**Reviewer's report**

**Title:** Projected growth of the adult congenital heart disease population in the United States to 2050: an integrative systems modeling approach

**Version:** 1  
**Date:** 23 December 2014

**Reviewer:** Russell Kirby

**Reviewer's report:**

In this manuscript the authors seek to develop estimates of the prevalence of CHD in the United States, with projections to 2050. Input sources are national vital statistics (mortality) and the National Health Interview Survey (NHIS, misnamed on p 6 first line of methods as 'Information' and also in the abstract).

**Major Compulsory Revisions:**

The authors have not incorporated data on national estimates of the prevalence of CHDs, which are available for selected defects (Parker et al. BDRA 2010), nor have they utilized information on survival with specific defects (several recent references including Hirsch et al J Pediatr 2010; Kucik et al AJPH 2014; Wang et al J Pediatr 2013; BDRA 2013; J Pediatr forthcoming 2015). Given that we have specific data on prevalence and survival outcomes to early childhood among infants born with the most prevalent and serious CHDs, one would think that this information would trump data, at least for early childhood, derived solely from cause of death certification.

Ideally, the authors might revise their methodology to incorporate data from these sources. If not, at least the manuscript should reflect the existence of these sources, make a cogent argument why they were not used, and consider their potential effect on the estimates in evaluating the utility of this work in the discussion section.

**Minor Essential Revisions:**

Provide a definition of 'recalled CHD'. It would appear that this means self-report of being told by a health care professional that the interviewee has a specific CHD diagnosis. But the term 'recalled CHD' will likely be foreign to most health researchers and readers.

p 4, first para. The sentence describes a recent meta-analysis, but includes three references. References 4 and 6 do not apply to this sentence.

On p 6, where 'recalled CHD' is discussed, although at first it appears that the term applies across the age span, later the authors discuss a question about their child. The authors should clarify whether this source is used to obtain a crude notion of population prevalence across all ages from the NHIS, or just for children.
On p 8 - give more details about DisMod-PDE - most readers will have no familiarity with this model, where it sits in the panoply of other modeling approaches, or for that matter what an integrative systems model is. Merely citing references 19 and 20 is not sufficient.

Also on p 8, birth defects researchers strongly prefer to use prevalence rather than incidence (Mason et al, BDRA 2005).

Somewhere, also in the methodology, consider discussing the implications of secular change in rate of termination after prenatal diagnosis - it is hard to foresee the future, but unlikely that this rate has been or will be constant over time.

Also in methods, how do cases diagnosed in adulthood factor into the estimates?

p 13 in limitations. Discuss the role also of underdiagnosis or late diagnosis along with misdiagnosis

Noted above are several additional references which will provide balance to the methods and argument.

The figures are not ready for production as presented. Figure 1 should show the actual values on the Y-axis rather than 10 to -3, etc, that would translate to 1000, 10000, 100000 . . . but does the graph show mortality, or survival? To this readers eye, it seems to show survival, with many more infants surviving in recent years.

Figure 2b assumes a level rate for birth prevalence, which is highly unlikely. While we do not have national data, metropolitan Atlanta has data from the 1960s, and New York state from the early 1980s. NBDPN has prepared national estimates for specific CHDs for 1999-2001 and 2004-2006 (Canfield et al BDRA 2006; Parker et al BDRA 2010).

The discussion seems rather long in relation to the data presented.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests