Author's response to reviews

Title: The economic impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model

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Author's response to reviews: see over
12 February 2014

Academic Editor
BMC Public Health

Resubmission of manuscript MS 4692259531083197 entitled “The economic impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model” to BMC Public Health

Response to Editor’s Letter

Dear Editor,

Please find attached a copy of the manuscript “The economic impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model” which we wish to re-submit to you.

In the following pages we set out a detailed response to the suggestions and comments received on 5 February 2014. We have highlighted in yellow in the re-submitted ‘track changes’ manuscript to indicate where the text has been changed, based on Editor feedback. All page numbers listed below are in relation to the ‘track-changes’ version of the manuscript.

Please note the change in list of authors: Michelle Cunich has been moved to second author.

If you have any queries regarding the manuscript please do not hesitate to contact me.

Yours sincerely,

Michelle Cunich
Detailed response to Editor for manuscript 4692259531083197 entitled “The economic impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model” submitted to BMC Public Health

**Title of Manuscript:** The economic impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model

**Submitted To:** BMC Public Health on 16 September 2013

**Received Reviewer Comments on:** 17 December 2013

**Resubmitted Manuscript:** 14 January 2014

**Received Editor Comments:** 5 February

**Resubmitted Manuscript and Rebuttal Letter:** 12 February 2014

We thank the Editor for their suggestions and comments regarding our manuscript. We provide an itemised response to their comments as follows:-

**Editor’s Comments:**

1. In response to a reviewer’s comment the authors state that "this study also takes into account the percentage of this increase that is potentially preventable, given its association with unhealthy lifestyles, the increasing obesity epidemic and absence of sustainable preventive interventions to combat obesity, when estimating the economic costs of diabetes." Please clarify how these associations were considered in the analysis.

**Authors’ reply:**

On page 6 of the revised manuscript (version 1) we state:
“...For this reason, this study also takes into account the percentage of this increase that is potentially preventable, given its association with unhealthy lifestyles, the increasing obesity epidemic and absence of sustainable preventive interventions to combat obesity, when estimating the economic costs of diabetes.”

This sentence is only referring to the reasons why a particular form of diabetes – Type 2 Diabetes – is potentially preventable. In our sensitivity analysis, we produced estimates of costs (lost income, lost taxation revenue, additional welfare payments and lost GDP) that were more in line with the size of the potentially preventable component of the disease. An estimate of the size of the potentially ‘preventable component’ was derived from published prevalence of Type 2 diabetes in Australians aged 45-64 years (sources provided in the paper).

We have changed the original paragraph on page 6 to help clarify this point:

Original was:

“ It should be noted, however, that the expected increase in diabetes prevalence is restricted to Type 2 diabetes only, and that Type 2 diabetes is (currently) the only preventable form of the disease. For this reason, this study also takes into account the percentage of this increase that is potentially preventable, given its association with unhealthy lifestyles, the increasing obesity epidemic and absence of sustainable preventive interventions to combat obesity, when estimating the economic costs of diabetes. Diabetes Australia (2013) estimates that 89% of people aged 40-59 years with diabetes in Australia have Type 2 diabetes ¹⁴ (and consistent with Australian Institute of Health and Welfare (AIHW) diabetes prevalence rates; http://www.aihw.gov.au/diabetes/prevalence). We undertook sensitivity analysis where our estimates of lost income, lost income taxation, extra government welfare payments and lost GDP were reduced in line with this prevalence rate at the point of identifying the potentially preventable component of these losses.”
Most of this burden is, in principle, preventable. Diabetes Australia (2013) estimates that 89% of people aged 40-59 years with diabetes in Australia have Type 2 diabetes, which is associated with unhealthy lifestyles (unmanaged cholesterol, blood pressure; smoking; unhealthy food choices; sedentary lifestyle) and obesity. We undertook sensitivity analysis where our estimates of lost income, lost income taxation, extra government welfare payments and lost GDP were reduced in line with this prevalence rate to estimate the potentially preventable component of these losses.

New reference:

With current effective, and cost-effective, interventions to prevent Type 2 diabetes such as a pharmaceutical intervention using metformin and lifestyle interventions, it may be possible to reduce the number of people with this form of diabetes. We have included this extra information into the Discussion as follows (highlighted text is new):

“Interventions that increase the labour force participation rate of people with chronic conditions (such as diabetes) are likely to yield benefits to both individuals and government. Several studies have demonstrated that pharmacological (such as metformin) and lifestyle interventions to prevent or delay the development of Type 2 diabetes in high risk individuals are effective and cost-effective, and have the potential to increase the labour force.
participation rate of older workers with this form of diabetes which, in turn, may reduce income losses."

2. The authors state "there was a loss of AU$384 million in individual earnings". Please clarify why this loss is not actually a transfer between diabetes patients and non-diabetes patients.

Authors’ reply:

We have replaced the sentence “there was a loss of AU$384 million in individual earnings” in Abstract (and throughout the paper) with “there was an estimated loss of AU$384 million in earnings by those with diabetes” (see highlighted track changes).

3. The authors reply to the reviewers that they are interested in "the patient’s perspective" and therefore use the human capital approach. However the societal losses (tax revenue and GDP) also seem to use the human capital approach, please justify this choice. Please comment on the direction and magnitude of effect of using the human capital approach in the limitations section.

Authors’ reply:

We chose the human capital approach because it represents the perspective of the person who has become too ill to work. We also reported on government impacts in terms of welfare payments and lost taxation revenue as well as national GDP impacts. This choice was made because it seemed to best reflect the economic environment in Australia. In Australia, many vacant positions are not filled by people who are unemployed, but are more likely to be filled by someone moving from another position, thus creating another job vacancy. This is partly due to the need to find an appropriate skills match between the position and the applicant and barriers to labour mobility partly caused by Australia being a large country (Layard, Niclèll et al 2005). For example, there have been labour shortages in mining, however these positions are usually in remote areas and families with young
children or whose partner is in employment may not be able to move. This results in a relatively long duration between unemployment and finding another job. In Australia, someone who is unemployed and on a government unemployment benefit (called Newstart in Australia), on average, has a little over three years before they find a new position and are no longer eligible for an unemployment benefit (Creighton 2012). Further, when someone leaves the labour force too ill to work, they may become eligible for a Disability Support Pension, which is about 50% higher than the unemployment benefit, thus the welfare costs to government of a person too ill to work are higher than someone who is simply unemployed.

(http://www.humanservices.gov.au/customer/enablers/centrelink/disability-support-pension/payment-rates). In terms of GDP, if someone unemployed were to fill a newly created position this would contribute to GDP growth, whereas filling a vacancy created by someone leaving the workforce permanently when they become chronically ill generates no growth.

For these reasons we felt that for this study, the friction cost method, which assumes that 3-6 months after someone leaves the labour force someone else will have filled the position, and thus the aggregate impact after 3-6 months is zero, (van den Hout 2010) would underestimate the effects of leaving the workforce due to ill health not only for the person themselves, who are faced with an ongoing loss of income, but also the impacts on unemployment benefits and GDP which are longer in duration in Australia than the 3-6 month provision in the friction cost method.

The main difference in outcomes of the two approaches when used in cost of illness studies stems from the fact that the human capital approach, by considering every hour not worked as an hour lost perhaps until the patient reaches the age of retirement, can lead to elevated costs. This approach has been criticised for overestimating productivity losses, and estimating potential costs as opposed to actual costs. But the friction cost approach has also been criticised on the basis that it only values the cost of lost labour over a short time period – the friction period – which is the time until the vacant job is filled again (3-6 months). Consequently, the friction cost approach tends to underestimate productivity losses. Limited empirical evidence is available on the differences in
outcomes derived from the two approaches; but see van den Hout (2010) for a comparison of
outcomes in relation to rheumatoid arthritis. In our study, we use the human capital approach, but
only report costs over a 12 month period.

We have commented on the direction and magnitude of effect of using the human capital approach
as identified in previous studies on costs of disease in the limitations section of our manuscript.

These issues are discussed in the Discussion on pages 15-17 with new text highlighted in yellow:

“Lastly, this study takes the human capital approach to valuing productivity costs (i.e. the
patient’s perspective) and thus counts any hour not worked as an hour lost and values these
hours. It does not consider potential ‘friction periods’ – the time in which a replacement
employee may be found. The friction method takes an employer’s perspective and only
measures as lost those hours not worked until another employee takes over the work of the
person who is ill25-27. The main difference in outcomes of the two approaches stems from the
different time horizon used to measure and value productivity costs. The human capital
approach, by considering every hour not worked as an hour lost perhaps until the individual
reaches the age of retirement, tends to lead to higher costs. Thus the human capital
approach may overestimate productivity losses. But the friction cost approach has also been
criticised as it values lost labour during a short time period – the friction period – which is a
time assumed until the vacant job is filled (usually 3-6 months)26, 27. Consequently, the
friction cost approach may underestimate productivity losses. Limited empirical evidence is
available on the differences in outcomes derived from these approaches; but see van den

In our study, we use the human capital approach which represents the perspective of the
person who has become too ill to work, but to be conservative only report costs over a 12
month period. We also reported on government impacts in terms of welfare payments and
lost taxation revenue as well as national GDP impacts. This choice was made because it
seemed to best reflect the economic environment in Australia. In Australia, many vacant positions are not filled by people who are unemployed, but are more likely to be filled by someone moving from another position, thus creating another job vacancy. This is partly due to the need to find an appropriate skills match between the position and the applicant and barriers to labour mobility partly caused by Australia being a large country. For example, there have been labour shortages in mining, however these positions are usually in remote areas and families with young children or whose partner is in employment may not be able to move. This results in a relatively long duration between unemployment and finding another job. In Australia, someone who is unemployed and on a government unemployment benefit (called Newstart in Australia), on average, has a little over three years before they find a new position and are no longer eligible for an unemployment benefit. Further, when someone leaves the labour force too ill to work, they may become eligible for a Disability Support Pension, which is about 50% higher than the unemployment benefit, thus the welfare costs to government of a person too ill to work are higher than someone who is simply unemployed. In terms of GDP, if someone unemployed were to fill a newly created position this would contribute to GDP growth, whereas filling a vacancy created by someone leaving the workforce permanently when they become chronically ill generates no growth.

For these reasons we felt that for this study, the friction cost method, which assumes that 3-6 months after someone leaves the labour force someone else will have filled the position, and thus the aggregate impact after 3-6 months is zero would underestimate the effects of leaving the workforce due to ill health not only for the person themselves, who are faced with an ongoing loss of income, but also the impacts on unemployment benefits and GDP.
which are longer in duration in Australia than the 3-6 month provision in the friction cost method.*

New references:

