Supplementary Information

**Text 1: Community Consultation**

Findings from the Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people (1) showed that falls had the highest total burden (disability-adjusted life year 56.1). Bone mineral density data was atop the list of key gaps in data to estimate exposure to risk factors for Aboriginal and Torres Strait Islander Australians (1), suggesting musculoskeletal health as a national priority for this population. We have undergone community consultation over several years and have built a strong relationship with several community members and Aboriginal community-controlled organisations including the Bunurong Health Service, Dandenong & District Aborigines Cooperative Limited (DDACL). When musculoskeletal health was discussed with community members who were 40 years and above – these individuals were concerned about their physical function and mobility, so were highly motivated about how to prevent fracture and falls. Discussions with Elders, who are respected individuals within the community, have highlighted that musculoskeletal health of Aboriginal and Torres Strait Islander people is an under-researched area and given all of the physical disability stories they recount during the discussions, this area is of high priority, and they have stated that the community and their people will benefit from this research. They explained that staying within the community and on Country is very important for their people, and so when community members begin to experience physical ailments, they do not want to go to aged-care facilities as this would result in them being away from their community. During these meetings, community members have also explained their culture and traditions. These highlighted the importance of taking a holistic approach when performing a research study with Aboriginal and Torres Strait Islander people.

Equality amongst research partners will be maintained with research transparency – this will not only ensure that all stakeholders are kept informed throughout the study period, but also builds trust, which is critical in research with Aboriginal and Torres Strait Islander people. Quarterly meetings, phone or video calls will be scheduled to discuss the progress of the study with Bunurong Health Service staff and other stakeholders including Elders and community champions (i.e., the Aboriginal Advisory Group). These will enable to modify any research procedures, if necessary, upon feedback from research participants. An Aboriginal Advisory Group (consisting of JO’s role within DDACL, TW’s position within the community, and community champions) will also provide ongoing advice to study investigators regarding
interpretation and presentation of findings, and how best to communicate and disseminate the findings from SIMBA.

**Text 2: Benefit to Community**

In a more general scope where the findings and health implications will be summarised, we will prepare plain language reports and summaries, infographics/posters, presentations and workshops at community meetings and social events – and make all this available on Aboriginal and Torres Strait Islander media (newspaper, websites, social media). An Aboriginal or Torres Strait Islander person will be employed to design the artwork which will be used for the reports and summaries, and the infographics. There is not a one-size fits all system, and so we will tailor our study outputs to the community’s needs, in line with the guidance from the Aboriginal Advisory Group.

DXA reports will be sent to all the participants’ general practitioners (upon their consent), in order for their doctors to follow-up with treatment if necessary. Furthermore, the age-bands that are listed have been strategically chosen to assist the Bunurong Health Service in their annual reports, as health data is included and summarised according to these age-bands. JO suggested that data on bone mineral density can also be incorporated into the annual reports to further highlight a need to improve screening and diagnosis for osteoporosis.

The described benefits from SIMBA have been discussed and agreed to by Aboriginal or Torres Strait Islander research stakeholders, community champions and Aboriginal investigators. Together, the benefits of SIMBA to community have been planned in accordance with the National Statement on Ethical Conduct in Human Research “The benefits from research should include the enhancement or establishment of capabilities, opportunities or research outcomes that advance the interests of Aboriginal and Torres Strait Islander Peoples” (2). We aim to empower Aboriginal and Torres Strait Islander people with regards to increased health literacy surrounding musculoskeletal health via the community educational program. SIMBA will be involved in capacity building through up-skilling clinicians to screen for osteoporosis and subsequent treatment plans. Additionally, healthcare professionals and other employees of the Bunurong Health Service will have increased knowledge and awareness regarding musculoskeletal health. Through the University’s specific PhD scholarship scheme for Aboriginal and Torres Strait Islander people, SIMBA will provide the opportunity for training in bone imaging and muscle function assessments.
Text 3: Community educational program
Every aspect will be developed together with key community stakeholders. For instance, the content of the program, the delivery (who should deliver it, train personnel if required), creating videos (if required) of key community members telling their own personal story, scheduling invitations of Elders to attend and facilitate the educational program, creating online content – whether it be in text, or various media (videos). Process evaluation and implementation will be conducted throughout the duration of the program (e.g. quarterly if focus groups reveal once per month frequency over one year). This will allow study investigators to monitor the progress of how well the content and delivery is being received and will subsequently provide early indications as to whether certain aspects require modification to better suit the needs of the community members.

Text 4: Ethics
Ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and communities (3) defines six core values — spirit and integrity, cultural continuity, equity, reciprocity, respect, and responsibility. We have applied these values in conjunction with The National Statement on Ethical Conduct in Human Research (2), Australian Code for Responsible Conduct of Research (4), Keeping research on track II (5) and Ethical considerations in quality assurance and evaluation activities (6).

We have detailed how we have addressed each core value below:

1. Spirit and integrity: SIMBA study investigators are committed to working in partnership with Aboriginal and Torres Strait Islander people and communities, in the spirit and integrity of Aboriginal and Torres Strait Islander cultural values. We will have ongoing engagement with Aboriginal community members in the research, in a meaningful way. Study investigators are dedicated to ensuring there is transparent communication and respect with Aboriginal people and communities. The SIMBA study investigator team includes two Aboriginal investigators, one of whom is the CEO of an Aboriginal Community Controlled Health Organisation (Bunurong Health Service – JO) and one of who is a chiropractor and musculoskeletal expert (TW).

2. Cultural continuity: we have used Aboriginal and Torres Strait Islander standpoints and methodologies when developing research proposals. For instance, we will offer both male and female investigators to perform the scans – whichever the participant
feels more comfortable with. The language in the questionnaires have been modified by Aboriginal study investigators to align with cultural appropriateness.

3. **Equity**: Throughout the consultation process, study investigators have actively engaged community champions in the research topic and methods of research. Our communication strategy (e.g. patient information consent form, questionnaires, feedback and final reports) will be in lay language to ensure all information can be easily understood by participants and community members. There is no exploitation of participants in the conduct of research; the potential benefits and risks of the research is clarified in the patient information consent form and participants are encouraged to ask questions regarding their involvement in the study. Study investigators conduct themselves where there is no judgement, particularly during the telephone screening and the study visit.

4. **Reciprocity**: Study investigators have conducted equitable and respectful engagement with and inclusion of Aboriginal and Torres Strait Islander peoples. In doing so we have prioritised working in partnership and prioritised the voices of Aboriginal and Torres Strait Islander peoples, their values and culture. We have engaged in respectful discussions to understand that the benefits for Aboriginal and Torres Strait Islander people and communities may encompass sharing of knowledge (through educational program and study visits), not be immediate – where the impact of the findings from SIMBA may take time to implement policy changes (for instance Medicare DXA screening specifically for this population), and be of benefit to not only study participants but the wider Aboriginal and Torres Strait Islander people and communities. We have addressed emerging needs articulated by Aboriginal and Torres Strait Islander people, as expressed during the consultation process by various community members, Elders, and community champions. For instance, the impacts of physical disability (due to falls and/or fractures) on community is very unfavourable, as Aboriginal and Torres Strait Islander people have a close connection to community and Country. SIMBA will have both direct (increased musculoskeletal health literacy) and indirect benefits for Aboriginal and Torres Strait Islander people (at the national level – Medicare policy changes for DXA screening). Study findings will also be translated to form the basis of a larger nation-wide study through the roles of co-author PRE as chairman of Healthy Bones Australia. SIMBA will provide evidence for a larger study where the aim is to visit rural and remote communities using a mobile bone imaging vehicle, as these communities do not have access to aBMD assessment. In line
with this, an e-health platform will be developed where experts in metropolitan areas can consult on musculoskeletal assessments in patients who reside in outer regional and remote areas to ensure equitable access to healthcare.

5. **Respect**: The participant information consent form used in SIMBA ensures conditions for consent are satisfied for the research, where the decision to participate is voluntary, participants are fully informed, and understand the information and what being a participant entail. The participant information consent form is written in lay language to ensure everything can be easily understood and has been checked and modified by Aboriginal investigators. Upon the completion of SIMBA individual and collective contributions of Aboriginal and Torres Strait Islander participants and groups will be acknowledged whenever findings are dissemination (e.g. through acknowledgement in final reports, presentations and publications).

6. **Responsibility**: We have demonstrated that SIMBA will do no harm by providing all relevant information for the participants prior to seeking consent during the study visit. We have performed a risk assessment where the research project has been classified as low risk. Additionally, due to the imaging devices utilising radiation, our scanning protocol has undergone a radiation safety assessment by a medical radiation safety officer, who is also a radiologist, and has been classed as low radiation exposure. Nevertheless, all this information is provided in the patient information consent form, which is sent out (either email or hard copy) to the participant prior to scheduling a study visit (where consent is taken). When research results will be published, we have ensured that individuals and/or communities will not identifiable and only aggregate data will be published (e.g. apply privacy-preserving protocols where study ID will be used to label samples, including biological samples, names will be removed from datasets including focus group interview transcripts and field notes).

References

3. National Health and Medical Research Council, Ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and communities: Guidelines for researchers and stakeholders. Commonwealth of Australia, Canberra.2018.

5. National Health and Medical Research Council, Keeping research on track II: A companion document to Ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and communities: Guidelines for researchers and stakeholders. Commonwealth of Australia: Canberra. 2018.