



## Time and travel costs incurred by women attending antenatal tests: A costing study



Talitha I. Verhoef, PhD (Research Associate)<sup>a,\*</sup>,  
 Rebecca Daley, RM, BSc, MRes (Study Co-ordinator)<sup>b</sup>,  
 Laura Vallejo-Torres, PhD (Research Associate)<sup>a</sup>,  
 Lyn S. Chitty, PhD, MRCOG (Professor)<sup>b,c</sup>, Stephen Morris, PhD (Professor)<sup>a</sup>

<sup>a</sup> Department of Applied Health Research, University College London, London, UK

<sup>b</sup> North East Thames Regional Genetics Service, Great Ormond Street Hospital for Children NHS Foundation Trust, London, UK

<sup>c</sup> Genetics and Genomic Medicine, Institute of Child Health, London, UK

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### ABSTRACT

**Objective:** to estimate the costs to women, their friends and family for different antenatal tests in the Down's syndrome (DS) screening pathway.

**Design:** questionnaire-based costing study.

**Setting:** eight maternity clinics across the UK.

**Participants:** pregnant women ( $n=574$ ) attending an appointment for DS screening, NIPT or invasive testing between December 2013 and September 2014.

**Measurements:** using data collected from the questionnaires we calculated the total costs to women by multiplying the time spent at the hospital and travelling to and from it by the opportunity costs of the women and accompanying person and adding travel and childcare costs. Assumptions about the value of opportunity costs were tested in one-way sensitivity analyses. The main outcome measure was the mean cost to the women and friends/family for each test (DS screening, NIPT, and invasive testing).

**Findings:** mean costs to women and their family/friend were £33.96 per visit, of which £22.47 were time costs, £9.15 were travel costs and £2.34 were childcare costs. Costs were lowest for NIPT (£22), £32 for DS screening (£44 if combined with NIPT), and highest for invasive testing (£60). Sensitivity analysis revealed that variations around the value of leisure time opportunity costs had the largest influence on the results.

**Key conclusions:** there are considerable costs to women, their friends and family when attending different tests in the DS screening pathway.

**Implications for practice:** when assessing the cost-effectiveness of changes to this pathway, costs to women should be considered.

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### Introduction

In the UK, all pregnant women are offered screening for Down's syndrome (DS) and other aneuploidies. Women with a high risk of DS ( $\geq 1:150$ ) after screening are offered diagnostic testing, which is currently invasive testing by amniocentesis or chorionic villus sampling (CVS), both of which are associated with a small risk of miscarriage. Non-invasive prenatal testing (NIPT) involves the analysis of cell free DNA in maternal plasma and allows detection of DS (and other genetic problems) in the fetus (Gil et al., 2015). NIPT is available in many parts of the world, but mostly through

private sector healthcare providers (Minear et al., 2015). It is expected that if NIPT was offered to women with a high screening risk for DS, the number of invasive tests (and procedure-related miscarriages) could decrease dramatically (Warsof et al., 2015). Implementation of NIPT in the current screening programme could therefore lead to significant changes to the screening programme. Recently, the costs to the UK National Health Service (NHS) of implementing NIPT in the national screening programme were investigated (Morris et al., 2014). However, implementing NIPT may have cost implications beyond those incurred by health service providers, for example for the women taking part in the screening programme. These may include direct costs, such as travel and childcare expenses or lost pay, and indirect costs of unpaid time (Posnett and Jan, 1996). Some women might be accompanied by a friend or family member or need someone to look

\* Correspondence to: Department of Applied Health Research, University College London, Gower Street, London WC1E 6BT, UK.

E-mail address: [t.verhoef@ucl.ac.uk](mailto:t.verhoef@ucl.ac.uk) (T.I. Verhoef).

after their children. This will also have cost implications, and so an analysis fully considering costs incurred by women attending antenatal tests ought to include these costs too. Little is known about the costs to women, their friends and family for attending DS screening, NIPT or invasive testing. One study assessed women's costs of antenatal ultrasound screening in 2002 and did not include costs to women for invasive testing or for NIPT (Henderson et al., 2002). The aim of this study was to estimate the costs to women, their friends and family of different antenatal appointments in the Down's syndrome screening pathway.

## Methods

### Participants

Women attending one of eight hospitals for Down's syndrome screening, NIPT or invasive testing during the period December 2013 to September 2014 were asked to complete a questionnaire detailing the time and money costs they incurred when attending the hospital. In these hospitals NIPT was offered as a contingent test to women with a traditional DS screening risk of  $\geq 1/1000$  as part of a study evaluating introduction of NIPT into the pathway (Hill et al., 2014). In two hospitals a one-stop DS screening service was in place and NIPT was usually offered on the same day as DS screening and women could therefore have a combined screening and NIPT appointment. In the other clinics, women with a screening result  $\geq 1/1000$  were contacted by phone and offered a further appointment for NIPT.

### Questionnaire

The questionnaire (see Supplement) consisted of nine questions asking for information about the costs incurred by pregnant women, their friends and family when attending the hospital for antenatal tests. A similar questionnaire (including the same 9 questions) was used in a previous study examining the costs of antenatal ultrasound screening (Henderson et al., 2002), so a pilot was not performed for the current study. The first two questions were used to determine what the woman would have been doing if she was not attending the clinic, and, if she was working, what arrangements were made to take time off work (paid or unpaid leave, etc.). The questionnaire also asked about mode and costs of travel and the amount of time spent travelling, whether the woman was accompanied by someone during the appointment, how much time was spent at the hospital, whether it was advised to take extra time off work, and what amount of money income was lost. A question was also included about the need for childcare and associated costs.

### Time costs

The opportunity costs of time lost from work (for the visit to the clinic, including travel time) was estimated using the median full-time gross weekly earnings for women in the UK (£458.80), as described in the Annual Survey of Hours and Earnings 2013 (ONS, 2013). We estimated tax, pension and national insurance contribution at 35% and assumed a 37.5-hour working week; net hourly earnings for women were therefore assumed to be £7.95. This wage rate was used for women who had unpaid absence from work or had to work additional hours in lieu of the appointment. When women attended the clinic outside work time or took annual leave, i.e., during leisure time, their time was valued at 40% of the female wage rate (£3.18). This valuation of leisure time was used in a previous study (Henderson et al., 2002). When the woman took paid leave from work, we assumed no opportunity costs

to the woman as these costs were borne by the employer. For women not in paid employment we assumed the opportunity costs were equal to the wage rate of women in the lowest paid occupations (£4.93) (Henderson et al., 2002).

When women were accompanied during their visit, the companion could either be male or female. Therefore, we used the median adult wage rate to value their time (£8.97 (ONS, 2013)) if this person took time off work (assuming they took unpaid leave), and the median adult wage rate for the lowest paid occupations (£5.84 (ONS, 2013)) if they would not have been working otherwise.

### Travel costs

When women travelled to the clinic by foot or bicycle, we assumed zero travel costs. For women who travelled to the clinic by car, we assumed a mean distance to the clinic of 16.1 km at a cost of £0.28/km (Propper et al., 2006; AA Motoring costs, 2013). Parking fees and costs of public transport/taxi were taken from the questionnaire directly.

### Childcare costs

When someone was paid to look after children or other dependents, these costs were taken from the questionnaire. When someone took time off work to look after children or other dependents, we valued their opportunity costs using the median adult wage rate (£8.97).

All costs are expressed in 2013–14 UK£.

### Statistical analysis

Total costs for each woman were calculated by multiplying the time spent at the hospital and travelling by the opportunity costs of the woman and accompanying person and adding travel and childcare costs. The different tests in the DS screening pathway were grouped into the following categories: DS screening; NIPT; DS screening and NIPT; invasive testing; and, other. For each test we calculated the average total costs and used regression analysis to adjust for variations by centre in which the woman had her appointment.

### Sensitivity analysis

We performed several sensitivity analyses. For the main analysis, we valued leisure time at 40% of the female wage rate. A value of zero to 150% of the wage rate has been used to value leisure time, based on the argument that for overtime work employers often pay a higher wage rate (Drummond et al., 2005). We therefore performed two alternative analyses; one in which the opportunity cost of leisure time was zero and another one in which these costs were 150% of the female wage rate. In another sensitivity analysis we costed the time of women not in paid employment at zero (in the main analysis we used the wage rate of women in the lowest paid occupations). Wages have a skewed distribution, the mean and median wage rates are not similar. We therefore performed an analysis based on the mean net hourly female rate (£9.26) instead of the median (£7.95).

Lastly, we calculated the costs to employers for women who took paid leave from work by valuing their time spent at the hospital and travelling using the female wage rate.

## Findings

In total, 574 women completed the questionnaire, each for a single visit. The majority attended an appointment for DS

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