a junior statistician.

If the Faculty suddenly withdrew all its funds to DMAC, nothing would change as far as DMAC was concerned. It would need to find paid work for 1 FTE statistician and that could be arranged within days. The Faculty directly accounts for perhaps 5% of DMAC's turnover. DMAC's realised aim is never to be dependent on Faculty or University funding, or for that matter any single source of funds. DMAC receives nothing back from the University from the RIBG or RTS it contributes to. Considering the enormous leverage it provides for other researchers' grant and project success, and the assistance with completion of PhD theses, this is something of an anomaly.
DMAC pays for all its own hardware and software, wiring, switches, telephone fees, furniture, advertisements for appointments, stationery and incidentals. Accommodation is provided by the Royal Adelaide Hospital almost free to the University under a

longstanding agreement (though this happy arrangement is sure to change with the expected decommissioning of the RAH within the next decade).

Governance?
DMAC is not its own "cost centre"; it is part of the School of Population Health, and its Director reports to the Head of School, not so much as Director of DMAC, but as an academic. DMAC is its own creation, not that of the School or Faculty. Moreover, it makes little or no demand on School resources. In fact, via levies the School charges on much of its income, DMAC supports/subsidises the School, so in practical terms there is little or no interference with its operation. Given the diversity of its activities and clients, DMAC could sit in almost any of the Schools of the Faculty, or be a separate entity in the Faculty. It might well depend on the disciplinary orientation of the Director. DMAC has always enjoyed very considerable (non-financial) support from successive Executive Deans of the Faculty.
As far as the Faculty Statistics Service is concerned, the Director of DMAC reports to the Head of the Faculty Research Committee, to whom he provides regular reports of usage in terms of FTE utilized, breakdown of client type (staff, student) and departments serviced etc. The FTE is characteristically within a 5-10% band around the nominal 1.0 allocated to DMAC.

How do we interact with the Discipline of Statistics?
The Department of Statistics (Faculty of Engineering, Computing and Mathematical Sciences) is relatively small, but DMAC has a great interest in its health. It provides us with an all too small pool of very well educated, undifferentiated statisticians. We are always on the lookout for (especially) their 1st class Honours graduates, whom we can then train up in the practical business of biostatistics. We consider the formal undergraduate mathematical statistics background virtually essential for a career as a biostatistician. DMAC is now also starting to train PhD students and we will often look for joint supervision from DoS. DMAC provides data for projects for senior students in DoS. Finally, DMAC invited DoS to be a partner in its application to join the Biostatistics Collaboration of Australia, and it splits the teaching and income for the BCA activities with DoS in an agreed proportion. Our main connection with DoS is via the Head of Discipline, with whom we have excellent professional relations. Both parties see the connection as symbiotic. There have been tensions at times (at the level of Executive Deans) with respect to the growth of DMAC's statistical resources.