ECONOMIC BENEFITS OF AUSTRALIA'S PUBLIC AQUATIC FACILITIES

INDUSTRY REPORT

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DID YOU KNOW?

$2.72 MILLION The average aquatic facility creates $2.72 million a year in value to the community

The average Australian visits a public aquatic facility 4.4 times a year

$48 BILLION Every year in Australia physical inactivity costs the health system $3.7 billion and leads to death and disability costing $48 billion

5% Insufficient physical activity is responsible for 5% of all death and disability in Australia

40% Nearly 40% of the Australian population is classified as "physically inactive" according to the World Health Organisation's physical activity scale

Increased risk of disease is heavily concentrated among the physically inactive category

A weekly visit to a pool is enough to take most people out of the "physically inactive" category

$26.39 As a result of these health benefits, every aquatic facility visit creates economic benefits worth an average of $26.39 in addition to the leisure value gained by users

Additional potential benefits of public aquatic facilities include:

- Patrons' enjoyment
- Benefits of water familiarisation and improved aquatic safety skills
- Increased sense of community and social capital
- Increased local economic activity
- Patrons' improved workplace productivity
- Keeping the option of accessing the pool open for potential users
- Improvements in property values and local tax base

The value of these additional sources of potential benefit is not estimated in this report. Estimating them could form the basis of additional future research.

ECONOMIC BENEFITS OF AUSTRALIA'S PUBLIC AQUATIC FACILITIES

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BACKGROUND

Australia's public aquatic facilities generate significant economic benefits for their patrons and for the Australian health care system. Increased physical activity, in the form of swimming and other aquatic exercise, leads to a valuable improvement in health outcomes.[1]

In addition, public aquatic facilities provide Australians with a safe place at which to familiarise themselves with the water, supported by lifeguards, good visibility and marked depths. This enables visitors to aquatic facilities to develop their aquatic survival skills in a low risk environment and to develop confidence in the water before being exposed to more hazardous open water aquatic recreation. We should work to encourage the provision of suitable public aquatic facilities for all Australians, and to encourage their use due to the benefits they provide for exercise and improved aquatic safety.

On average, each Australian visits a public aquatic facility 4.4 times a year, leading to 106 million individual pool visits annually.[2] The physical activity engaged in during these visits, including lap swimming, aquatic sports, learning to swim and unstructured aquatic play, helps to increase visitors' levels of physical activity.

To determine the overall health benefits of exercise, health professionals measure levels of activity based on the number of minutes of exercise engaged in each week, adjusted for intensity as measured on the Metabolic Equivalent of Tasks ("MET") scale, to arrive at an estimate of MET.minutes per week.[3] Increases in activity, as measured in MET.minutes, can be traced to predictable improvements in health outcomes.

AIMS

This study aims to estimate the economic benefits of an individual aquatic facility visit by measuring the links between an increase in physical activity from an average pool visit and reduced risk of mortality, morbidity and health care expenditure, as well as reduced absenteeism.

This figure can then be used to calculate the additional value created by individual pools or the aquatic facility sector as a whole, based on estimated annual attendance.

METHODS

Estimating the dollar value of health gains

Estimates of the burden of illness caused by insufficient physical activity, measured in Disability Adjusted Life Years (DALYs), is taken from the Australian Institute of Health and Welfare's (AIHW) 2016 Australian Burden of Disease Study.[1] One DALY is equal to either one year of reduced life expectancy or equivalent reductions in quality of life over a period of time. So, for example, an illness which reduced life expectancy by one year would cause one DALY, as would one which caused the patient to experience a 50% reduction in quality of life for two years. These DALY figures were converted into a dollar value using Royal Life Saving Society – Australia's (RLSSA) preferred 2016 Value of a Statistical Life Year (VSLY) of $198,000.[4, 5]

Measuring impact of physical inactivity

The measurement scale for levels of physical activity was taken from the assessment of behavioural risks in the 2015 Global Burden of Disease study.[6, 7]

The appendix to this study provides data on the links between different levels of activity and the relative risks of stroke, type 2 diabetes, heart disease and breast and colon cancers for different age groups.

These risks based on activity level were weighted by their relative contribution to the burden of inactivity and by the age distribution of the Australian population to derive a single relative-risk-of-health-reduction measure for the average Australian at each level of physical activity.[8] This measure enables us to divide the overall burden of physical activity across persons at the different activity levels.

The distribution of physical activity in Australia

Detailed physical activity data from the Australian Health Survey was used to estimate the proportions of the population in each activity level used by the Global Burden of Disease Study, based on World Health Organization (WHO) physical activity groupings.[9] These activity levels are measured using average MET.minutes per week, with levels of activity (including both physical exercise and gardening) allocated as follows:

- Persons who undertake less than 600 MET.mins/week are classified as "inactive" and experience a 32% higher relative risk of harm from lifestyle-related illness than those with the highest level of activity. This cut off roughly equates to 60 minutes per week of vigorous exercise, such as lap swimming, or 120 minutes of low intensity exercise such as snorkelling.
- Persons with between 600 and 4000 MET.mins/week are classified as "low activity" and experience 14% more harm from lifestyle-related illness than those with the highest level of activity. Four thousand MET.mins is equivalent to 400 minutes of vigorous exercise each week.
- Persons with more than 4000 but less than 8000 MET.mins/week – 800 minutes of vigorous exercise or a proportionately longer period of more moderate exercise – are classified as "moderate activity" and experience 5% more harm from lifestyle-related illness than those with the highest level of activity
- Persons with more than 8000 MET.mins/week are classified as "high activity" and are used as the baseline.

Figure 1 shows the percentage increase in mortality and morbidity (measured in DALYs) experienced by the average person in each activity level, relative to the average high activity individual.

Figure 1 shows that persons who are physically inactive according to the WHO guidelines experience 32% higher levels of disability and premature mortality than persons engaging in high levels of activity, while persons engaging in low and moderate activity experience 14% and 5% increases in ill-health, respectively, compared to persons with high activity levels.

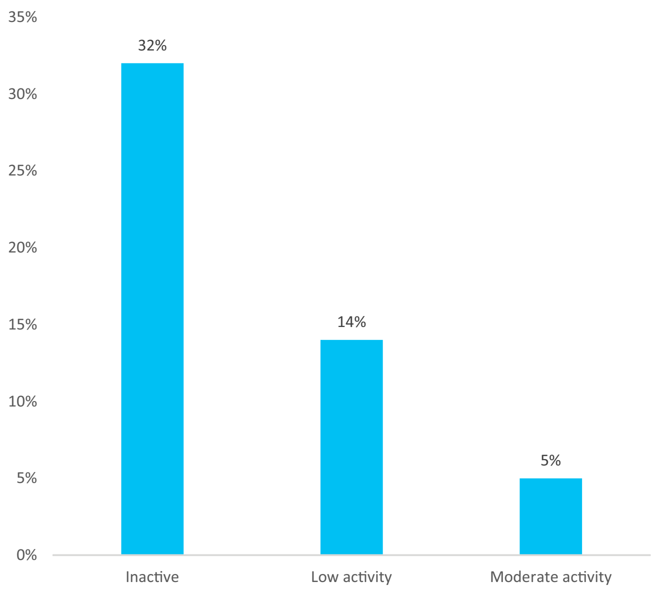

Figure 1: Average increase in mortality and morbidity, relative to high activity

The physical activity levels used by the WHO are based on the medical literature linking physical activity to illness, and are much higher than the minimum levels of exercise recommended by the Commonwealth Department of Health.[10]

Figure 2 shows the breakdown of the Australian population across the different WHO activity levels, based on distributional data for average levels of reported physical activity (including gardening) provided by the AIHW.

Based on this data, we estimate that 39% of the Australian population qualify as "inactive" by the WHO standard, undertaking the equivalent of less than 60 minutes of vigorous exercise each week and suffering 32% more disability and premature mortality than high activity persons. A further 53% of Australians report "low" levels of physical activity, or under 400 minutes of vigorous exercise, while only 8% of Australians are classified as "moderate" or "high" activity, with the equivalent of more than 400 minutes of vigorous exercise.

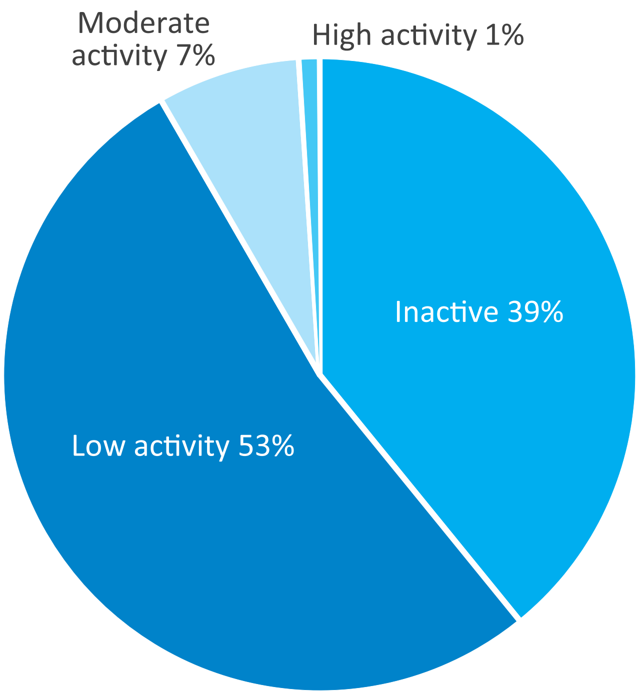

Figure 2: Distribution of activity levels across the Australian population

Total costs of existing physical activity

We then estimate a per capita health cost of low physical activity for people in each category, based on the share of DALYs experienced by each group. We also allocate a portion of Australia's health care spending, using the projected expenditure on the illnesses linked to low activity and the percentage contribution of low activity to each illness.

The calculation of per capita costs by activity level also incorporates an approximation for levels of absenteeism, calculated as a function of self-reported health and taken from a survey of 3,620 employees.[11] This qualitative health estimate is then mapped to MET activity levels based on conservative assumptions about how the two rating scales are likely to overlap, with low self-reported health being overrepresented in the inactive category, based on the established links between low physical activity and reduced overall health outlined above. Projected days of work missed are then valued based on estimated daily wages calculated from Australian average weekly earnings.

Taking all these costs together, Figure 3 shows the breakdown of overall additional costs for the average person in each activity level, relative to someone who is engaging in high physical activity.

Figure 3 shows that the additional ill health experienced by every Australian who is physically inactive costs Australian society an additional $4,576 each year, in the form of disability, lowered life expectancy, increased medical expenditures and increased absenteeism. Every person who engages in "low" physical activity generates costs of $1,185 and each person who reaches "moderate" activity costs $385 per year, compared to the "high" activity baseline. When an individual moves between any two activity levels, we can use these figures to calculate the dollar value of the expected improvement in health.

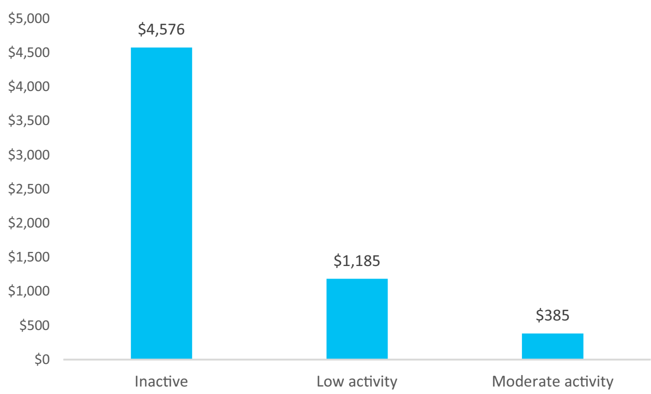

Figure 3: Additional per person costs of activity-related ill health, compared to high activity persons

Effect of additional aquatic facility visits on health costs

Based on existing approaches to valuing active transport,[12] we simulate the effect of an additional aquatic facility visit on the overall distribution of physical activity to calculate the reduction in health care costs from this amount of additional physical activity.

Existing estimates suggest that swimming has a metabolic intensity of between 4.3 and 13.6,[3] depending on the exact activity and swimming speed. We adopt the relatively conservative figure of 7.5, towards the middle of this range and in line with the ABS figure for "vigorous" exercise.[9] This implies that ten minutes spent swimming will, on average, generate 7.5 x 10 or 75 MET.mins of physical activity, a little more than 10% of the 600 MET.min threshold for a "low" level of physical activity.

We estimate the average time spent swimming per pool visit at 74 minutes, based on a large (n=8,000) Dutch survey,[13] which is broadly consistent with a smaller Australian study (n=100) estimate of 69 minutes per visit.[14] Based on detailed distributional data for Australian activity levels we randomly assign METs equivalent to an additional aquatic facility visit to a member of the Australian population and calculate the resulting change in the costs of insufficient physical activity.

Relationship between activity categories and risk reduction

The value of additional physical activity depends heavily on the assumptions about the relationship between elevated risk and a person's activity level within an activity band: whether the benefits of increased activity accrue gradually as a person moves from an average inactive activity level to an average low activity level, or whether they occur mainly when the person actually crosses the threshold for the higher activity level.

We deal with this in our final result by taking the average of the benefits calculated using these two different assumptions – first by assuming that all "inactive" individuals are equally at risk and that all health benefits occur when changing activity levels, and second by assuming that the benefits of increased activity accrue at a constant rate when moving from the observed average activity level of someone who is "inactive" activity level to the average activity of persons at the "low activity" level.

Using these figures, we calculate the value of increased physical activity from one additional pool visit for the average Australian in terms of improved health and reduced health care costs.

Extrapolating from per-visit to per-facility and industry-wide benefit

Figures from the Western Australian aquatic industry[2] suggest that the average Australian visits a public aquatic facility 4.4 times per year. Extrapolating these figures to the Australian population as a whole implies 106 million individual public aquatic facility visits each year. Multiplying this figure by the value of the average individual visit enables us to estimate the wider economic value of the aquatic industry as a whole. Similarly, attendance figures for the average aquatic facility enable us to calculate the benefit from individual facilities.

Attendance data gathered by Wollongong City Council[15] for public aquatic facilities under its control show that the average public aquatic facility in the Illawara region attracted 128,000 visits per year. This is broadly consistent with calculating the number of visits per-pool based on the 4.4 per person annual figure, above, and the estimate of 1,027 total public aquatic facilities calculated by the RLSSA,[16] which implies 99,000 visits per-pool each year.

Benefits per visit

Based on the methods outlined above, we find that the average pool visit generates benefits of $26.39 in improved health outcomes and consequent reductions in health spending and absenteeism.

This figure is based on the average of $41.99, which is the calculated benefit if all members of the same activity category are assumed to experience equal levels of elevated health risk, and $10.80, which is the estimate of benefits if health costs are assumed to decline linearly between average activity levels within each activity category.

The vast majority of this benefit (more than 99% of the total) is due to currently inactive persons moving into the "low" activity category. Each year, each person who leaves the inactive category as a result of an additional pool visit generates improved health valued at $3,542, while persons moving from "low" to "moderate" generate $801 and those moving from "moderate" to high generate only $385. In addition, given the low exercise requirement for reaching the threshold for "low" activity, many more inactive persons are likely to move to a higher activity classification when undertaking an additional pool visit than those whose activity is already "low" or "moderate".

This suggests that increases in aquatic facility usage which target currently inactive persons will have greater benefit than those which target the average Australian (the basis on which the $26.39 figure is calculated) and that increases in swimming among the already active will generate much smaller benefits.

This figure is calculated by looking at additional aquatic facility visits, and is technically not applicable to reductions in existing swimming, such as those due to the closure of an existing facility for example. In these cases the benefit calculation which assumes that risk increases evenly as activity falls will be mostly unchanged, while the benefit where risk is assumed to be constant for all members of an activity level needs to be recalculated using a revised simulation designed to model reduced activity from the current baseline. Modelling reduced visits in this way yields a significantly lower estimate of $7.77 per visit, but this figure displays higher variance during simulations than the figure for increased exercise and should be applied with caution. However, if there is a gradual upward trend in physical activity over time, future additional aquatic facility visits, whether increases or reductions in today's activity levels, will effectively be additional to the 2011/12 physical activity levels used in calculating these estimates. As such, we suggest applying the $26.39 per visit figure for most purposes.

The breakdown in value of improved health across the three categories measured – the value of longer life and reduced disability, reductions in health care spending and reduced absenteeism – for individuals moving from inactive to low activity are shown in Figure 4, below. This suggests that the majority of the gains result from the societal value of the improved health enjoyed by the newly-active person themselves. This is due in part to the conservative assumptions used in estimating the portion of health care costs directly associated with inactivity and the level of absenteeism caused by ill health due to low physical activity.

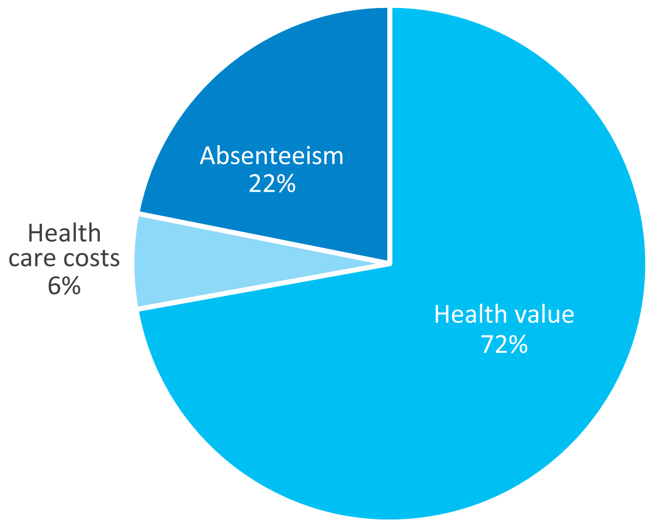

Figure 4: Breakdown of gains from a single individual leaving the inactive group, by category

Industry-wide benefits

Based on the calculated per-visit benefits of $26.39, and the 4.4 annual visits per person cited above, the Australian aquatic industry as a whole generates $2.8 billion in wider economic benefits, in addition to the leisure benefits enjoyed by the visitors.

Benefits from the average aquatic facility

We have three different estimates for the average aquatic facility's annual attendance. Western Australian figures[2] – the source of the 4.4 visits per person estimate – suggest an average of 82,000 visits per aquatic facility per year. Figures from Illawara-region pools[15] suggest more than 128,000 visits, while a calculation based on RLSSA estimates of total facility numbers in Australia[16] implies 99,000.

Taking the average of these figures suggests 103,000 pool visits per year which, when multiplied by the value per visit of $26.39, implies that the average facility generates $2.72 million in additional economic value.

DISCUSSION

The calculations outlined earlier represent one of a number of ways in which the value of public pools can be estimated. An alternative approach is taken in a Victoria University study on the Community Benefits of Victorian Aquatic and Recreation Centres,[17] which calculates a direct economic benefit of $13.83 per pool visit on the basis of patrons' travel and pool entry costs.

Neither of these approaches attempt to measure the less tangible social and community benefits of a public pool, nor the potential improvements in water safety, environmental amenity, option value or property value benefits experienced by local residents even if they are not patrons. The exact values of these less direct benefits are difficult to calculate, but they are likely to be significant, meaning that the $26.39 figure quoted above is likely to underestimate the true benefits of pool visits. The health benefits of increased physical activity are also likely to be accompanied by improved productivity at work, and these extra benefits are not yet captured by this research.

Neither study attempts to calculate the additional economic contribution which public pools might make to the local economy via an input-output framework, given the concerns as to the difficulty of avoiding double counting benefits and identifying potential alternative uses for funding when this approach is employed.[18]

In addition, this paper assumes that patrons place no leisure value on their pool visits over and above the cost of entry and that they take into account the future health benefits of their aquatic activities when deciding how often to visit. If patrons took no account of the value of health benefits when visiting the pool then it would be appropriate to add together the estimated health benefits of $26.39 and the leisure benefits of $13.83 to determine the total value of a pool visit. However, evidence from studies of the motivations of visitors to public aquatic facilities[19] shows that visitors place a high level of value on health benefits, suggesting that some of the physical activity benefit is already captured in the value of leisure benefits.

LIMITATIONS AND NEXT STEPS

More accurate estimates could be generated by separately modelling the health gains for different age cohorts, rather than assuming that patrons have the same age profile as the Australian population as a whole. Adopting this approach would require data on the ages and activity levels of current and potential pool attendees.

We have likewise assumed that the activity levels of patrons mirror the overall activity levels of the Australian population. We justify this assumption on the basis that our focus is on the marginal aquatic facility patron, who is most likely to increase or decrease their level of exercise based on the local availability of a public pool. While the average pool patron may be more active than the average Australian, this is less likely to be true of the marginal patron.

Similarly, the assumptions around length of time spent swimming and metabolic intensity, while backed by evidence, remain quite stringent. This is offset to some extent by the fact that less active patrons are likely to possess lower cardio-respiratory fitness and therefore to experience higher metabolic loads at lower levels of exercise than the average Australian.

Finally, since we do not have access to a timeline for when the health gains from additional physical activity are likely to arrive, we have not applied a discount rate to future health gains. This may lead to economic benefits being slightly overstated, but precedents exist for using this kind of approach.[12, 20]

The accuracy of these estimates could be improved by tying the benefit of a specific aquatic facility, whether existing or proposed, to the average activity levels of the demographic groups in its catchment area, rather than the averages for Australia as a whole. The benefits of exercise could also be tailored to reflect differences in relative risk as a function of the ages of the target population. This would allow the identification of high value areas for the placement of aquatic facilities.

CONCLUSIONS

Physical inactivity imposes massive costs on Australian society, leading to higher rates of stroke, heart disease, diabetes and cancer. Almost every Australian could benefit from engaging in additional exercise.

Our public aquatic facilities enable Australians to engage in more than 130 million hours of vigorous exercise each year. This activity generates direct economic value, particularly in the form of patrons' improved future health and reductions in health care expenditure, which we estimate to be $22.14 per visit, or $2.35 billion each year.

These benefits from public aquatic facilities are additional to the revenue they generate and to their many intangible benefits including a sense of community, social capital, access to water safety education and patron enjoyment.

When considering whether to provide new aquatic infrastructure and whether to maintain existing facilities, governments should take into account the measurable health benefits these facilities deliver when conducting cost benefit analysis.

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APPENDIX

Table 1 sets out the age-weighted average increases in relative risk of key lifestyle illnesses as a result of insufficient physical activity. The relative risk of each disease for a person engaging in high physical activity has been normalised to 1.00, meaning that a value of 1.16 shows a 16% increase in the risk of that condition relative to a person of the same age who engages in high physical activity. As such, the relative risks show how the impact of exercise changes with age, but do not show how age influences the overall risk of disease.

Activity level	Breast cancer	Colon cancer	Type II Diabetes	Heart disease	Stroke
Inactive	1.16	1.29	1.34	1.34	1.39
Low	1.12	1.17	1.19	1.11	1.16
Moderate	1.09	1.07	1.04	1.02	1.11
High	1.00	1.00	1.00	1.00	1.00

Table 1: Relative risk of illness as a function of physical activity. Source: Global Burden of Disease 2013.

These figures are calculated from age-specific relative risk ratios for each activity level.

Tables 2-4, below, set-out the relative risks for each activity-linked disease for persons in the "inactive", "low activity" and "moderate activity" categories, with all risks faced by high activity persons once again normalised to 1.00.

Age	Breast cancer	Colon cancer	Type II Diabetes	Heart disease	Stroke
25-29	1.16	1.29	1.34	1.57	1.67
30-34	1.16	1.29	1.34	1.52	1.62
35-39	1.16	1.29	1.34	1.48	1.57
40-44	1.16	1.29	1.34	1.45	1.52
45-49	1.16	1.29	1.34	1.41	1.48
50-54	1.16	1.29	1.34	1.37	1.43
55-59	1.16	1.29	1.34	1.34	1.39
60-64	1.16	1.29	1.34	1.30	1.35
65-69	1.16	1.29	1.34	1.27	1.31
70-74	1.16	1.29	1.34	1.23	1.27
75-79	1.16	1.29	1.34	1.20	1.23
80+	1.16	1.29	1.34	1.17	1.20

Table 2: Relative risk of illness as a function of age, inactive persons only. Source: Global Burden of Disease 2013.

Age	Breast cancer	Colon cancer	Type II Diabetes	Heart disease	Stroke
25-29	1.12	1.17	1.19	1.18	1.26
30-34	1.12	1.17	1.19	1.17	1.24
35-39	1.12	1.17	1.19	1.16	1.22
40-44	1.12	1.17	1.19	1.15	1.21
45-49	1.12	1.17	1.19	1.14	1.19
50-54	1.12	1.17	1.19	1.13	1.17
55-59	1.12	1.17	1.19	1.11	1.16
60-64	1.12	1.17	1.19	1.10	1.14
65-69	1.12	1.17	1.19	1.09	1.13
70-74	1.12	1.17	1.19	1.08	1.11
75-79	1.12	1.17	1.19	1.07	1.10
80+	1.12	1.17	1.19	1.06	1.09

Table 3: Relative risk of illness as a function of age, low activity persons only. Source: Global Burden of Disease 2013.

Age	Breast cancer	Colon cancer	Type II Diabetes	Heart disease	Stroke
25-29	1.09	1.07	1.04	1.03	1.18
30-34	1.09	1.07	1.04	1.03	1.17
35-39	1.09	1.07	1.04	1.03	1.15
40-44	1.09	1.07	1.04	1.03	1.14
45-49	1.09	1.07	1.04	1.03	1.13
50-54	1.09	1.07	1.04	1.02	1.12
55-59	1.09	1.07	1.04	1.02	1.11
60-64	1.09	1.07	1.04	1.02	1.10
65-69	1.09	1.07	1.04	1.02	1.09
70-74	1.09	1.07	1.04	1.02	1.08
75-79	1.09	1.07	1.04	1.01	1.07
80+	1.09	1.07	1.04	1.01	1.06

Table 4: Relative risk of illness as a function of age, moderate activity persons only. Source: Global Burden of Disease 2013.

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