CHARLES UNIVERSITY ENVIRONMENT CENTER

Stated-preference study to examine the economic value of benefits of avoiding selected adverse human health outcomes due to exposure to chemicals in the European Union

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FD7. Final Report

Part II:
Fertility and Developmental Toxicity

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List of Abbreviations:

CAPI	Computer-assisted personal interviewing
CASI	Computer-assisted self-interviewing
CAWI	Computer-assisted web interviewing
CBA	Cost-benefit analysis
CI	Confidence interval
CP	Cerebral palsy
CV	Contingent valuation
CVM	Contingent valuation method
DC	Discrete choice question
DCE	Discrete choice experiment
DEFECT-POL	Scenario: healthy child (birth defects) - Public good (chemical policy)
DEFECT-VIT	Scenario: healthy child (birth defects) - Private good (novel vitamins)
ECHA	European Chemicals Agency
ESS	European Social Survey
EU	European Union
EUGLOREH	The Global Report on the Health Status of the European Union
EUR PPS	Euro purchasing power standard
EUROCAT	European Surveillance of Congenital Anomalies
EVS	European Values Study
EXTERNAL	Birth defects of external body parts
FERT-POL	Scenario: probability to conceive - Public good (chemical policy)
FERT-VIT	Scenario: probability to conceive - Private good (novel vitamins)
GENPOPUL	General population
INTERNAL	Birth defects of internal organs, metabolic and genetic disorders
ISSP	International Social Survey Programme
IVF	In vitro fertilization
LBW	Low birth weight (<2 500 grams)
MINOR	Minor birth defects
OC	Ovarian tissue cryopreservation
OECD	Organisation for Economic Co-operation and Development
PCBs	Polychlorinated biphenyls
PCDFs	Polychlorinated dibenzofurans
PPP	Purchasing power parity
PROB	Probability
QALY	Quality-adjusted life year
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RP	Revealed preferences
SP	Stated preferences
SQ	Status quo
SSI	Survey Sampling International
US EPA	United States Environmental Protection Agency
VLBW	Very low birth weight (<1 500 grams)
VSC	Value of a statistical case
VSCHCh	Value of statistical case of a healthy child
VSCVLBW	Value of statistical case of very low birth weight
VSL	Value of a statistical life
VSP	Value of a "statistical pregnancy"
WANT	People who want a child
WHO	World Health Organization
WTP	Willingness to pay

Executive summary

The primary objective of this stated-preference study was to estimate willingness to pay to avoid selected adverse human health outcomes due to exposure to chemicals in the European Union and to derive representative EU-wide benefit estimates reference values that the ECHA and other bodies can use when carrying out socio-economic analyses or health impact assessments in connection to REACH Regulation.

This report focuses on health outcomes linked to two specific health endpoints, particularly to **fertility** and **developmental toxicity**.

To briefly summarize the main characteristics of the stated preference study, we provide an overview of the six selected health outcomes, valued goods and valuation methods in the following table.

Table I: Overview of selected health outcomes, valued goods and valuation methods

Health endpoint	Health Outcome	Valued good	Valuation approach
Fertility	1. Conception of a child	*Private good:* new complex of vitamins and minerals which increase the probability of conception *Public good:* new, stricter regulation that will reduce the concentration of chemicals in products and increase the probability of conception	Sequence of discrete choice questions Sequence of discrete choice questions
	2. Infertility	*Private good:* in vitro fertilization treatment	Single discrete choice
Developmental toxicity	3. Minor birth defects 4. Birth defects of internal organs, metabolic and genetic disorders 5. Birth defects of external body parts	*Private good:* new complex of vitamins and minerals which decrease the probability of birth defects *Public good:* new, stricter regulation that will reduce concentration of chemicals in products and decrease the probability of birth defects	Sequence of discrete choice questions Sequence of discrete choice questions
	6. Very low birth weight	*Private good:* new complex of vitamins and minerals which decrease the probability of very low birth weight *Public good:* new, stricter regulation that will reduce the concentration of chemicals in products and decrease the probability of very low birth weight	Double bounded discrete choice

Our study aims at eliciting preferences from two different target populations: the first comprises people who would like to have a child; the second is the general population. Preferences for contingent private goods are elicited only from people who want a child, while preferences for public goods are elicited from both populations.

Our study provides, in principle, two sets of results; the marginal willingness to pay for risk reduction and value of a statistical case of a health outcome. Overall, we provide these values for six health outcomes, derived within two different contexts, and elicited from two different populations, yielding in total 16 different values of benefits (see Table III below). However, we recommend 11 values of benefits (see Table II below). Our base models are based on samples from which speeders (defined by time of survey completion) and protesters are excluded.

Respective willingness-to-pay values were elicited from both samples of the adult population in four EU Member States: the Czech Republic, the United Kingdom, the Netherlands and Italy. In total, 4 326 respondents were interviewed, and after cleaning the dataset and allocating the respondents into the two samples, our datasets consist of 1 500 valid observations in the sample of the general population and 2 924 valid observations in the sample of people who want a child (all respondents who would like to have children in the future). The latter sample thus also includes the observations from the sample of the general population who want a child in order to increase the efficiency of estimates in the new sample A.

Recommendation for using the benefit values estimated in this study in cost-benefit analysis and policy impact assessment:

1. We provide the benefit estimates for two different populations – the general population and the population of people who want to have a baby – while the former group also includes a part, but not all, of respondents from the latter group. To avoid double-counting, **the benefits** associated with a certain health outcome that were **derived from preferences of individuals from the general population** and **the benefits** associated with the same outcome but **derived from preferences of people who want a child should not be summed up.**
2. As we elicited preferences of individuals within two different valuation contexts, we can also deliver two sets of WTP values for same health outcome. However, **the two values of willingness to pay for the same health outcome** (for instance, the probability of conceiving) that were **elicited within both the private context and the public good context should not be compared.**
3. If we consider the public good scenario, it would be hard to imagine that there would not be any other effects owing to stricter regulation of chemicals besides the effects on fertility and birth defects or birth weight. If a cost-benefit analysis assesses the impact of a public project or public program, the analysis of costs and benefits should not consider only some of the effects, but all possible effects and related benefits. Therefore, **considering other effects while stating willingness to pay for improving public health risks by a respondent within the public good context should not devalue the estimation results.** If a cost-benefit analysis uses the benefit estimates as derived in our study, then care **should be taken to avoid double-counting** when other non-health impacts and benefits are separately considered in the cost-benefit analysis. In such cases, the benefit estimates which do not include co-benefits related to other considered effects should be used in the CBA.
4. Considering the main purpose of our study, if the benefit estimates derived from the private good context shall be used in the CBA, we recommend **using the willingness to pay values elicited within the private good context after subtracting the benefit component attributable to the other effects**. Subtracting this part of the benefits from the WTP value of

respective health outcome would provide a conservative value of the benefits for the cost-benefit analysis. **The gross values of the willingness to pay, i.e. those that include the benefits linked to the other effects, can be used in the sensitivity analysis of cost-benefit assessment.**

5. If **impacts of public programs with long-lasting effects are to be analysed, we recommend using the WTP values as derived within the public good scenario**.
6. Certain projects might have, however, a short-term, or immediate, impact on fertility and/or development. In such cases, we think that such **acute, immediate effects might be better valued by using the benefit values as estimated within the private good context**.

Based on the simple benefit transfer that adjust the values by purchasing power parity, and assuming the income elasticity of WTP equal to 0.7, the EU-wide values for each health outcome valued in this study are provided (see Table II).

Table II: Recommended EU-28 WTP values for the health outcomes (EUR PPS, 2013)

People who want a child – private good

Health outcome	Base value *	Sensitivity analysis
Value of a statistical pregnancy	21 600	34 700
Value of a statistical case of Healthy Child: MINOR birth defects	4 300	12 100
Value of a statistical case of Healthy Child: defects in INTERNAL organs	128 200	178 000
Value of a statistical case of Healthy Child: defects on EXTERNAL body parts	25 700	108 300
Value of a statistical case of VLBW	126 200	
Value of statistical infertility (in vitro fertilisation treatment)	29 400	

General population – public good

Health outcome	Base value	Sensitivity analysis
Value of a statistical pregnancy	37 900	12 500* 20 800*[c] 40 700[c]
Value of a statistical case of Healthy Child: MINOR birth defects	50 700	41 800[c]
Value of a statistical case of Healthy Child: defects of INTERNAL organs	771 300	711 800[c]
Value of a statistical case of Healthy Child: defects of EXTERNAL body parts	453 600	329 800[c]
Value of a statistical case of VLBW	548 300	405 500[c]

Note: ** The value based on WTP estimates after controlling the effect of considering other co-benefits while stating the WTP for improving health risks within the private good valuation scenarios .*
[c] Values estimated from preferences as stated for the public good improvement by people who want a child.

Table III. provides the benefit estimates for each health outcome derived from two different populations and within two different valuation contexts (i.e. the private and public good scenario) as used in our study, and their EU-wide counterparts computed from the population weighted WTP values transferred to each EU Member State by using the benefit transfer technique based on purchasing power parity adjustments and three values of income elasticity of willingness to pay.

Table III: EU28-wide WTP values (in EUR PPS, population weighted mean)

Health outcome	**Scenario**	**Sample**	**Pooled data estimated**	**EU28 (weighted)**		
				Income elasticity =.31	Income elasticity =.7	Income elasticity =1.0
VSP	private	WANT	**33 019**	33 452	34 675	36 066
VSP	public	WANT	**38 783**	39 292	40 728	42 362
VSC Healthy Child:						
MINOR birth defects	private	WANT	**11 537**	11 688	12 116	12 601
Birth defects of **INTERNAL organs**	private	WANT	**169 456**	171 678	177 955	185 092
Birth defects of **EXTERNAL body parts**	private	WANT	**103 168**	104 521	108 343	112 688
MINOR birth defects	public	WANT	**39 763**	40 284	41 757	43 432
Birth defects of **INTERNAL organs**	public	WANT	**677 778**	686 667	711 774	740 317
Birth defects of **EXTERNAL body parts**	public	WANT	**314 074**	318 193	329 827	343 054
VSC VLBW	private	WANT	**120 165**	121 741	126 193	131 253
VSC VLBW	public	WANT	**386 114**	391 178	405 481	421 741
VSP (IVF)	private	WANT	**28 000**	28 367	29 404	30 584
VSP	public	GENPOPUL	**33 018**	33 585	35 297	34 959
VSC Healthy Child:						
MINOR birth defects	public	GENPOPUL	**44 172**	46 542	50 686	54 759
Birth defects of **INTERNAL organs**	public	GENPOPUL	**672 147**	708 217	771 265	833 245
Birth defects of **EXTERNAL body parts**	public	GENPOPUL	**395 337**	416 553	453 635	490 090
VSC VLBW	public	GENPOPUL	**477 838**	503 481	548 302	592 364

1 Introduction

The objectives of this report are:

1) to summarize the selection process of the most relevant outcomes and descriptions of the health outcomes related to fertility and developmental toxicity endpoints that were presented to respondents (see Chapter 2);
2) to provide a review of empirical literature on valuation of benefits of improving fertility and of developmental health risk reductions (see Chapter 3);
3) to describe valuation and econometric methods utilized in this study (Chapter 4), the questionnaire development and its structure (Chapter 5), an original stated preference survey (Chapter 6), data gathering and datasets by descriptive statistics (Chapter 7);
4) to estimate willingness to pay (WTP) for health outcomes related to the effect on fertility and developmental toxicity (see Chapter 8);
5) to perform benefit transfer and provide EU-wide WTP values (Chapter 9).

2 Description of health endpoints and related health outcomes

2.1 Fertility

2.1.1 The selection of health outcomes

As is shown in the literature review study by Kumar (2008), exposure to chemicals increases the risk of lower/compromised fertility due to several reproductive dysfunctions, including, for example, lower sperm count, lower motility of sperm, changes in the oestrous cycle, changes in hormone levels, changes in sexual behaviour, spontaneous abortion. Moreover, the issues concerning the exposure to endocrine disruptors and hormesis effects are vigorously debated. One of the most recent review studies (Diamanti-Kandarakis, 2009) concluded that endocrine disruptors may affect male and female reproduction.

Thus, the first set of health outcomes that were selected and described based on findings from toxicological and epidemiological research included: ovarian failure, reduced sperm (semen) quality, and changes in hormone levels. However, the scenario had to be described in a way which is plausible and understandable for the general public. The first selection of health outcomes did not reflect the way people think about fertility. People want to reduce the risk not only of ovarian failure, as they would like to increase their chance to get pregnant and to deliver a healthy child.

Finally, the below described health outcomes were selected (conception of a child, time to conceive and infertility) so that they cover the broadest possible range of attributes, specifically symptoms, prevalence, treatment, and impacts on quality of life.

The aetiologies of infertility are extremely complicated and often unknown. For example, the hormone misbalances can be of genetic origin with environmental determinants, life style determinants, medication, and diet, occupational or psychogenic disorders all playing a role. To avoid framing bias, we paid special attention to description of factors influencing the probability of conceiving.

2.1.2 Conception

First, figures were prepared to illustrate that the probability of conception decreases with age and increases with the length of time a couple has been trying to conceive (see Appendix 4: Questionnaire: figure illustrating). A figure was also drawn to show the probability of conception for different age categories depending on the length of time a couple has been trying to conceive.

Second, the age- and sex-specific probabilities of conceiving were taken from a study conducted in Europe (Dunson, Baird, & Colombo, 2004) in order to be able to generate various figures depending on respondents' age and sex.

Figure 1: Health outcome description: conception

Although conceiving a child is assumed to be a natural part of life, it is not certain and it depends on many factors.

The probability of conception	- decreases with the age as shown in the figure - increases with the length of time a couple has been trying to conceive as shown in the picture The next figure shows the probability of conception for different age categories depending on the time a couple has been trying to conceive. - increases with frequency of sexual intercourse, - is also determined by lifestyle and other factors
Infertility	- failure to conceive after 12 months or more of regular unprotected intercourse
Treatment of infertility	- drug treatments that alter levels of reproductive hormones in tablets or injections - medical procedures involving the manipulation of sperm, eggs and embryos, such as in vitro fertilization, sometimes referred to as an "IVF conceived baby"
Quality of life impact of infertility	- difference in the sexual life of the couple, such as the planning of intercourse - sexual dysfunction, depression, anxiety

2.1.3 Infertility

The issue of infertility was introduced in the part on conception. However, we also included a description of one specific treatment, in particularly in vitro fertilization (IVF) for at least two reasons. First, we want to compare the WTP estimates based on ex ante valuation (WTP for increased probability of conceiving) and ex post valuation (WTP for treatment in the event that a respondent is infertile). Second, we attempt to compare the results of our survey with values found in the literature. While IVF has been examined using stated preference methods in several studies, private ex ante approach that aims at valuating dietary supplements that increase the probability of conception is unique.

Figure 2: Description of treatment: In vitro fertilization

Probability of conceiving a child could be increased by a fertility treatment such as in vitro fertilization.

Treatment stages:	1. Suppressing natural monthly hormone cycle (daily injection or a nasal spray). 2. Boosting the egg supply (follicle-stimulating hormone as a daily injection for around 12 days). 3. Checking on progress (through vaginal ultrasound scans and, possibly, blood tests) + patient is given a hormone injection to help eggs mature. 4. Collecting and fertilising the eggs (cultured in the laboratory). 5. Embryo transfer (before a medication in the form of pessaries, injection or gel)
Possible side effects:	- while taking fertility drugs female can suffer from stomach pains, hot flushes, mood swings, heavy periods, breast tenderness, insomnia, increased urination, spots, headaches, weight gain, dizziness, and vaginal dryness, restlessness, or feeling down and irritable - multiple birth (twins, triplets or more) - ovarian hyper-stimulation syndrome (nausea and vomiting, severe stomach pains and swelling, shortness of breath, faintness and reduced urine output).
Probability of conceiving a child for one attempt:	30%

2.2 Developmental toxicity

2.2.1 The selection of health outcomes

Developmental toxicity covers a broad spectrum of symptoms, syndromes and diagnosis. Congenital anomalies (birth defects) and neurodevelopment disorders were proposed as exemplary health outcomes because the effect of environmental toxicants seemed to be the most pronounced.

Most congenital anomalies are probably caused by an interaction of environmental and genetic factors (EUROCAT, 2012). Environmental factors (maternal illness, infections, drugs, radiation, alcohol and chemicals) account for 6-8 % of birth defects, single gene mutations for 6-8 % and 6-8 % result from chromosome abnormalities (EUROCAT, 2004).

Maternal exposure to pesticides, polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs), lead, mercury, and other endocrine disruptors may lead to various birth defects (Wigle et al., 2008, Prüss-Ustün, 2011). The review of Wigle et al. (2008) summarized the level of epidemiologic evidence for relationships between environmental toxicants and main birth defects. The study concluded that there is sufficient epidemiological evidence for causal relationship between neonatal tooth abnormalities and high-level prenatal exposure to polychlorinatedbiphenyls (PCBs), polychlorinated dibenzofurans (PCDFs), and related toxicants. The authors found limited evidence for neural tube birth defects, cardiac birth defects, and urinary tract birth defects. However, the epidemiologic evidence was inadequate in case of musculoskeletal birth defects and male genital birth defects.

Environmental contaminants (e.g. lead, methylmercury, polychlorinated biphenyls, cadmium, arsenic, and manganese) can damage a child's developing brain and nervous system and cause neurodevelopmental effects, for example learning problems, reduced cognitive development, lowered intelligence and behavioural deficits such as inattention and impulsive behaviour (US EPA, 2013).

2.2.2 Birth of an "unhealthy" child: minor birth defects; birth defects of internal organs, metabolic and genetic disorders; birth defects of external body parts

It is estimated that around 14 % of babies are born with a single minor malformation and around 2-3 % of neonates have a single major malformation requiring extensive medical treatment (EUROCAT, 2004). Congenital anomaly can be "defined as any abnormal deviation from the expected structure, form or function" (Weber & Sebire, 2010) that is present at birth.

Congenital anomalies are major cause of perinatal mortality and morbidity and disability throughout childhood and later life (Dastgiri et al., 2007). A total perinatal mortality rate associated to congenital anomaly is 0.99 per 1 000 births in EU (EUGLOREH project). Some defects result in debilitating illness or death at a very young age, while others may be successfully treated with surgery or other medical treatments but some defects may not be discovered or treated until adulthood. In any case, inpatient hospital care is often necessary (Russo & Elixhauser, 2007). The most common congenital anomalies in live births are heart disease, central nervous system malformation, musculoskeletal system, respiratory and digestive system anomalies and genitourinary anomalies (Kovacheva et al., 2009).

As the consequences of the congenital anomalies are very diverse ranging from death to minor anomalies that can be treated easily, we distinguish between minor and major congenital anomalies.

Minor congenital anomalies are those that can easily be removed and are of little consequence. Minor abnormalities do not significantly affect health and development, are of neither medical nor cosmetic importance to the affected individual (Marden et al., 1964 in Hook, 1975) and require no treatment or can be treated easily and have no permanent consequence for normal life expectancy (Kumar and Burton, 2008).

Major congenital anomalies are those with serious medical or functional consequences; some of these may also be lethal (EUGLOREH project). Outcomes and treatment is depending on the precise lesion and the presence of associated anomalies. Congenital anomalies may be life-threatening , may result in long-term disability and may negatively affect individuals, families, health-care systems and societies (WHO, 2010), reduce life expectancy or compromise normal function (Kumar and Burton, 2008).

Because the category of major congenital anomalies was still too broad, we further divided this category into two subcategories: i) birth defects of internal organs, metabolic and genetic disorders, and ii) birth defects of external body parts. The main characteristics of these subcategories of major congenital anomalies and of minor congenital anomalies are summarised in the Figure 3 and in the Figure 4. However, we use rather term birth defects because we perceived it more commonly used than term congenital anomalies.

Figure 3: Health outcome description: Birth defects

About 16.4 % of all children born in the EU have a birth defect. This corresponds to 164 per 1 000 children with birth defects.

Pregnancy terminations following prenatal diagnosis and screening slightly reduce the number of children born alive with birth defects to 160 per 1 000 children.

The share of birth defects is shown in the grid below that contains 1 000 squares, each of which represents a child.

Out of these 160 children born alive with birth defects,

- **15 have birth defects affecting internal organs or the neurological system (blue squares in the grid below),**
- **6 have birth defects of the external body parts (red squares),**
- **139 have minor birth defects (yellow squares).**

Of course nobody knows which children will be born with or without defects (white squares).

Figure 4: Health outcome description: Birth defects

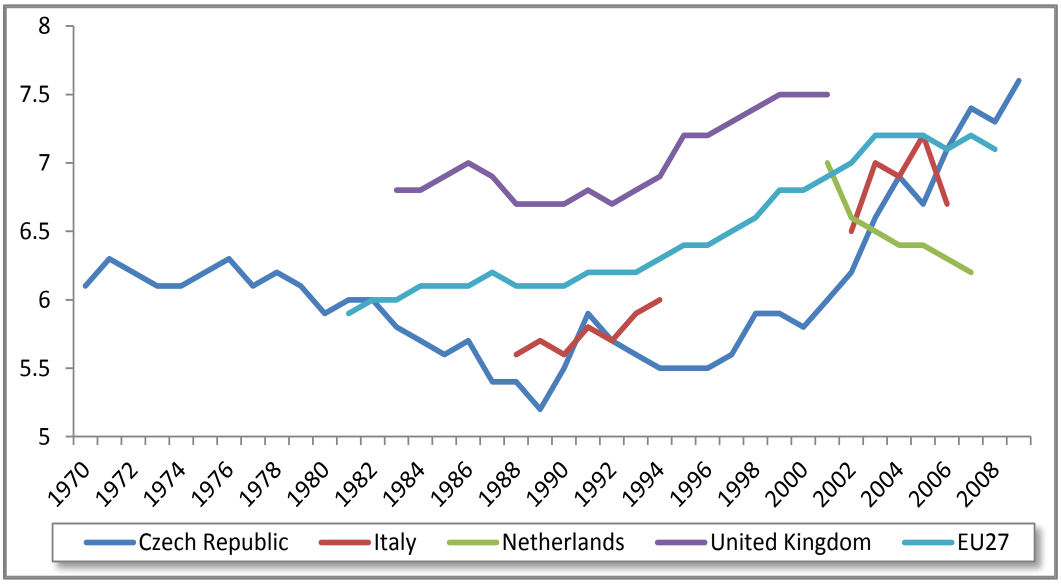
Types of defects	Minor birth defects	Birth defects of internal organs, metabolic and genetic disorders	Birth defects of external body parts
Description	- abnormalities in the structure of an otherwise healthy part of the body - most frequent in areas of complex body parts (face and limbs) - examples: abnormally decreased/ increased distance between eyes, low-set ears, fingers fused together, accumulation of fluid in a body cavity, hole located on the lower back, third nipple	- defects that affect body organs and systems – heart, nervous, respiratory, digestive and urinary systems and genitals - errors of metabolism (problems with accumulation of substances or reduced ability to synthesize essential compounds) - blood diseases and genetic diseases (e.g. cystic fibrosis - thick, sticky mucus in the lungs and other areas of the body; haemophilia - impaired ability to stop bleeding)	- defects of the skull, face, hands and feet - examples: limb defects (limb reduction; complete absence of a limb; club foot – foot is twisted at the ankle); conjoined twins; cleft lip or/ and palate; small eye, absence of one or both eyes
The number of cases	139 per 1 000 births in Europe	15 per 1 000 births in Europe	6 per 1 000 births in Europe
Treatment	- most of them can be easily removed and treated	- surgery transplantation in case the defect can't be repaired; sometimes other medical treatment is available: diet, medication, enzyme replacement therapy, gene therapy (use of DNA as an agent to treat disease).	- can be surgically repaired to some extent
Quality of life impact	- no permanent consequence for normal life expectancy - minimal functional or cosmetic significance	- some may be fatal, may result in long-term disability - hospitalisation, long-term treatment, surgery and on-going care - lifelong monitoring, an increased risk of other health problems, especially serious infections - exercise restrictions, poor adjustment to demands of daily living - psychological and social problems	- hospitalisation, surgery - lower satisfaction with facial and body appearance - depression, anxiety, behavioural problems

Source: EUROCAT (2004), EUROCAT (2009a), EUROCAT (2009b), Kumar and Burton (2008), WHO (2010).

2.2.3 Very low birth weight

Low birth weight means a birth weight of a live-born infant of less than 2 500 g. With respect to different health consequences we distinguish very low birth weight, which is weight of less than 1 500 g, and extremely low birth weight, which is weight of less than 1 000 g. One-in-fifteen babies born in the European Union in 2010 – or 6.9 % of all births – weighed less than 2 500 grams at birth (OECD, 2012). WHO Regional Office for Europe provides data on the percentage of live births; the number of live births weighting less than 2500 grams is expressed as a percentage of total number of live births (see Figure 5).

Figure 5: Proportion of live births of low birth weight (<2 500 grams) per 100 live births



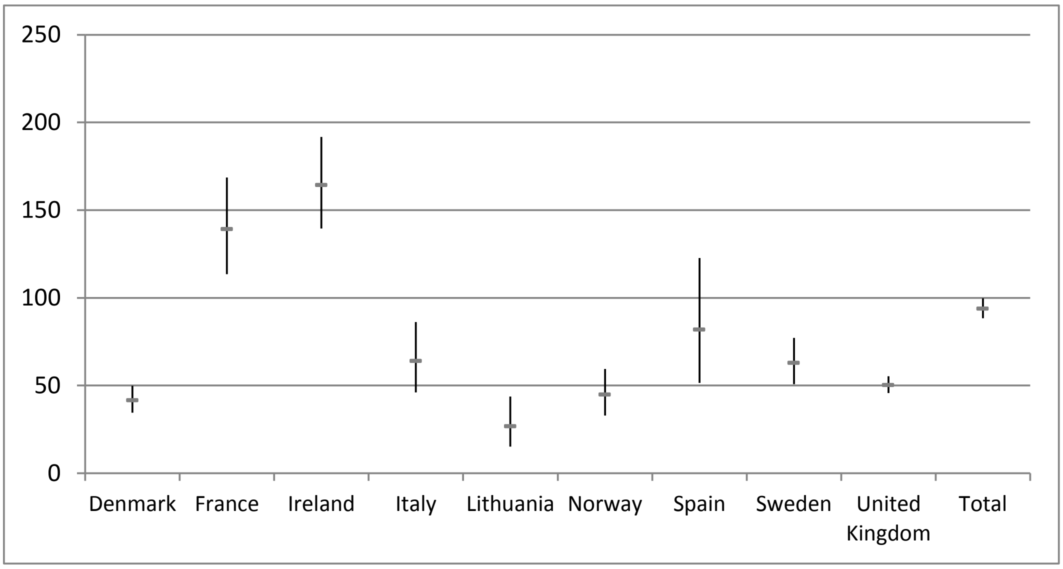
Source: WHO-HFA

Low birth weight infants experience more health and developmental difficulties than infants with normal birth weight. Serious developmental disorders could appear during first year of life especially among infants with a birth weight lower than 1 500 g. Lower birth weight babies have worse health outcomes, both in the short-term in terms of mortality rates and in the longer-term in terms of height, IQ, educational attainment and earnings (Black et al., 2007).

Low birth weight and especially very low birth weight infants are at a significant risk for major neurodevelopmental impairments defined as cerebral palsy, blindness, deafness, and severe cognitive developmental disabilities and high rates of disorders of communication, perception, attention, cognition and learning disorders (Msall & Tremont, 2002), impaired immune function (Alderman & Behrman, 2006), mental retardation and sensual defects (Mahram et al., 2009). Low birth weight may have negative impact on children's health in later life (Rudnai et al., 2007).

The most common disabling condition in childhood is cerebral palsy (CP), a group of permanent movement, and/or posture disorders that result from damage to motor control centres of the developing brain. CP affects 1.5 to 2.5 infants per 1 000 live births. Low birth-weight is a known risk factor for CP. The risk of developing CP is 20 to 80 times higher for very low birth weight infants (see Figure 6) compared to infants of birth weight more than 2 500 g (Platt et al., 2007).

Figure 6: CP rates (with 95% CI) among very-LBW babies in 1990-1998 birth cohorts in 9 countries



Source: (Platt et al., 2007)

As health and developmental difficulties are more closely associated with very low birth weight than low birth weight and we were able to access data about rates of adverse health outcomes for very low birth weight infants in comparison to normal birth weight infants, we decided to select very low birth weight. The final descriptions of three types of health problems which may occur if a child is born with very low birth weight can be found in Figure 7.

Figure 7: Health outcome description: Very low birth weight

About 15 per 1 000 children born in Europe are born with a very low birth weight, meaning that a child weighs less than 1 500 grams at birth.

Very low birth weight infants experience many more health and developmental difficulties than infants with normal birth weight.

We will now show you cards with descriptions of three types of health problems which may occur if a child is born with very low birth weight. Please read them carefully.

	Neurosensory Problems	Behavioural and Social Competence Problems	Intellectual and Learning Disabilities
Description	The most common causes of chronic disability that restricts children's participation in daily life are: - Cerebral palsy (motor conditions that cause physical disability) - Hydrocephalus (fluid collecting in the brain), blindness or deafness, and epilepsy (neurological disorder characterized by seizures of different types from inattentive staring to unconsciousness)	- behavioural problems - hyperactivity (abnormally active), and attentional weaknesses - disruptive behaviour - impulsivity	- sub average intellectual functioning (IQ less than 70) - poorer language abilities - poorer memory, motor coordination and problem solving abilities - learning problems, low levels of achievement in reading, spelling, and maths
Share of children that have these health problems	10 % for very low birth weight Less than 1 % for normal birth weight	16 % for very low birth weight 7 % for normal weight	Subnormal intelligence (IQ less than 70) 7 % for very low birth weight 2 % for normal birth weight School problems 34 % for very low birth weight 14 % for normal birth weight
Treatment	- is not curable - only improvement of child's condition - rehabilitation - physical therapy, remediation of impairments and disabilities, medicines, orthopaedic surgery, pain management	- is not curable - only improvement of child's condition - medication, diet, psychotherapy, education or training to reduce negative impacts on life	- special education assistance and help
Quality of life impact	- more impaired self-reported health and functional status - usage of more medications, feeding tubes - respiratory problems, disorder of movement and motor function - need of assistance	- social problems, difficulty organizing tasks and activities - antisocial behaviour - special educational needs - diminished school performance, reduction in vocational achievement	- impairments in life skills - communication, self-care, home living, social or interpersonal skills - school problems - grade repetition or placement in special education programs

Source: Hack M., Klein N.K., Taylor H.G. (1995).

3 Review of the valuation literature (state-of-the-art)

3.1 Fertility

The literature review has shown that several empirical studies have utilized stated preference methods to evaluate the benefits of improving fertility (see Appendix 1). Most of these studies have focused only on estimating willingness to pay (WTP) for assisted reproduction technologies (Dalton and Lilford, 1989; Gardino, Sfekas, and Dranove, 2010; Granberg et al., 1995; Neumann and Johannesson, 1994; Palumbo et al. 2011; Ryan, 1996; 1997; 1998; 1999). In general, the main objective of these studies was to determine the utility values ascribed to different attributes of assisted reproduction technologies and to estimate willingness to pay for these technologies. However, we have found one study (van Houtven and Smith, 1999) that examined WTP for reducing risk of experiencing infertility rather than for its treatment. Therefore we describe this study in detail below.

Although the scope of most of the valuation studies dealing with infertility has been limited to assisted reproduction technologies, especially in vitro fertilization treatment (IVF), a number of important empirical findings and related theoretical and methodological issues, which need to be considered when designing a valuation study on reductions in infertility risks, have arisen:

- contingent valuation method and choice experiment seem to be appropriate methods for evaluation of the benefits of infertility treatments, but the studies have important sampling and methodological limitations
- WTP is much higher when assessed ex ante (WTP for insurance) than ex post (WTP for treatment in the event of the respondent needing it) – some researchers doubted reasonability of WTP values for lifetime insurance
- public ex ante WTP per statistical baby is lower than private ex ante estimates, even though public WTP should include both private ex ante WTP and altruism – people may react negatively to a public program financed by higher taxes
- the range bias was proved only for WTP for public IVF programs financed by taxes and for trade-off between programs that would cover IVF for state inhabitants and programs that would reduce the number of vehicle deaths
- differences between studies in estimates of ex ante WTP for statistical pregnancy and in estimates of ex post WTP – the comparability of studies is very limited
- some socio-demographic and socio-psychological variables have been found to affect WTP, especially the positive effect of personal and household income
- WTP as a function of chance of success is nonlinear – people highly value simply the possibility of being able to bear children
- estimates of WTP for prevention of infertility through hypothetical medication (instead for a particular treatment) are based on presumptions about discount rates, timing of the medication, and respondents' perception of effects of the medication on reduction of infertility probabilities

3.1.1 Potential and limitations of stated preference methods for assessing fertility

The empirical evidence suggests that contingent valuation method and choice experiment are appropriate methods for the evaluation of benefits of infertility treatments for several reasons. First, infertility reduction is not usually traded in private markets. Second, it is often necessary to elicit preferences for risk reduction and evaluating benefits that are not uncovered by other methods (Neumann and Johannesson, 1994). Third, the application of the stated preference methods provided findings that were theoretically valid (van Houtven and Smith, 1999; Neumann and Johannesson, 1994). When applying conjoint analysis, the results were also internally consistent (Ryan, 1999; Palumbo et al., 2011). Fourth, the results of the study by Gardino et al. (2010) indicated that the estimated values for WTP for the ovarian tissue cryopreservation (OC) procedure were reasonable both relative to other goods and services and in absolute terms, although respondents were at an age where they may have more limited responsibility for financial decisions (respondents between 18 and 25 years old). Fifth, focus groups and pre-tests have shown that respondents are capable of understanding the nature of the commodity that they are assessing (van Houtven and Smith, 1999).

Although the application of contingent valuation method and choice experiment seems to be promising, there are number of limitations of existing studies. First, the results are limited due to sampling procedures. All surveys were conducted on small samples. The sample sizes range between 48 and 339 respondents. All surveys used nonprobability sampling and the findings cannot be generalized to national populations. Many survey samples included only patients, or women. Few surveys tried to recruit respondents from different populations. Second, several methodological issues need to be addressed, which are discussed in detail below.

3.1.2 Variability in WTP estimates

The combination of sampling and methodological limitations, different populations, survey years and objectives are some of the factors that affected the large variability in WTP estimates. However, we summarized the results in the table in the annex so that they are as comparable as possible.

Both the studies by Gardino et al. (2010) and Neumann and Johannesson (1994) have found large differences between WTP for treatment in the event that respondents need it (ex post) and WTP for lifetime insurance coverage for the treatment (ex ante). Values of WTP were much higher when assessed ex ante than ex post. Gardino et al. (2010) doubted the reasonability of WTP values for lifetime insurance to cover the costs of ovarian tissue cryopreservation. They explained that the evaluation of the set of probabilities related to insurance might be too difficult for respondents. Neumann and Johannesson (1994) proposed that the differences between ex ante WTP and ex post WTP might be due to inappropriate presumptions about the perception of using IVF. Respondents might have perceived their probability of using fertility treatment to be higher than the probability that was provided to them in the cover page of the questionnaire.

Both Neumann and Johannesson (1994) and van Houtven and Smith (1999) calculated the implied marginal WTP per "statistical baby". In the study by Neumann and Johannesson (1994), the WTP per statistical baby ranged from $ 40 640 ($ 63 156 in USD 2010) to $ 1 730 000 ($ 2 688 461 in USD 2010). The WTP per statistical baby was much higher in the ex ante case than in the ex post case. However, estimates of ex ante WTP for statistical pregnancy by van Houtven and Smith (1999) are two orders of magnitude lower than estimates by Neumann and Johannesson (1994).

Neumann and Johannesson (1994) found that the public ex ante WTP per statistical baby is lower than private ex ante estimates, even though public WTP should include both private ex ante WTP and altruism. According to the authors, a possible explanation relies on the fact that people react negatively to a public program financed by higher taxes and on the perception that quality of care would be lower under a public program.

The mean ex post WTP for IVF with a 25% chance of conceiving a child ($ 43 597 in USD 2010) estimated by Neumann and Johannesson (1994) was twice higher than estimates for ovarian tissue cryopreservation ($ 21 342 in USD 2010) in the study by Gardino et al. (2010).

3.1.3 Socio-demographic and socio-psychological variables influencing WTP

In general, the reviewed studies have found significant positive effects of personal income (Ryan, 1998; 1999), household income (van Houtven and Smith, 1999) and expected household income (Neumann and Johannesson, 1994) on WTP for reduction of infertility. According to Ryan (1999), WTP for the chance of having a baby and for various other attributes of IVF services was lower for the lower income groups than the higher income groups. Van Houtven and Smith (1999) found that although household income significantly affected WTP, the personal income of one partner did not have a stronger effect than the personal income of the second partner. Even though the respondent had a greater desire to have children, gaining a higher income relative to her partner did not raise the probability of purchasing the hypothetical medication that delays the increased risk of infertility for up to five years (van Houtven and Smith, 1999). However, the effect of the expected household income was insignificant for ex post WTP and vehicle-death equivalent, i.e. the number of births due to IVF treatment program equivalent to the number of vehicle fatalities avoided due to other programs (Neumann and Johannesson, 1994).

The effects of other socio-demographic characteristics have also been examined. However, the empirical evidence is very limited. Neumann and Johannesson (1994) have shown that respondents who had attended school for longer had lower ex ante WTP and public WTP. Van Houtven and Smith (1999) stated that higher educated respondents would start to take the medication later.

In the study by Neumann and Johannesson (1994), the number of children had a significant positive effect only on ex post WTP. Women were more likely to state higher willingness to pay than men only for public WTP. According to van Houtven and Smith (1999), respondents who spend more hours in work would wait a shorter time before starting the medication.

The exception is the study by Palumbo et al. (2011), in which socio- demographic characteristics, namely age, education, marital status and net monthly income, did not influence WTP for controlled ovarian stimulation. The authors suggested that the reason for such a result might be that the respondents were only patients that were ready to receive, or were receiving infertility treatment. Because the respondents had already decided to undergo the treatment, they were ready to pay the costs. As a result, income did not have significant effect on WTP for the treatment.

Empirical evidence concerning the effects of socio-psychological variables is inconclusive. In the study by Neumann and Johannesson (1994), respondents who were more inclined to use IVF had higher WTP for IVF treatment (ex post), IVF insurance (ex ante) and for public IVF programs. People who wanted to have (more) children were willing to pay more for IVF treatment and for IVF insurance. However, the effect was insignificant for public IVF programs. The more infertile perceived respondents themselves the higher WTP for IVF insurance. WTP for a public program that would partially cover the costs of IVF is lower for respondents who prefer state-subsidized adoption over IVF and higher for those preferring state-funded IVF.

Ryan (1998) focuses on the analysis of psychological outcomes of undergoing assisted reproduction technologies. Several psychological outcomes are significant predictors of WTP for IVF attempts. Therefore Ryan (1998) suggests that they should be taken into account when the utility from IVF is valued. Ryan (1998) follows regret theory and disappointment theory and concludes that people seem to be mainly motivated to try IVF treatment by the feelings of “regret” and “disappointment”. Respondents were trying or tried IVF in order to know that they had tried every possible option. The more respondents were surprised that the first attempt at IVF was unsuccessful, the less they valued IVF. Moreover, Ryan (1995) stated that people consistently overstate the chance of giving birth to a child as result of IVF. Thus, according to the author the feeling of disappointment might be an important factor.

3.1.4 Theoretical and methodological issues

Studies that examined WTP for various levels of probability of conceiving a child found that WTP as a function of chance of success is nonlinear (Gardino et al., 2010; Neumann and Johannesson, 1994). In the study by Neumann and Johannesson (1994), marginal WTP per statistical baby is highest for the 10% probability of success and then it sharply decreases as the probabilities of success increase. The reason might be that simply a chance to try the treatment is highly valued with less emphasis on increases in probabilities after the chance has been taken (Gardino et al., 2010; Neumann and Johannesson, 1994). Gardino et al. (2010) explained that individuals highly value the possibility of being able to bear children, independently of the actual probability it will occur. Still, the result might be also due to an anchoring effect (Neumann and Johannesson, 1994).

The further issue related to levels of probability of conception is whether preferences for a 100 % success rate should be elicited. On the one hand, both Gardino et al. (2010) and Neumann and Johannesson (1994) included a 100 % level in their analyses and concluded that WTP for 100 % effective treatment is not disproportionately higher than WTP for other probabilities. In the case of success rates of infertility treatments, the certainty effect (Kahneman and Tversky, 1979) does not seem to be present. According to Kahneman and Tversky (1979), certain outcomes are overweighed relative to outcomes which are less probable. On the other hand, Ryan (1999) who selected as a health outcome chance of giving birth to a live baby instead of probability of conception argued that a 100 % chance to deliver a child should not be offered to respondents because it is an unrealistic option.

Another issue is the possibility of anchoring. If a study elicits preferences for several levels of probabilities of conception, answers to WTP question for one level may be influenced by the response to the preceding level. Neumann and Johannesson (1994) suggested that such a kind of anchoring could be avoided if the probabilities vary in subsamples. The other way to avoid this type of anchoring is to describe infertility treatment only by one success rate. Stavinoha and Barner (2001) and Palumbo et al (2011) used only one level of probability of conception. Studies by Ryan (1996; 1997; 1998) did not provide probabilities of IVF success.

Even if only one probability level is offered, the amount and characteristics of other information that is provided to respondents may affect the WTP values. WTP scenario formulated by Stavinoha and Barner (2001) entails information that the chance of having a baby as a result of IVF differs with age, being on average 28.7 % for women under 35 years, 21.3 % for women in the age category 35-39 years and only 8.7 % for women older than 39 years. However, respondents were asked to answer the WTP question assuming that their chance of having a baby is 20 %-25 %. The question is whether respondents presumed probability between 20 %-25 % as they were instructed, or if they stated preferences for age-specific probabilities of having a baby. The probabilities that are presented to respondents need to be cautiously chosen. For example Palumbo et al (2011) has shown that patients are willing to pay an additional sum of money even for very low gain (1%-2%) in probability of success of the treatment.

Anchoring of responses might be also a source of bias. In the study by Neumann and Johannesson (1994), 20 % of respondents answered contingent valuation questions in which amounts were doubled. The range bias was proved for willingness to pay in taxes for public IVF programs and for a trade-off between programs that would cover IVF for state inhabitants and programs that would reduce the number of vehicle deaths. However, estimates of WTP for IVF in the event respondents were infertile and WTP for lifetime insurance coverage for IVF were unbiased.

The study by van Houtven and Smith (1999) is unique because it aims at individuals' WTP for reduction of risks only to themselves and only risks of infertility. The contingent valuation scenario does not deal with assisted reproduction technologies but it offers the respondent the possibility of prevention of infertility through hypothetical medication. Respondents are supposed to decide on whether they would buy and start medication (on a weekly basis) that would increase their chances of delivering a child. Three options were shown to respondents. Respondents could decide to a) start with the medication by the end of the next year, b) start with the medication later than next year, or c) not to start taking the medication. The authors concluded that the nature of the good was understandable for respondents and their answers were meaningful. The approach of the authors is inspiring also because they examine whether characteristics of women's partners affect stated preferences. Van Houtven and Smith (1999) stated that individuals within couples have similar preferences regarding how strongly and when they wish to have children and regarding infertility risks. The results suggest that the unitary model of household decision making might be appropriate for analysis of making decisions about fertility. Nevertheless, there are some important caveats. First, the survey sample is relatively small and includes only individuals of child-bearing age who had a partner of opposite gender for a long period of time and who did not know whether they would be able to have a child. The second and more important limitation is that estimates of WTP for reductions in infertility risks are based on presumptions about discount rates, timing of the medication, and respondents' perception of effects of the medication on reduction of infertility probabilities. Third, the study is based on self-reported data and mostly women reported about their partners. The male partners were not included in the second pilot because the first pilot pointed to problems with the instrument stemming from the fact that men were asked to state their WTP for medication that their partner would take.

3.2 Developmental toxicity

Most valuation studies related to developmental end-point have utilized cost-of-illness method (recently for example Hutchings & Rushton, 2007; Olesen et al., 2012; Case & Canfield 2009). Therefore we conducted an overview of studies that applied cost-of-illness method to value developmental effects, such as low birth weight, birth defects, neurobehavioral disorders, and autism, exposure to some relevant chemicals, such as lead and methyl mercury (see Appendix 2). However, the cost of illness does not include a measure of changes in social welfare and is not suitable for cost-benefit analysis (Kuchler & Golan, 1999). Furthermore, the possibility of comparison of WTP that will be estimated in our study and costs of illness that we report here in Appendix 2 is very limited among others due to cultural differences and distinctions in the definition of outcomes. In general, "WTP for a given reduction in illness unambiguously exceeds the cost of illness, because the cost of illness utility does not account for the utility value of health or for pain and suffering" (Champ, Boyle, & Brown, 2003, p. 409). If we consider WTP for a given reduction in pollution, the comparison might be even more uncertain because WTP comprises not only pain and suffering but also behavioural changes to reduce impacts of pollution. Therefore Champ et al. (2003, p. 411) state that "WTP probably exceeds the cost of illness" and lower bound of WTP is expected to be close to the cost of illness.

The issue of deriving WTP estimates for developmental end-point has been addressed to a very limited extent in the existing empirical literature. To our knowledge, there are only few studies that estimated WTP for developmental health risk reductions (Joyce et al., 1989; Agee and Crocker, 1996; von Stackelberg and Hammitt, 2009; for review of literature see Appendix 3).

A distinct methodological issue that has to be addressed is that of deriving WTP estimates for individuals (pre-natal or post-natal) that cannot expect to form budget-bounded preferences of their own (see e.g. Dockins et al. 2002).

Studies undertaken in the US - Joyce et al. (1989), Agee and Crocker (1996) and Nastis and Crocker (2003; 2012) – used production function approaches based on the parental expenditure and food consumption choices to estimate WTP for aggregate pre-natal and neo-natal benefits. Agee and Crocker (1996) reports estimates of parental WTP for marginal and for a one percent reduction in child lead burden. These studies were therefore not able to differentiate WTP between specific health outcomes.

The most relevant study to the objective of our research is that by von Stackelberg and Hammitt (2009) because it presents findings from contingent valuation surveys conducted in the US that elicit preferences for reduction of developmental health risks related to chemical exposure in the environment. Von Stackelberg and Hammitt (2009) utilized double-bounded dichotomous choice questions to elicit WTP for a probability of a 6-point reduction in IQ and 7-month deficit in reading comprehension. The estimate of WTP per IQ point was $ 466 ($ 380, $ 520; in USD 2000). Furthermore, this study used standard gamble and a time-tradeoff formats to derive QALY weights for the same health endpoints. However, the key objectives of this study were to examine relationship between risk reduction and WTP and between QALY and WTP.

Although von Stackelberg and Hammitt (2009) found that risk reduction was significantly associated with WTP, the directions of the relationships were opposite for the two endpoints. The relationship between risk reduction and WTP for decreasing the risk of a 6-point reduction in IQ was positive and proportional. On the other hand, the study found that the larger risk reduction, the lower WTP for reading comprehension. The authors suggested three hypotheses that could explain the negative relationship. First, respondents did not trust that larger reductions in risk can be achieved. Second, respondents had "flat preferences over the range of risk reductions" (p. 51), which would lead to positive relationship between risk reduction and WTP, but not to rejecting the null hypothesis that the slope of the regression line is equal to zero. Third, respondents did not understand the risk reduction questions. The third hypothesis is perceived by the authors to be less likely because the findings related to reduction in IQ were plausible. The authors conclude that the reduction in IQ might be more reasonable developmental endpoint than reading comprehension. According to von Stackelberg and Hammitt (2009), the relationship between QALY and WTP was not proportional, which is important finding for cost-effectiveness analysis that relies on assumption of proportionality.

Finally, the von Stackelberg-Hammitt study indicated that SG and TTO methods can legitimately be used in this context, even in combination with QALY weight derivation. However, care needs to be taken with the specification of welfare effects to be considered by the survey respondent. Otherwise, the role of medical treatment costs and future earnings loss in determining WTP cannot be identified and may be double-counted. Third, there is likely to be a potential trade-off between the level of specification of the health end-point and its cause, and the value of the WTP estimates in terms of their transferability to wider CBA applications. Thus, it can be expected that as the level of specification increases, the potential for robust transfer declines.

4 Methods

4.1 Valuation methods

Neither medical cost, loss of productivity nor opportunity or resource costs are able to capture the welfare loss due to inconveniences, suffering and pain, and as such they can only provide a lower bound of the overall willingness-to-pay. Therefore the objective of this study is to utilize stated preference methods to estimate the values for the fourth component of overall economic costs, i.e. willingness-to-pay to avoid adverse human health outcomes, such as birth defects, or developmental disorders associated with very low birth weight.

Since the application of stated preference methods on improving fertility and of reducing risks of congenital anomalies is a specific domain of research, the variety of authors in this domain is limited. Yet the terminology used is not entirely unified. This is a problem for the stated preference approach as a whole (Carson and Louviere, 2011), hence we use the nomenclature clarified by Carson and Louviere (ibid.). Based on their nomenclature, we distinguish two main categories of studies according to the elicitation methods that are used: matching methods and discrete choice experiments. A third category labelled hybrid methods refers to a combination of matching and DCE questions in a survey instrument.

In the first, matching methods, respondents "are asked to provide a number (or numbers) that will make them indifferent in some sense", such as "indifferent between obtaining the good and giving up the money" (Carson and Louviere, 2011, p. 545-6). In the second, the discrete choice experiments (DCE), the respondents are asked to "pick their most preferred alternative from a set of options" (ibid.). The single-bounded or double-bounded dichotomous choice contingent valuation technique would then belong to the DCE methods, while contingent valuation using open-ended, payment ladder or bidding game as the elicitation format would be classified as the matching method.

The discrete choice experiments can simply be thought of as a decision-making situation among two or more alternatives described by different levels of characteristic attributes of non-market goods being valued (one of the attributes is typically a price). By repeating these hypothetical choices for each respondent with different attribute values it can be assumed that the level of individual attributes determines the benefit of various alternatives and the respondent always chooses an alternative with the highest utility, as the attribute theory suggests (Lancaster, 1966). In this way the marginal rate of substitution between attributes may be inferred as well as monetary valuation of marginal changes in non-monetary attributes (Ryan et al., 2008).

In the discrete choice experiments, respondents are shown K ($K \geq 2$) alternative variants of a hypothetical good or policy described by a set of m attributes, and are asked to choose their preferred alternative (Hanley et al., 2001; Bateman et al., 2002). The alternatives differ from one another in the levels taken by two or more of the m attributes. Price (or cost to the respondent) is usually one of the attributes, which allows the analyst to estimate the value people ascribe to the good or the monetized benefits of the policy. The choice responses are assumed to be driven by an underlying random utility model.

Through the extensive pre-survey and piloting we used hybrid methods because we first asked ***single-bounded dichotomous choice questions*** and then ***open-ended questions*** in order to set the bids for the main wave of data gathering.

In the main wave of the data collection, we rely on ***the discrete choice experiments method***. To value the conception of a child and birth defects, we use ***sequences of multinomial choice questions*** (also called conjoint choice experiments) with three options. One of the options is the status quo. Attributes and their levels used to describe the contingent scenarios in the discrete choice experiments are summarized in the following figures (Figure 8 to Figure 11).

In the case of very low birth weight we utilize the ***double-bounded discrete choice questions*** (also called contingent valuation questions) (for description of attributes and their levels see Figure 12 and Figure 13) and in the case of IVF, we decided for a ***single-bounded discrete choice question*** (see Figure 14).

Figure 8: Design of the choice experiment for the conception of a child valued as a private good (DCE 1)

Attribute	Levels	Description
Percentage increase in the probability of conception	0 - no change (SQ only) +2% +3% +4% +5%	percentage increase in the probability of conception as shown in the graph
Number of months of trying to conceive after which the probability will increase	0 - no change (SQ only) 6 months 12 months 18 months	the number of months during which the couple is trying to conceive before the vitamins take effect and increase the probability of conception
Costs	0 - no change (SQ only) € 120 (€ 10) € 360 (€ 30) € 600 (€ 50) € 1 200 (€ 100) € 3 000 (€ 250)	total costs (monthly payment over 1 year period)

Figure 9*:* Design of the choice experiment for the conception of a child valued as a public good (DCE 2)

Attribute	Levels	Description
Percentage increase in the probability of conception	0 - no change (SQ only) +2% +3% +4% +5%	percentage increase in the probability of conception as shown in the graph
Costs	0 - no change (SQ only) € 120 (€ 1) € 360 (€ 3) € 600 (€ 5) € 1 200 (€ 10) € 3 000 (€ 25)	total costs (monthly payment over 1 year period)

Figure 10*:* Design of the choice experiment for birth defects valued as a private good (DCE 3)

Attribute	**Levels**	**Description**
Type of birth defect	Minor birth defects; Birth defects of internal organs; Birth defects of external body parts	the type of the birth defect the risk of which will be reduced
Decrease in probability of - Minor birth defects	no decrease (139 in 1 000) 20 in 1 000 (119 in 1 000) 30 in 1 000 (109 in 1 000) 50 in 1 000 (89 in 1 000) 70 in 1 000 (69 in 1 000)	decrease in the probability of minor birth defects by one of the levels (to the resulting level) as shown in the graph
- Birth defects of internal organs	no decrease (15 in 1 000) 2 in 1 000 (13 in 1 000) 3 in 1 000 (12 in 1 000) 5 in 1 000 (10 in 1 000) 7 in 1 000 (8 in 1 000)	decrease in the probability of birth defects of internal organs by one of the levels (to the resulting level)
- Birth defects of external body parts	no decrease (6 in 1 000) 1 in 1 000 (5 in 1 000) 2 in 1 000 (4 in 1 000) 3 in 1 000 (3 in 1 000) 4 in 1 000 (2 in 1 000)	decrease in the probability of birth defects of external body parts by one of the levels (to the resulting level)
Costs	0 - no change (SQ only) € 120 (€ 10) € 180 (€ 15) € 240 (€ 20) € 600 (€ 50) € 960 (€ 80)	total costs (monthly payment over 10 years)

Figure 11*:* Design of the choice experiment for birth defects valued as a public good (DCE 4)

Attribute	Levels	Description
Type of birth defect	Minor birth defects; Birth defects of internal organs; Birth defects of external body parts	the type of the birth defect the risk of which will be reduced
Decrease in probability of - Minor birth defects	no decrease (139 in 1 000) 20 in 1 000 (119 in 1 000) 30 in 1 000 (109 in 1 000) 50 in 1 000 (89 in 1 000) 70 in 1 000 (69 in 1 000)	decrease in the probability of minor birth defects by one of the levels by one of the levels (to the resulting level) as shown in the graph
- Birth defects of internal organs	no decrease (15 in 1 000) 2 in 1 000 (13 in 1 000) 3 in 1 000 (12 in 1,000) 5 in 1 000 (10 in 1 000) 7 in 1 000 (8 in 1 000)	decrease in the probability of birth defects of internal organs by one of the levels (to the resulting level)
- Birth defects of external body parts	no decrease (6 in 1 000) 1 in 1 000 (5 in 1 000) 2 in 1 000 (4 in 1 000) 3 in 1 000 (3 in 1 000) 4 in 1 000 (2 in 1 000)	decrease in the probability of birth defects of external body parts by one of the levels (to the resulting level)
Costs	0 - no change (SQ only) € 600 (€ 5) € 1 200 (€ 10) € 1 800 (€ 15) € 3 000 (€ 25) € 6 000 (€ 50)	total costs (monthly payment over 10 years)

Figure 12*:* Design of the double bounded discrete choice for very low birth weight valued as a private good

Attribute	Levels	Description
Reduction in probability of very low birth weight	2 in 1 000 3 in 1 000 5 in 1 000 7 in 1 000	decrease in the probability of very low birth weight by one of the levels (in 1 000)
Costs	€ 80 (€ 10) € 240 (€ 30) € 450 (€ 50) € 640 (€ 80) € 800 (€ 100)	total costs (monthly payment over 8 months, i.e. 8 times)

Figure 13*:* Design of the double bounded discrete choice for very low birth weight valued as a public good

Attribute	Levels	Description
Reduction in probability of very low birth weight	2 in 1 000 3 in 1 000 5 in 1 000 7 in 1 000	decrease in the probability of very low birth weight by one of the levels (in 1 000)
Costs	€ 120 (€ 1) € 360 (€ 3) € 600 (€ 5) € 1 200 (€ 10) € 3 000 (€ 25)	total costs (monthly payment 10 years, i.e. 120 times)

Figure 14*:* Design of the single discrete choice for IVF valued as a private good

Attribute	**Levels**	**Description**
Probability of conceiving a child for one attempt	20% 30% 50%	probability of conceiving a child for one IVF attempt in case respondent was diagnosed as infertile and the in vitro fertilization was not fully or partially covered by public health insurance
Costs	€ 1 000 € 2 000 € 3 000 € 5 000 € 7 500	total costs for one attempt of in vitro fertilization (include the medication, examinations and tests)

4.2 Econometric model

Conception of child

We assume that respondents will select the probability increasing alternative if their willingness to pay for the increase in the probability to conceive (PROB) is greater than the cost of this alternative (COST). The corresponding indirect utility function is as follows

$$V_{ij} = \alpha_1 \cdot PROB_{ij} + \beta \cdot (y_i - COST_{ij}) + \varepsilon_{ij} \qquad \text{(1a)}$$

where *i* denotes the respondent, PROB is the probability of conception in scenario *j*. The coefficients α and β are marginal utility of the chance to conceive and marginal utility of income that need to be estimated.

We do not observe willingness to pay, but we posit that if the respondent chooses the risk-reducing alternative, then the willingness to pay for it, WTP*, must be greater than the cost of that alternative. If we assume that ε_{ij} is an independent and identically distributed type I extreme value error term with a scale parameter equal to 1, the resulting statistical model for the response in choice task j is

$$\Pr(Yes_{ij}) = \Pr(WTP_{ij}^{*} > COST_{ij}) = \Phi(\alpha_1 \cdot PROB_{ij} + \beta \cdot COST_{ij}) \qquad \text{(1b)}$$

where $\Phi(\ )$ denotes the cdf of standard logit variate.

The probability that respondent *i* chooses alternative *k* is:

$$\Pr(k) = \frac{\exp(\bar{V}_k)}{\sum_{j=1}^{K} \exp(\bar{V}_j)} \qquad \text{(1c)}$$

This means that the appropriate statistical model of the responses is a conditional logit that is linear in the parameters, and the probability is the contribution to the likelihood of the conditional logit model.

The Value of a Statistical Pregnancy equals the marginal utility of a unit chance increase weighted by the marginal utility of income. Because in our estimation we express the cost as the monthly payment and the increase in a chance of conceiving in percentage points, we multiply the ratio by 1 200, that is 12 payments over a year times 100.

$$VSP = (\hat{\alpha}/\hat{\beta}) \cdot 12 \cdot 100 \qquad \text{(1d)}$$

The respondents state their WTP as a monthly payment over one year in the private good scenario, while in the public good context they state their WTP as a monthly payment over 10 years. The value of a statistical pregnancy in the population is therefore derived as the ratio multiplied by 12 000, that is 120 monthly payments times 100.

The probability of conception can be increased within the private good scenario after 6 months, 12 months or 18 months of trying to conceive. To allow a non-constant marginal utility of probability to conceive across different times when the probability will begin to increase, we estimate the econometric models that are based on following indirect utility function

$$V_{ij} = \alpha_1 \cdot PM6_{ij} + \alpha_2 \cdot PM12_{ij} + \alpha_3 \cdot PM18_{ij} + \beta \cdot (y_i - COST_{ij}) + \varepsilon_{ij} \qquad \text{(1e)}$$

where PM6, PM12 and PM18 are the probabilities to conceive after 6, 12, and 18 months of trying to conceive. Alternatively, PM6 can be replaced by PROB.

To allow controlling for the effect of socio-demographics or other respondent-specific indicators, such as past experience, perception about time to conceive etc., we interact the probability of conception with these indicators

$$V_{ij} = \alpha_1 \cdot PROB_{ij} + \boldsymbol{\alpha_2} \cdot PROB_{ij} \cdot \mathbf{X_i} + \beta \cdot (y_i - COST_{ij}) + \varepsilon_{ij} \tag{1a}$$

A healthy child

Again, our econometric model is based on a random utility framework and the appropriate statistical model of the responses is a conditional logit linear in the parameters, as in the case of fertility. We assume that marginal utility of reducing probability of three distinct birth defects is not same. The resulting indirect utility is as

$$V_{ij} = \alpha_1 \cdot MINOR_{ij} + \alpha_2 \cdot INTERNAL_{ij} + \alpha_3 \cdot EXTERNAL_{ij} + \beta \cdot (y_i - COST_{ij}) + \varepsilon_{ij}$$

where MINOR, INTERNAL, and EXTERNAL denotes to the probabilities of three different birth defects. To allow controlling for the effect of respondent-specific indicators, we interact them with the three birth defect covariates.

The Value of a Statistical Case of healthy child that is linked to one of the three birth defects, *b*, equals the marginal utility of a unit chance reduction in the probability of respective birth defect *b* weighted by the marginal utility of income. Because in our estimation we express the cost as the monthly payment and the increase in a chance of birth defect is presented to the respondent as X in 1 000, we multiply the ratio in the private good scenario by 12 000, that is, 12 payments over a year times 1 000.

$$VSP_b^{VIT} = (\hat{\alpha}_b / \hat{\beta}) \cdot 12 \cdot 1000 \tag{1d}$$

Since our respondents are stating the willingness to pay in the public good scenario as a monthly payment over 10 years, the ratio is multiplied by 120 000 that is 120 monthly payments times 1 000.

Very low birth weight

The respondent's preference for reducing the probability of very low birth weight of her child or the probability of children to be born in the EU with very low birth weight is elicited through a double-bounded dichotomous choice question, however, in this report we base our estimate on responses on the single-bounded discrete choice questions. These binary responses are analysed both parametrically by a logit model and non-parametrically.

A non-parametric estimation of the mean WTP provides an empirical approach to estimating the survival function of the WTP interval responses with no need for assuming the distribution of WTP (Bateman et al. 2002). We follow the approach as demonstrated, for instance, in Haab and McConnell (2002) to calculate the lower bound to the mean WTP using a maximum likelihood framework. The so called Turnbul model and the resulting Kaplan-Meier estimator is a decreasing step function with a jump at each WTP amount (i.e. unique WTP value). For details see Report I on valuation of skin sensitisation and dose toxicity.

As in the scenario valuing birth defects, the probabilities of very low birth weight are expressed as X in 1 000. The payment will however take only 8 months, after conceiving and before child delivery. The resulting value of a statistical case is derived as the ratio of the marginal utility of a unit chance reduction in the probability weighted by the marginal utility of income, multiplied by 8 000, that is, 8 payments over a year times 1 000.

In the public good scenario, the respondents state their WTP as a monthly payment over ten years, so the VSCC is derived as the ratio of the two marginal utilities multiplied by 8 000.

Infertility

The respondent's preference for one attempt of in vitro fertilisation treatment in order to conceive is elicited through a single-bounded discrete choice question. Responses are analysed, in the same way as for very low birth weight, parametrically by a logit model and non-parametrically by the Kaplan-Meier estimator.

The value of a statistical case of pregnancy equals the marginal utility of a unit change in chance to conceive after one attempt of in vitro fertilisation weighted by the marginal utility of income. Because in our estimation we express the chance of conceiving in percentage points, we multiply the ratio by 100.

5 The structure of the questionnaire

The final version of the questionnaire, including contingent valuation scenarios, was prepared based on extensive testing of previous versions. Based on tests of the instrument, the research team identified long and less important parts of the questionnaire and shortened the questionnaire accordingly. The comprehensibility of the questionnaire was also checked and texts reworded accordingly.

First, the Czech master version of the questionnaire was translated by native speakers to other languages. Second, the English version was double-checked and comprehensively revised by a native speaker. Third, the Italian and Dutch questionnaires were checked against the English version and comprehensively revised by different native speakers than those who translated the original version. The text of the Dutch version was even triple-checked. Some of the socio-demographic and attitudinal questions were adopted from questionnaires applied in comparative panel surveys, such as the ISSP[1], the ESS[2], the EVS[3] or the Eurobarometer surveys[4].

The questionnaire structure follows a common ordering (e.g. Bateman et al., 2004). However, a few questions on socio-demographic characteristics were placed in the beginning of the questionnaire to be able to monitor quota attainment, as recommended for Computer Assisted Self Interviewing (CASI).

Several randomised treatments have been programmed, specifically the rotation of the order on public versus private valuation scenario, random selection whether respondents who want a baby will value either birth defects or very low birth weight under the public scenario.

The questionnaire was composed of 6 parts:

SECTION A. Personal characteristics of the respondent and the respondent's partner

In the first part of the questionnaire, socio-demographic characteristics of the respondent were gathered to be able to monitor quota attainment to meet quota requirements and to generate plots of probability of conceiving based on personal characteristics of the respondent.

In order to minimise misunderstandings the respondents read an explanation that by steady life partner we mean a non-marital partner, domestic partner, spouse, wife or husband, but also a partner one does not live in the same household.

- education
- region of the residence
- employment status
- gender
- age
- a steady life partner
- age of partner

[1] International Social Survey Programme (www.issp.org)
[2] European Social Survey (www.europeansocialsurvey.org)
[3] European Values Study (www.europeanvaluesstudy.eu)
[4] Eurobarometer 65.1 (Feb-Mar 2006) (European Commission, 2012) and Eurobarometer 75.4 (2011) European Commission, 2014) (http://ec.europa.eu/public_opinion/index_en.htm)

SECTION B. Respondent's children and planning a family

- total number of respondent's children
- age of the youngest child and the oldest child
- number of children that the respondent has with the current partner
- respondent's grandchildren
- intention to have a child
- when respondent intends to have a child
- planned number of children

SECTION C. The concept of Probability

The concept of probability is explained using examples from daily life and the probability of conception of a child. Comprehension of a figure illustrating the probability of conception of a child is tested (see Appendix 4).

SECTION D. Willingness to pay related to fertility and de-briefing questions

Section D contains the description of fertility related outcomes (conception of a child and IVF), valuation scenarios (a new complex of vitamins and minerals and chemical-free products), and valuation questions. As previously explained, these are sequences of multinomial choice questions that are presented as the choice between the current situation and two improved situations (examples of the choice sets are shown in Figure 15 and Figure 16).

Improved situation means that the probability of conception is increased by a number of percent after a number of months of trying to conceive in comparison to the current probability of conceiving for the respondent's age category. We ask respondents to engage in a total of four such valuation questions.

In the case of IVF, respondents are asked to imagine that they were diagnosed as infertile and the in vitro fertilization was not fully or partially covered by public health insurance. Then a single-bounded discrete choice follows.

Debriefing questions are put at the end of the valuation section to allow for an opportunity to express disagreement with the valuation scenarios (i.e. protest votes), and to understand whether certain response patterns are legitimate or imply protest. Perceived probability of conceiving is elicited because previous studies have suggested that people may not believe that given probabilities are relevant for them. The aim was to avoid confusion about whether respondents presumed given probabilities, as they were instructed, or whether they presumed different probabilities. Respondents are further asked whether they considered any other effects, positive or negative, aside from increased probability of conceiving, when they were thinking about the payment. Therefore we can control for the co-benefits and negative side effects in our models to estimate willingness to pay.

SECTION E. Willingness to pay related to birth defects and de-briefing questions

Section E is composed from the description of different types of birth defects, ranking of these types of birth defects from the least severe to the most severe one, a brief reminder about valuation scenarios introduced in the Section D, valuation questions, specifically multinomial choice questions (examples of the choice sets are shown in Figure 17 and in Figure 18), and debriefing questions (similar to the Section D).

SECTION F. Willingness to pay related to very low birth weight and de-briefing questions

Section E provides information about adverse health and developmental difficulties that are more likely among very low birth weight than normal birth weight infants. Further, it includes ranking of these adverse health effects, explanation of slight changes in previously introduced valuation scenarios, double-bounded dichotomous choice question, and a few debriefing questions (similar to those in Section D).

SECTION G. Health state

Section G asks questions about the health status of respondent and the respondent's partner and children. Questions will be used to assess differences in WTP depending on the respondent's health status.

***SECTION* I. Socio-economic characteristics of respondents**

- household income
- social status (such as single, retired, student etc.)
- number of family members
- number of children for several age categories
- size of residence

***SECTION* J. Perception of the respondent and the instrument comprehension**

Finally, a question on the comprehension of the questionnaire and specific comments on the questionnaire are placed at the end of the instrument.

Figure 15: Example of the choice set for the conception of a child valued as a private good (DCE 1)

Attribute	**Complex of vitamins A**	**Complex of vitamins B**	**Current state**
Beneficiary	You and your partner	You and your partner	You and your partner
Percentage of increase of the probability of conception as shown in the graph	+ 1%	+ 5%	0% no increase
Number of months of trying to conceive after which the probability will increase	after 6 months	after 12 months	0
Costs	£ 120	£ 2 400	£ 0
(Monthly payment over 1 year period)	(£ 10 per month for 1 year)	(£ 200 per month for 1 year)	

Figure 16: Example of the choice set for the conception of a child valued as a public good (DCE 2)

Attribute	Chemical-free products A	Chemical-free products B	Current state
Beneficiary	All people in the EU	All people in the EU	All people in the EU
Percentage of increase of the probability of conception as shown in the graph	+ 1%	+ 5%	0% no increase
Costs	£ 360	£ 6 000	£ 0
(Monthly payment over 10 year period)	(£ 3 per month for 10 years)	(£ 50 per month for 10 years)	

Figure 17: Example of the choice set for birth defects valued as a private good (DCE 3)

Attribute	**Complex of vitamins A**	**Complex of vitamins B**	**Current state**
Who is affected	Your child	Your child	Your child
Type of birth defect	Minor birth defects	Birth defects of internal organs	All birth defects
Decrease in probability of birth defects *to the resulting level*			
- minor	**by 20** in 1 000 *to 119 in 1 000*	**no decrease** *139 in 1 000*	**no decrease** *139 in 1 000*
- of internal organs	**no decrease** *15 in 1 000*	**by 5** in 1 000 *to 10 in 1 000*	**no decrease** *15 in 1 000*
- of external organs	**no decrease** *7 in 1 000*	**no decrease** *7 in 1 000*	**no decrease** *7 in 1 000*
Costs (Monthly payment over 1 year period)	**£ 120** (£ 10 per month over 1 year)	**£ 2 400** (£ 200 per month over 1 year)	**£ 0**
Which option would you prefer?	☐	☐	☐

Figure 18: Example of the choice set for birth defects valued as a public good (DCE 4)

Attribute	Chemical-free products A	Chemical-free products B	Current state
Who is affected	All children in the EU	All children in the EU	All children in the EU
Type of birth defect	Minor birth defects	Birth defects of internal organs	All birth defects
Decrease in probability of birth defects *to the resulting level*			
- minor	**by 20** in 1 000 *to 119 in 1 000*	**no decrease** *139 in 1 000*	**no decrease** *139 in 1 000*
- of internal organs	**no decrease** *15 in 1 000*	**by 5** in 1 000 *to 10 in 1 000*	**no decrease** *15 in 1 000*
- of external organs	**no decrease** *7 in 1 000*	**no decrease** *7 in 1 000*	**no decrease** *7 in 1 000*
Costs (Monthly payment over 10 year period)	**£ 120** (£ 10 per month for 10 years)	**£ 24 000** (£ 200 per month for 10 years)	**£ 0**
Which option would you prefer?	☐	☐	☐

6 The Survey

6.1 Target populations

The survey is focused on the valuation of the health outcomes related to fertility and developmental toxicity, which takes into account the fact that the beneficiaries will be – directly – expecting parents and future parents. However, we also considered the fact that older people, e.g. those expecting to become grandparents, might also reap benefit from the improved fertility chances of their children. Additionally, other people may benefit due to altruistic reasons, though one might reasonably expect their WTP to be smaller than the WTP of young respondents still expecting to deliver their first child.

For these reasons, we defined two target populations. The first target population are people aged between 18 and 65 who would like to have children in the future. Specifically, we wanted to reach mostly people who have steady life partners of the opposite gender (but not necessarily living together in one household) and plan to have a baby within next 3 years. The second target population is the general population in four EU countries: the Czech Republic, Italy, the Netherlands and the United Kingdom.

6.2 The results of the qualitative pre-survey, development and testing of the questionnaire

The first draft of the questionnaire was developed as an outline for the qualitative pre-survey, which took place in November 2012 and consisted of 8 semi-structured interviews with Czech citizens aged from 23 to 32, as the attitudes of young people to planning their family and birth defects of infants are the most important in respect to the topic of our survey. The structure and the content of the draft were based mostly on previous research summarized in the literature review and on hypotheses and questions formulated in respect to research objectives. The interviews were conducted using paper questionnaires and cards. The data from the questionnaires were transcribed into excel worksheets along with all the respondent's comments which were recorded during the interviews.

Our first proposal of the valuation good was a new pill that increases the probability of conception. However, some respondents could not believe that this treatment would have no side effects. Other respondents called for more information about the treatments. Thus, we decided to use instead of a pill a novel dietary supplement (complex of vitamins and minerals).

We proposed a dietary supplement that prevents the birth of an "unhealthy" child because pregnant women may feel uneasy about medication. In the scenario for the birth of a "healthy" child, the goods were dietary supplements provided either only to the respondent or to all inhabitants of a country. Willingness to pay was derived both for private and public good separately in case of policy that increases chance of conception in 5 years for the respondent, or for all inhabitants of a country.

We also wanted to avoid problems with the instrument that were found by van Houtven and Smith (1999), which stemmed from the fact that men were asked to state WTP for medication that their partner would take. Therefore we elicit preferences for hypothetical vitamins that are taken by the respondent, or by both the respondent and spouse. Both men and women can use these vitamins. The valuation good and scenario seemed to be acceptable for respondents.

During the pre-survey, the instrument was redesigned and revised several times according to the main findings from other interviews people from the Czech Republic, from the Netherlands, from the UK and Italy in order to maximise its comprehension.

Finally, we paid special attention to the comprehensive testing of the research instrument in an extensive pilot study. The questionnaire was piloted in all countries and we interviewed 409 people in total. After the pilot, 10 short interviews were conducted with respondents who participated in the pilot study in order to identify potential problems or possible improvement of verbatim. Based on the pilot, the instrument was slightly revised. The pilot was carried out by IPSOS Tambor.

6.3 Programming the instrument

The final version of the instrument prepared for the pilot was programmed. In the final stage of the pre-survey, we tested whether the program worked properly, including screening and filter questions.

Due to the complexity of the instrument, we did not use any pre-programmed solution and decided to build our own instruments in-house. The instrument was based on PHP framework Nette 1.9 and database system MySQL, both being widely used web technologies. The Nette framework is particularly useful in creation and validation of form elements as well as in setting up basic security layers.

The core of the application allows for translation of the instrument into multiple languages with a possibility to backtrack changes of the strings, it allows for a branched design of the questionnaire and for splitting the respondents into multiple samples and, furthermore, it allows the respondents to pause and continue later on, be it couple of days later or from another computer. The system is also capable of real-time monitoring of pre-set socio demographic quotas to ensure an efficient data collection.

To allow for deeper analysis of the respondent’s behaviour or for the identification of intentional speeders, all actions of the respondents such as a page load and submission of answers, including unsuccessful submission of some answers (e.g. when not all required fields are filled in), is logged and can be reviewed in the phase of data analysis.

The front end of the application had to fulfil the following criteria: constrained to less than 1200px, usability on PCs as well as on tablets and cross-browser compatibility. As the instrument was designed to include interactive elements such as visual scales and dynamically generated plots, the instruments use jQuery JavaScript library along with jqPlot plugin.

7 Data description

7.1 Data collection and sampling technique

The data exploited in this study comes from a survey of the adult population of the Czech Republic, the United Kingdom, the Netherlands and Italy. The data were collected by the IPSOS opinion poll company in compliance with ISOMAR standards between 24th February 2014 and 10th June 2014. The survey took the form of Computer Assisted Self Interviewing (CASI).

The first wave of data collection started on 24th February 2014 and ended on 31st March 2014, during which 2 958 interviews were conducted. After checking the quotas, 932 additional interviews were conducted in two additional waves during 17-24 April and 4-10 June 2014. In total slightly more than **4 300 interviews** were carried out, including 436 interviews conducted in the pilot. Our sampling strategy resulted in the sample size that was about one third larger than it originally planned. The quality of data was significantly improved to ensure our dataset well represents the target populations. Country sample sizes range from 854 in the UK to 1 451 in the Czech Republic (see Table 1).

Table 1: Sample sizes for Sample A and Sample B

	Sample A		Sample B		Total per country
	main wave	pilot	main + additional waves	pilot	
Czech Republic	779	78	555	39	1 451
United Kingdom	449	74	302	29	854
Italy	476	95	520	23	1 114
Netherlands	491	72	318	26	907
Total	2 195	319	1 695	117	4 326
Total per sample	2 514		1 812		4 326

The subsamples were drawn from the population using quota sampling with quotas for age, gender, the region of residence and employment status in the case of sample A or household income in the case of sample B. While sample B comprises subsamples representative of general national populations, sample A aimed at gathering information about people who are planning to have a child.

A part of the respondents in Sample B who want a baby were also used in new sample A in order to increase the efficiency of our estimates. We ‘duplicated’ about 600 observations from sample B that met the condition of sample A (those who want children) and included them in the new sample A.

The raw data have been cleaned. Incomplete cases were excluded. All logical conjunctions in the questionnaires were verified and approved. In sample A, one case was deleted due to serious errors in data consistency (caused probably by respondent herself by using the back button in web browser). In both samples, some filter errors occurred in different individual cases, again probably caused by respondents returning to previous questions and changing their answers. These cases were recoded to missing for given questions.

After data cleaning to increase their representativeness and this transfer from the original sample B to the new sample A, in total, Sample A consists of **2,924 observations** and Sample B has **1,500 observations**, which are used further in the analysis.

Representativeness

Obviously sample A cannot be deemed to represent the general adult population. The main socio-economic characteristics should be close to the population of people planning children. Although only imprecise information about the subpopulation of people planning children is available from the Eurobarometer surveys conducted in 2006 (European Commission, 2012) and in 2011 (European Commission, 2014), quota sampling was used to get at least a similar sample of this specific sub-population. However, we cannot state that it is representative of the target population because the quotas were set using surveys instead of statistics. Random sampling would be also problematic, because there is no sampling frame available for this subpopulation.

The idea behind collecting sample A is that this subsample can be used to boost sample B and increase efficiency of the estimates of population parameters derived from sample A. As a matter of fact, the proportion of people planning children and especially those planning a child in 3 years is relatively low, on average 33 % in 2011 in all four national populations according to the Eurobarometer 75.4 conducted in 2011 (European Commission, 2014; for detailed information about the shares of people planning children according to age see Figure 19). A very large sample of observations of the general population or of the population aged 18 to 40 would be therefore needed to gain precise estimates of population parameters for people planning a child in 3 years.

The choice of data collection mode depends not only on research objectives but also on the available budget. To visualize risks, design experiments and obtain values for the variety of health endpoints, an electronic survey instrument and use of computers was the only viable option. Considering the total budget, we relied on CAWI to achieve the sample size, rather than on CAPI that would necessitate smaller sample treatments.

However, there are two major challenges for the Internet surveys: non-coverage (lack of Internet access or limited use) of the general population and high non-response (unwillingness to participate given access) (Couper et al., 2007).

First, certain social groups, typically the elderly, people in rural areas and people with low education (and income) could be under-represented. The issue of non-coverage of the general population is of different importance in different countries, depending on levels of Internet penetration in the country. However, this study is focused on countries where the penetration of Internet users is high (94 % in the Netherlands, 90 % in the United Kingdom, 74 % in the Czech Republic in 2013) with exception of Italy, where is the share of internet users lower (58 % in 2013) (Eurostat, 2014). According to Eurostat (2014), 92 % of inhabitants of the Netherlands, 87 % of inhabitants of the United Kingdom, 70 % of inhabitants of the Czech Republic and 56 % of inhabitants of Italy used the internet on average at least once a week.

In the Netherlands, van der Heide et al. (2008) could not reject the hypothesis that WTP values derived through interviews are the same as values obtained from the Internet survey. Moreover, both samples were quite representative of the Dutch population. In Italy, the study by Canavari et al. (2005) investigated WTP for a ban on pesticides in fruit production and has found higher mean WTP in the Internet sample. The Internet sample had high income, education and male overrepresentation reflecting the unequal adoption of the Internet in Italy. However, WTP from both samples varied in the same expected way to relevant socio-economic covariates. In general, the review study of Lindhjem and Navrud (2011) shows that the large majority of the SP studies that compare Internet with other modes find equal or lower WTP welfare measures for the Internet mode. A recent study on VSL derived from WTP for the reduction in risk of dying in various contexts by Scasny and Alberini (2011) conclude that the VSL for two used mode of survey administration – CAWI and CAPI – are not statistically different; however, if they estimate VSL for specific segments of population, the VSL's differ.

Non-response

Second, we controlled the number and percentages of non-responses according to reasons why the observations were not included in the final dataset. Regarding sample B, 2 483 members of the four country internet panels were contacted to participate in the survey. On average, the non-response rate was about 29 %. The majority of the non-responses, about 20 % of the contacted members of the four panels, was due to not allowing them to continue in the survey because of controlling the quotas. About 3 % closed the survey just at the beginning of the questionnaire and 5 % finished the survey during the interview. Almost nobody finished the survey during answering the valuation questions (see Table 2).

Table 2: Number and percentages of non-responses

Reason	Percentage
non-response	**29 %**
unfinished at the beginning	3 %
unfinished at the valuation questions	0 %
unfinished at the filter	20 %
unfinished other	5 %
valid obs.	**71 %**

Time to fill the questionnaire and speeders

The actual median time of questionnaire completion was ca 30 minutes (32 for sample A, 27 for the sample B). Those who completed the interviews in significantly shorter time than the others were identified and labelled as potential 'speeders' and moved to a separate data file. People who want a child filling out the questionnaire in less than 16 minutes were considered as speeders. Those who do not want a child were considered speeders when filling in the questionnaire in less than 14 minutes. The different criteria reflect the different length of the questionnaire based on respondent characteristics. The criteria were set based on our experimental testing of time needed to complete the questionnaire properly reading all information texts. This definition of a speeder is used in all analyses carried out in this report.

In sample B, 9 % respondents were classified as speeders and were removed from the dataset, resulting to total number of 1 363 observations (see Table 3). The cleaned dataset without speeders we labelled as "General population", as it is representative of general populations. The data is further analysed in the following chapters.

Table 3: Number of observations in the sample representative of general populations and share of the speeders

	General population		
	N (all)	**N (without speeders)**	**Percentage of speeders**
Czech Republic	502	483	4 %
United Kingdom	279	245	12 %
Italy	472	415	12 %
Netherlands	247	220	11 %
Total	**1 500**	**1 363**	9 %

In the new sample A (people who want a child), there were only 10 % of observations removed as speeders from the dataset (see Table 4).

Table 4: Number of observations in the sample of people who want children and share of the speeders

	People who want children		
	N (all)	**N (without speeders)**	**Percentage of speeders**
Czech Republic	939	897	4 %
United Kingdom	569	482	15 %
Italy	923	821	11 %
Netherlands	493	425	14 %
Total	**2 924**	**2 625**	10 %

For the identification of speeders, we also tried to follow the recommendation of SSI (Survey Sampling International, 2013) to define as speeders those who complete the survey in 48 % of the median time. This definition of speeders led to a calculation of the number of speeders similar to that which we had already identified. For sample A, the speeder criteria ranged between 12 and 17 minutes, for sample B between 11 and 15. However, as we considered this definition less useful than the first one, we decided not to use it.

7.2 Comparison of statistics with the quotas

In order to corroborate the data, we compared socio-economic and demographic characteristics of sample A (see Table 5) and sample B (see Table 6) with those of the target populations for all countries.

Sample B has been collected using different quota restrictions than in the case of sample A. The goodness-of-fit chi-square test shows that the structure of the national subsamples is similar in terms of quota characteristics to the populations according to the data from national censuses. Indeed, our samples are ***not statistically different from the target populations*** in terms of ***gender, age, region, and household income***.

Regarding ***sample A***, ***quotas on gender, age, region and type of occupation*** were set for both the pilot and the main wave data collections**.** However, because only very imprecise information about our target population, i.e. people who are planning to have a child, was available, we set the quota on age and occupation based on our estimates of 95% confidence intervals for the population proportions of people who intend to have a child in three year using data from the Eurobarometer opinion poll conducted in 2006 and in 2011 (European Commission, 2012 and 2014). The quota on gender was set arbitrary as the same share of males and females, assuming that a couple is needed to conceive a child. The quota for region is the same as in sample B. Thus, it does not make much sense to control the quotas attainments. Still, we compared our dataset with the quota prescription (see Table 5). The achieved quotas varied mostly less than 5 % from the original set up with the exception of the Netherlands, where there are more females (the difference is 11%) and less people from western part of the country (the difference is 19%).

Table 5: Characteristics of the national samples and target populations for the SAMPLE A

Czech Republic

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	50.0 %	52.2 %	2.2%
Female	50.0 %	47.8 %	-2.2%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-29 y.o.	41 % –53 %	46.6 %	-6.4%
30-35 y.o.	29 % – 49 %	40.3 %	2.3%
36-65.o.	9 % – 20 %	13.1 %	4.1%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Jihočeský	6.0 %	6.6 %	0.6%
Jihomoravský	11.1 %	10.8 %	-0.3%
Královéhradecký	5.2 %	6.4 %	1.2%
Karlovarský	2.8 %	3.2 %	0.4%
Liberecký	4.1 %	4.2 %	0.1%
Moravskoslezský	11.5 %	12.3 %	0.8%
Olomoucký	6.0 %	5.2 %	-0.8%
Pardubický	4.8 %	3.5 %	-1.3%
Praha	12.7 %	13.8 %	1.1%
Plzeňský	5.5 %	5.9 %	0.4%
Středočeský	12.3 %	8.3 %	-4.0%
Ústecký	7.7 %	7.7 %	0.0%
Vysočina	4.8 %	6.0 %	1.2%
Zlínský	5.5 %	6.2 %	0.7%
Occupation	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Students	Max. 3 %	5.6 %	2.6%
Non – active	13 % – 27 %	27.1 %	5.1%
Self employed	10 % – 19 %	8.1 %	-3.9%
Employed	56 % – 73 %	68.3 %	2.3%

Source: statistics for regions - Czech statistical office (2011), other characteristics- Eurobarometer 65.1 (Feb-Mar 2006) (European Commission, 2012) and Eurobarometer 75.4 (2011) (European Commission, 2014)

United Kingdom

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	50.0 %	44.1 %	-5.9%
Female	50.0 %	55.9 %	5.9%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-29 y.o.	40 % – 57 %	41.3 %	-6.2%
30-35 y.o.	23 % – 33 %	28.1 %	5.6%
36-65 y.o.	16 % – 30 %	30.6 %	0.6%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
North East	4.0 %	5.1 %	1.1%
North West	11.0 %	11.8 %	0.8%
Yorkshire and the Humber	9.0 %	10.7 %	1.7%
East Midlands	7.0 %	5.8 %	-1.2%
West Midlands	9.0 %	10.2 %	1.2%
East of England	9.0 %	8.1 %	-0.9%
London	13.0 %	13.0 %	0.0%
South East	14.0 %	15.8 %	1.8%
South West	9.0 %	6.7 %	-2.3%
Wales	5.0 %	3.2 %	-1.8%
Scotland	8.0 %	7.0 %	-1.0%
Northern Ireland	3.0 %	2.6 %	-0.4%
Occupation	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Students	Max. 3 %	3.9 %	0.9%
Non – active	22 % – 33 %	26.7 %	-4.3%
Self employed	6 % – 16 %	5.8 %	-6.2%
Employed	56 % – 66 %	68 %	12%

Source: statistics for regions - Eurostat (2011), other characteristics - Eurobarometer 65.1 (Feb-Mar 2006) (European Commission, 2012) and Eurobarometer 75.4 (2011) (European Commission, 2014)

Italy

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	50.0 %	47.9 %	-2.1%
Female	50.0 %	52.1 %	2.1%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-29 y.o.	15 % – 29 %	28.8 %	-0.2%
30-35 y.o.	33 % – 52 %	45.1 %	5.1%
36-65 y.o.	32 % – 43 %	26.2 %	-4.8%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
South	35.0 %	30.0 %	-5.0%
North East	24.0 %	24.5 %	0.5%
Centre	12.0 %	15.7 %	3.7%
North West	27.0 %	24.5 %	-2.5%
Sardinia	3.0 %	5.2 %	2.2%
Occupation	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Students	Max. 3 %	4.8 %	1.8%
Non – active	9 % – 25 %	20.9 %	1.9%
Self employed	11 % – 28 %	15.9 %	-5.1%
Employed	53 % – 72 %	64.6 %	4.6%

Source: statistics for regions - Eurostat (2011), other characteristics - Eurobarometer 65.1 (Feb-Mar 2006) (European Commission, 2012) and Eurobarometer 75.4 (2011) (European Commission, 2014)

Netherlands

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	50.0 %	38.2 %	-11.8%
Female	50.0 %	61.8 %	11.8%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-29 y.o.	33 % – 45 %	45.7 %	10.7%
30-35 y.o.	30 % – 48 %	31.8 %	-9.2%
36-65 y.o.	15 % – 26 %	22.6 %	-1.4%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
North	10.0 %	14.4 %	4.4%
East	21.0 %	32.0 %	11.0%
West	47.0 %	27.3 %	-19.7%
South	22.0 %	26.3 %	4.3%
Occupation	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Students	Max. 3 %	6 %	3%
Non – active	6 % –14 %	17.9 %	4.9%
Self employed	2 % – 10 %	7.4 %	2.4%
Employed	74 % – 90 %	76.9 %	-5.1%

Source: statistics for regions - Eurostat (2011), other characteristics - Eurobarometer 65.1 (Feb-Mar 2006) (European Commission, 2012) and Eurobarometer 75.4 (2011) (European Commission, 2014)

Table 6: Characteristics of the national samples and target populations for SAMPLE B

Czech Republic

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	50.2 %	48.7 %	-1.5%
Female	49.8 %	51.3 %	1.5%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-35 y.o.	38.0 %	38.9 %	0.9%
36-50 y.o.	31.3 %	32.5 %	1.2%
51-65 y.o.	30.7 %	28.6 %	-2.1%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Jihočeský	6.0 %	6.0 %	0.0%
Jihomoravský	11.1 %	10.1 %	-1.0%
Královéhradecký	5.2 %	5.0 %	-0.2%
Karlovarský	2.8 %	3.5 %	0.7%
Liberecký	4.1 %	4.8 %	0.7%
Moravskoslezský	11.5 %	11.8 %	0.3%
Olomoucký	6.0 %	6.0 %	0.0%
Pardubický	4.8 %	4.3 %	-0.5%
Praha	12.7 %	12.6 %	-0.1%
Plzeňský	5.5 %	5.4 %	-0.1%
Středočeský	12.3 %	11.6 %	-0.7%
Ústecký	7.7 %	8.9 %	1.2%
Vysočina	4.8 %	4.3 %	-0.5%
Zlínský	5.5 %	5.6 %	0.1%
Income*	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Less CZK 19 000	30.0 %	26.3 %	-3.7%
CZK 19 000-35 000	40.0 %	42.0 %	2.0%
CZK 35 000 more	30.0 %	31.6 %	1.6%

Source: Czech statistical office (2011)

United Kingdom

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	49.0 %	47.8 %	-1.2%
Female	51.0 %	52.2 %	1.2%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-35 y.o.	36.0 %	36.7 %	0.7%
36-50 y.o.	37.0 %	34.3 %	-2.7%
51-65 y.o.	27.0 %	29.0 %	2.0%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
North East	4.0 %	4.5 %	0.5%
North West	11.0 %	11.0 %	0.0%
Yorkshire and the Humber	8.0 %	8.6 %	0.6%
East Midlands	7.0 %	7.8 %	0.8%
West Midlands	9.0 %	7.8 %	-1.2%
East of England	9.0 %	7.8 %	-1.2%
London	13.0 %	12.7 %	-0.3%
South East	14.0 %	18.4 %	4.4%
South West	9.0 %	11.8 %	2.8%
Wales	5.0 %	2.4 %	-2.6%
Scotland	8.0 %	4.5 %	-3.5%
Northern Ireland	3.0 %	2.9 %	-0.1%
Income*	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Less £ 1 300	30.0 %	28.4 %	-1.6%
£ 1 300 - 2 750	40.0 %	40.7 %	0.7%
£ 2 750 more	30.0 %	30.9 %	0.9%

Source: Eurostat (2011), Ipsos

Italy

Gender	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Male	49.0 %	50.1 %	1.1%
Female	51.0 %	49.9 %	-1.1%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-35 y.o.	32.0 %	34.9 %	2.9%
36-50 y.o.	40.0 %	36.4 %	-3.6%
51-65 y.o.	28.0 %	28.7 %	0.7%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
South	34.5 %	32.3 %	-2.2%
North East	23.5 %	23.6 %	0.1%
Centre	12.0 %	12.0 %	0.0%
North West	27.0 %	28.9 %	1.9%
Sardinia	3.0 %	3.1 %	0.1%
Income*	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Less € 1 600	30.0 %	31.0 %	1.0%
€ 1 600 - € 2 750	40.0 %	40.8 %	0.8%
€ 2 750 more	30.0 %	28.2 %	-1.8%

Source: Eurostat (2011), Ipsos

Netherlands

Gender	Set up quotas	Proportion in the sample	Difference between proportion in the sample and in the population
Male	50.0 %	51.4 %	1.4%
Female	50.0 %	48.6 %	-1.4%
Age	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
18-35 y.o.	33.0 %	36.8 %	3.8%
36-50 y.o.	39.0 %	35.5 %	-3.5%
51-65 y.o.	28.0 %	27.7 %	-0.3%
Region	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
North East	31.0 %	33.6 %	2.6%
South West	69.0 %	66.4 %	-2.6%
Income*	**Set up quotas**	**Proportion in the sample**	**Difference between proportion in the sample and in the population**
Less € 1 750	30.0 %	30.3 %	0.3%
€ 1 750- € 3 300	40.0 %	42.9 %	2.9%
€ 3 300 more	30.0 %	26.9 %	-3.1%

Source: Eurostat (2011), Ipsos

7.3 Attribution / allocation of the experimental design(s)

Efficient experimental design for each of four discrete choice experiments was prepared using NGENE. The experimental design was also prepared for three CV scenarios. The efficiency of the DCE experimental designs was improved after the pilot based on the preliminary WTP estimates. All experimental designs are described in the following tables (Table 7 to Table 13).

Table 7: Frequency of variants of the efficient experimental design for the choice experiment for the conception of a child valued as a private good (DCE 1)

	alt 1 (SQ)			alt A			alt B				
CHOICESET	**DCE1-PROB(SQ)**	**DCE1-TIME(SQ)**	**DCE1-PRICE(SQ)**	**DCE1-PROB(A)**	**DCE1-TIME(A)**	**DCE1-PRICE(A)**	**DCE1-PROB(B)**	**DCE1-TIME(B)**	**DCE1-PRICE(B)**	Block	**Order within the block**
1	0	0	0	3	6	30	4	6	250	**1**	**1**
2	0	0	0	3	12	250	3	18	100	**1**	**2**
3	0	0	0	5	18	100	3	6	250	**1**	***rotate***
4	0	0	0	2	18	50	5	6	100	**1**	***rotate***
5	0	0	0	5	12	250	2	12	10	**2**	***1***
6	0	0	0	3	6	100	5	18	50	**2**	***rotate***
7	0	0	0	2	12	100	4	18	10	**2**	***rotate***
8	0	0	0	5	6	50	2	12	30	**2**	***rotate***
9	0	0	0	2	6	50	5	6	250	**3**	***1***
10	0	0	0	2	6	100	2	18	10	**3**	***2***
11	0	0	0	4	18	10	2	6	50	**3**	***rotate***
12	0	0	0	4	6	50	5	12	50	**3**	***rotate***
13	0	0	0	4	12	50	3	12	30	**4**	***1***
14	0	0	0	5	6	250	5	12	10	**4**	***2***
15	0	0	0	2	12	250	4	18	250	**4**	***rotate***
16	0	0	0	4	6	50	2	18	30	**4**	***rotate***
17	0	0	0	4	12	50	4	6	100	**5**	***1***
18	0	0	0	3	18	30	4	12	250	**5**	***rotate***
19	0	0	0	3	12	50	5	18	30	**5**	***rotate***
20	0	0	0	5	12	250	3	6	100	**5**	***rotate***

Table 8: Frequency of variants of the efficient experimental design for the choice experiment for the conception of a child valued as a public good (DCE 2)

	alt 1 (SQ)		alt A		alt B			
CHOICESET	**DCE2-PROB(SQ)**	**DCE2-PRICE(SQ)**	**DCE2-PROB(A)**	**DCE2-PRICE(A)**	**DCE2-PROB(B)**	**DCE2-PRICE(B)**	**Block**	**Order within the block**
1	0	0	5	25	4	1	1	rotate
2	0	0	4	5	2	3	1	rotate
3	0	0	2	1	3	10	1	rotate
4	0	0	3	3	5	5	1	rotate
5	0	0	3	1	4	25	2	rotate
6	0	0	4	10	3	3	2	rotate
7	0	0	5	5	2	1	2	rotate
8	0	0	2	3	5	5	2	rotate

Table 9: Frequency of variants of the efficient experimental design for the choice experiment for birth defects valued as a private good (DCE 3)

CHOICESET	alt 1 (SQ)				alt A				alt B					
	DCE4-MINOR (SQ)	**DCE4-INT (SQ)**	**DCE4-EXT (SQ)**	**DCE4-PRICE (SQ)**	**DCE4-MINOR(A)**	**DCE4-INT (A)**	**DCE4-EXT (A)**	**DCE4-PRICE (A)**	**DCE4-MINOR (B)**	**DCE4-INT (B)**	**DCE4-EXT (B)**	**DCE4-PRICE (B)**	**Block**	**Order within the block**
1	0	0	0	0	0	0	1	50	70	0	0	20	**1**	***rotate***
2	0	0	0	0	0	3	0	80	0	0	4	10	**1**	***rotate***
3	0	0	0	0	0	0	1	50	0	7	0	10	**1**	***rotate***
4	0	0	0	0	0	2	0	80	0	0	1	15	**1**	***rotate***
5	0	0	0	0	70	0	0	15	0	2	0	50	**2**	***rotate***
6	0	0	0	0	50	0	0	20	0	0	2	50	**2**	***rotate***
7	0	0	0	0	0	5	0	10	20	0	0	80	**2**	***rotate***
8	0	0	0	0	0	3	0	20	50	0	0	20	**2**	***rotate***
9	0	0	0	0	0	0	3	20	0	3	0	20	**3**	***rotate***
10	0	0	0	0	0	0	4	50	0	2	0	15	**3**	***rotate***
11	0	0	0	0	30	0	0	10	0	0	3	80	**3**	***rotate***
12	0	0	0	0	70	0	0	15	0	3	0	50	**3**	***rotate***
13	0	0	0	0	0	0	4	20	20	0	0	20	**4**	***rotate***
14	0	0	0	0	0	7	0	15	50	0	0	50	**4**	***rotate***
15	0	0	0	0	30	0	0	80	0	0	4	10	**4**	***rotate***
16	0	0	0	0	0	0	3	10	0	5	0	80	**4**	***rotate***
17	0	0	0	0	0	0	2	20	70	0	0	20	**5**	***rotate***
18	0	0	0	0	20	0	0	10	0	7	0	80	**5**	***rotate***
19	0	0	0	0	0	5	0	15	0	0	1	50	**5**	***rotate***
20	0	0	0	0	0	7	0	10	30	0	0	80	**5**	***rotate***
21	0	0	0	0	0	2	0	80	0	0	3	10	**6**	***rotate***
22	0	0	0	0	20	0	0	80	0	0	2	10	**6**	***rotate***
23	0	0	0	0	0	0	2	50	30	0	0	15	**6**	***rotate***
24	0	0	0	0	50	0	0	50	0	5	0	15	**6**	***rotate***

Table 10: Frequency of variants of the efficient experimental design for the choice experiment for birth defects valued as a public good (DCE 4)

CHOICESET	alt 1 (SQ) DCE4-MINOR (SQ)	DCE4-INT (SQ)	DCE4-EXT (SQ)	DCE4-PRICE (SQ)	alt A DCE4-MINOR(A)	DCE4-INT (A)	DCE4-EXT (A)	DCE4-PRICE (A)	alt B DCE4-MINOR (B)	DCE4-INT (B)	DCE4-EXT (B)	DCE4-PRICE (B)	Block	Order within the block
1	0	0	0	0	0	3	0	25	0	0	4	10	**1**	***rotate***
2	0	0	0	0	0	0	3	5	30	0	0	50	**1**	***rotate***
3	0	0	0	0	70	0	0	25	0	7	0	10	**1**	***rotate***
4	0	0	0	0	20	0	0	15	0	7	0	5	**1**	***rotate***
5	0	0	0	0	0	0	2	15	0	3	0	15	**2**	***rotate***
6	0	0	0	0	50	0	0	50	0	0	4	5	**2**	***rotate***
7	0	0	0	0	0	7	0	5	0	0	2	25	**2**	***rotate***
8	0	0	0	0	0	0	1	25	20	0	0	5	**2**	***rotate***
9	0	0	0	0	0	2	0	25	0	0	2	15	**3**	***rotate***
10	0	0	0	0	0	0	3	10	0	3	0	25	**3**	***rotate***
11	0	0	0	0	0	0	4	5	0	2	0	50	**3**	***rotate***
12	0	0	0	0	0	3	0	50	0	0	2	15	**3**	***rotate***
13	0	0	0	0	0	0	1	10	70	0	0	50	**4**	***rotate***
14	0	0	0	0	0	5	0	25	0	0	3	25	**4**	***rotate***
15	0	0	0	0	0	0	4	10	50	0	0	10	**4**	***rotate***
16	0	0	0	0	70	0	0	15	0	0	2	10	**4**	***rotate***
17	0	0	0	0	0	0	4	5	20	0	0	50	**5**	***rotate***
18	0	0	0	0	0	7	0	10	0	0	3	25	**5**	***rotate***
19	0	0	0	0	30	0	0	5	0	0	4	15	**5**	***rotate***
20	0	0	0	0	30	0	0	50	0	7	0	5	**5**	***rotate***
21	0	0	0	0	0	5	0	10	0	0	1	25	**6**	***rotate***
22	0	0	0	0	20	0	0	50	0	0	4	10	**6**	***rotate***
23	0	0	0	0	0	0	3	15	0	5	0	15	**6**	***rotate***
24	0	0	0	0	50	0	0	15	0	7	0	5	**6**	***rotate***

Table 11: Frequency of variants of the experimental design for the single discrete choice for IVF valued as a private good

CVM3id	Chance	BID (EUR)
1	50	7 500
2	30	1 000
3	50	3 000
4	50	2 000
5	20	2 000
6	20	3 000
7	30	5 000
8	50	5 000
9	20	1 000
10	30	7 500

Table 12: Frequency of variants of the efficient experimental design for the double bounded discrete choice for very low birth weight valued as a private good

CVM1ID	VLBW reduction	BID
1	5	10
2	2	10
3	2	100
4	3	10
5	7	10
6	3	30
7	7	100
8	3	80
9	5	100
10	2	50
11	7	30
12	7	80
13	2	80
14	5	50
15	3	50
16	5	30

Table 13: Frequency of variants of the experimental design for the double bounded discrete choice for very low birth weight valued as a public good

CVM2ID	VLBW reduction	BID
1	2	10
2	3	10
3	7	3
4	5	1
5	2	25
6	5	25
7	2	1
8	3	1
9	7	25
10	3	5
11	7	1
12	7	10
13	5	5
14	2	5
15	3	3
16	5	3

7.4 Descriptive statistics

7.4.1 Socio-economic characteristics

As Sample B is representative of the national populations in terms of several socio-demographic characteristics (see Chapter 7.2), we further compare estimates from our data with population statistics or with results of other surveys (if the statistics are not available).

The shares of married people in our samples of general populations are not significantly different from the population statistics. However, there are 5 per cent more married persons in our sample than in the statistics in the Netherlands. The number of household members in the sample exceeds the population statistic in all countries (on average by 0.4 to 0.8 members) (see Table 14). While the average number of household members is similar in both of our samples, there are less married respondents in the samples of people who want children than in our samples of general populations in all countries (see Table 15). This might be expected, as respondents who want children are in general younger than those in our samples of general populations.

Table 14: Descriptive statistics of sample B (general population) and population statistics

	CZ	UK	IT	NL
Married - sample	46%	49%	51%	45%
Married - population	42%	43.8%*	49%	40.2%
Household size – sample	2.9	2.8	3.0	2.8
Household size – population	2.4	2.3	2.4	2.2

*Source: Eurostat (population data for the latest available year, i.e. marital status – 2012, * UK-200, household size – 2012)*

Table 15: Descriptive statistics of the sample of people who want children

	CZ	UK	IT	NL
Married - sample	30%	42%	45%	38%
Household size – sample	3.0	3.0	3.1	2.8

In sample B, there are 61 % of childless families, about 8 % are singles and 28 % are couples both without children. Most of respondents (61 %) are childless (ranging from 59 % in the Czech Republic to 65 % in the Netherlands), about 19 % have one child, 14 % have two children and only 6 % have more than three children. However, there are significant differences between the countries in respect of the number of children. In Italy, there is a higher share of households with one child (23 %). In the Czech Republic, two children in the household are more frequent than in other countries (see Table 16).

Table 16: General population: Number of children in respondent's household (under the age of 18) by country

	CZ	UK	NL	IT
none	59 %	64 %	65 %	61 %
1	20 %	14 %	13 %	23 %
2	18 %	14 %	16 %	10 %
3 and more	4 %	8 %	7 %	6 %

In general, the number of children under the age of 18 in the respondent's household in the sample of people who want children is quite similar to the general sample. However, there are more households with two children in the Czech Republic, in the UK and in the Netherlands among the people who would like to have a child (see Table 17).

Table 17: People who want children: Number of children in respondent's household (under the age of 18) by country

	CZ	UK	NL	IT
none	51 %	52 %	53 %	53 %
1	29 %	25 %	28 %	24 %
2	17 %	15 %	12 %	14 %
3 and more	3 %	8 %	7 %	9 %

The higher share of Czech respondents lives in small villages (up to 2 000 inhabitants) in comparison to the remaining countries. This trend is in accordance with population statistics. The share of respondents living in cities with more than 100,000 inhabitants ranges between 21 % in the UK and 27 % in the Netherlands (see Table 18). These shares are similar among people planning a child (see Table 19).

Table 18: General population: Size of municipality by country

	CZ	UK	IT	NL
up to 199 inhabitants	4 %	2 %	0 %	0 %
200 to 499 inhabitants	6 %	2 %	1 %	0 %
500 to 999 inhabitants	8 %	3 %	1 %	1 %
1 000 to 1 999 inhabitants	9 %	3 %	4 %	3 %
2 000 to 4 999 inhabitants	9 %	6 %	11 %	6 %
5 000 to 9 999 inhabitants	10 %	7 %	10 %	7 %
10 000 to 19 999 inhabitants	9 %	8 %	13 %	9 %
20 000 to 49 999 inhabitants	11 %	11 %	19 %	20 %
50 000 to 99 999 inhabitants	8 %	10 %	13 %	14 %
100 000 to 999 999 inhabitants	12 %	12 %	15 %	26 %
1 million or more inhabitants	12 %	9 %	10 %	1 %
I don’t know	1 %	27 %	3 %	13 %

Table 19: People who want children: Size of municipality by country

	CZ	UK	IT	NL
up to 199 inhabitants	4 %	2 %	1 %	1 %
200 to 499 inhabitants	4 %	2 %	1 %	1 %
500 to 999 inhabitants	8 %	3 %	1 %	2 %
1 000 to 1 999 inhabitants	7 %	3 %	6 %	3 %
2 000 to 4 999 inhabitants	9 %	5 %	11 %	7 %
5 000 to 9 999 inhabitants	8 %	6 %	10 %	7 %
10 000 to 19 999 inhabitants	9 %	6 %	13 %	12 %
20 000 to 49 999 inhabitants	12 %	9 %	15 %	20 %
50 000 to 99 999 inhabitants	12 %	9 %	13 %	11 %
100 000 to 999 999 inhabitants	11 %	14 %	17 %	21 %
1 million or more inhabitants	14 %	13 %	8 %	1 %
I don’t know	2 %	27 %	3 %	14 %

The country samples differ significantly in the shares of individual employment categories. Most respondents declared gainful employment of 30 hours or more a week. The number ranges between 52 % in the Czech Republic and 39 % in the Netherlands. The number of part time employed respondents varies significantly among countries, ranging between 9 % (the Czech Republic) and 19 % in the Netherlands. The number of unemployed persons is significantly higher in the Italian sample (13 %) than in the other countries. Being a housewife is most common in the Italian sample (12 %), but forms only 2 % in the Czech Republic.

Table 20: General population: Employment status by country

	CZ	UK	IT	NL
30 hours a week or more	52 %	42 %	45 %	39 %
less than 30 hours a week	9 %	15 %	12 %	19 %
self employed	8 %	7 %	9 %	8 %
military service	0 %	1 %	0 %	0 %
retired	8 %	9 %	8 %	3 %
housewife	2 %	11 %	12 %	10 %
maternity leave	6 %	1 %	1 %	1 %
student	10 %	4 %	7 %	10 %
unemployed	8 %	7 %	13 %	8 %
disabled	8 %	11 %	1 %	10 %
other	1 %	3 %	5 %	6 %

Note: The columns do not sum to 100 % as multiple answers were allowed

Table 21: People who want children: Employment status by country

	CZ	UK	IT	NL
30 hours a week or more	68 %	67 %	63 %	61 %
less than 30 hours a week	12 %	17 %	20 %	30 %
self employed	11 %	7 %	23 %	11 %
military service	0 %	1 %	2 %	1 %
retired	0 %	1 %	1 %	0 %
housewife	3 %	16 %	14 %	8 %
maternity leave	14 %	3 %	1 %	1 %
student	15 %	8 %	9 %	13 %
unemployed	9 %	7 %	18 %	10 %
disabled	2 %	3 %	1 %	3 %
other	1 %	0 %	2 %	3 %

Note: The columns do not sum to 100 % as multiple answers were allowed

Further, we included questions about personal, partner's or household net monthly income. For example, when the respondent formed a one member household and did not have a steady life partner, the question about partner's or household net monthly income were skipped. When a household consists from two members and respondent lives with his or her partner, we skipped the question about household income (for complete definition see the instrument).

Respondents were always asked to count all sources of income such as child support and other state support, interest, and other revenues. When asking information about income, we reminded the respondents that all answers will be treated confidentially. Respondents should choose one of 12 categories of personal and partner's income, or 10 categories of household income. Both questions also included the option *"I would prefer not to answer"*, there was also the option *"I don't know"* when asking for household income. If a respondent preferred to not provide this information, we showed him/her the following text: *"Please note that income is a key indicator for securing representativeness of our sample. We assure you that all the information will be treated as completely confidential and anonymous."* and asked him/her for the second time to provide this information but with broader income categories (collapsing income categories into five, offering again the option not to provide this information).

Household income, which we computed from personal, partner's and household income variables, is distributed among ten income categories, with slightly lower shares of observations in the lowest and the highest categories. In the general population, there are range about 13 % of Czech and 17 % of Netherlander respondents who did not know or would prefer not to answer. The repeated asking resulted in quite a low share of nonresponses to the household questions. There are 14 % of respondents who preferred not to answer in the general population and 15 % among people planning a child of respondents preferred not to answer (see Table 22 to Table 27).

Table 22: General population: Total monthly household income by country

	CZ	UK	IT	NL
1st **decile**	9 %	16 %	14 %	19 %
2nd **decile**	7 %	5 %	6 %	7 %
3rd **decile**	10 %	9 %	11 %	4 %
4th **decile**	7 %	7 %	10 %	6 %
5th **decile**	11 %	13 %	12 %	13 %
6th **decile**	10 %	8 %	8 %	9 %
7th **decile**	14 %	15 %	11 %	15 %
8th **decile**	9 %	9 %	8 %	10 %
9th **decile**	12 %	13 %	14 %	7 %
10th **decile**	11 %	6 %	6 %	9 %

Table 23: People who want children: Total monthly household income by country

	CZ	UK	IT	NL
1st **decile**	7 %	7 %	12 %	12 %
2nd **decile**	4 %	2 %	7 %	4 %
3rd **decile**	6 %	6 %	10 %	4 %
4th **decile**	5 %	4 %	10 %	9 %
5th **decile**	10 %	14 %	10 %	10 %
6th **decile**	12 %	9 %	9 %	11 %
7th **decile**	16 %	15 %	11 %	14 %
8th **decile**	9 %	17 %	8 %	11 %
9th **decile**	14 %	16 %	17 %	14 %
10th **decile**	15 %	10 %	7 %	12 %

Table 24 : General population: Total monthly personal income by country

	CZ	UK	IT	NL
1st quantile	14 %	13 %	12 %	7 %
2nd quantile	10 %	14 %	6 %	13 %
3rd quantile	9 %	12 %	20 %	12 %
4th quantile	9 %	11 %	24 %	15 %
5th quantile	8 %	10 %	11 %	8 %
6th quantile	10 %	5 %	9 %	10 %
7th quantile	13 %	9 %	5 %	12 %
8th quantile	11 %	9 %	3 %	11 %
9th quantile	8 %	6 %	2 %	5 %
10th quantile	3 %	4 %	2 %	4 %
11th quantile	3 %	4 %	3 %	2 %
12th quantile	3 %	3 %	1 %	2 %

Table 25 : People who want children: Total monthly personal income by country

	CZ	UK	IT	NL
1st quantile	17 %	8 %	12 %	11 %
2nd quantile	6 %	8 %	9 %	10 %
3rd quantile	5 %	10 %	20 %	9 %
4th quantile	8 %	13 %	23 %	15 %
5th quantile	8 %	10 %	14 %	8 %
6th quantile	10 %	9 %	8 %	10 %
7th quantile	14 %	17 %	4 %	11 %
8th quantile	12 %	8 %	3 %	7 %
9th quantile	8 %	6 %	2 %	7 %
10th quantile	7 %	6 %	2 %	7 %
11th quantile	3 %	3 %	2 %	4 %
12th quantile	2 %	1 %	1 %	3 %

Table 26: General population: Percentages of nonresponses to total monthly household income and personal income by country

	CZ	UK	IT	NL
household income	13 %	15 %	14 %	17 %
personal income	10 %	16 %	13 %	21 %

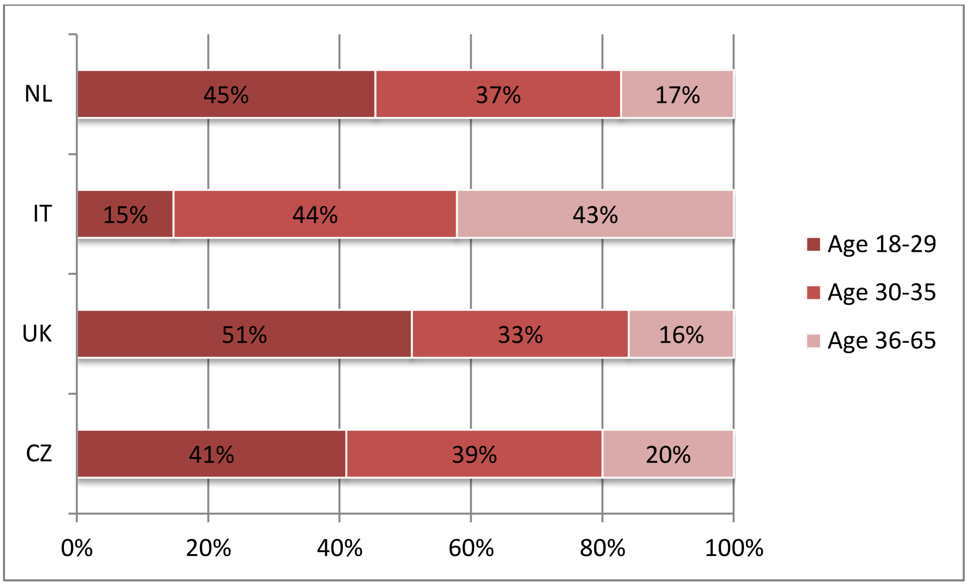
Table 27: People who want children: Percentages of nonresponses to total monthly household income and personal income by country

	CZ	UK	IT	NL
household income	11 %	20 %	13 %	17 %
personal income	9 %	12 %	12 %	17 %

7.4.2 Planning children

We set up broad quotas for Sample A based on confidence intervals for the proportions of people who intend to have a child in three years according to age categories and employment status estimated using data from the Eurobarometer 65.1 conducted in 2006 (European Commission, 2012) and from the Eurobarometer 75.4 carried out in 2011 (European Commission, 2014). However, we did not set any general quota for the proportion of people planning children for either sample. Because we used the question from the Eurobarometer survey in our survey, we can compare estimates based on our dataset (sample General population) and based on the dataset from the Eurobarometer 75.4 (European Commission, 2014) (see Figure 19).

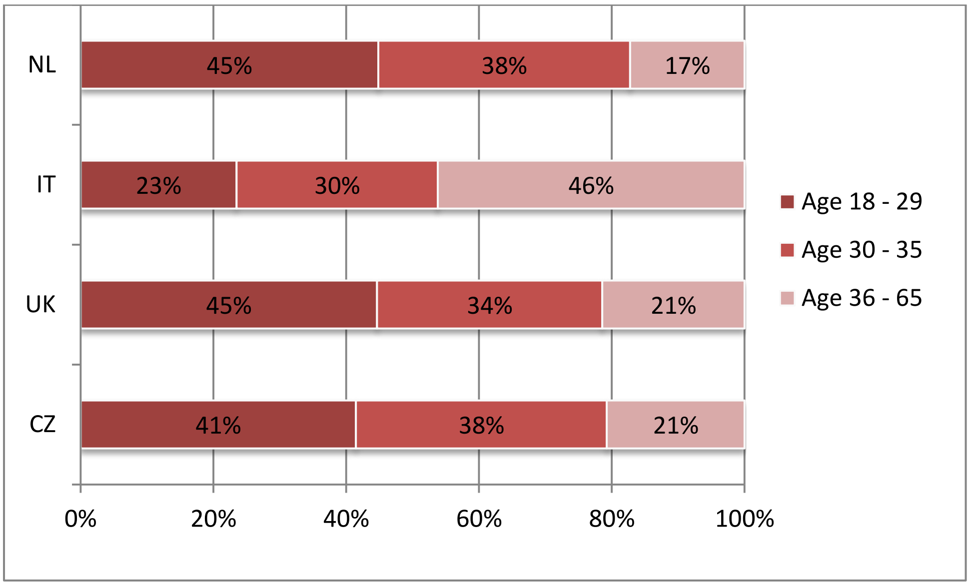
Figure 19: Eurobarometer: Percentages of those who intend to have a child within the next 3 years by age categories



Source: (European Commission, 2014)

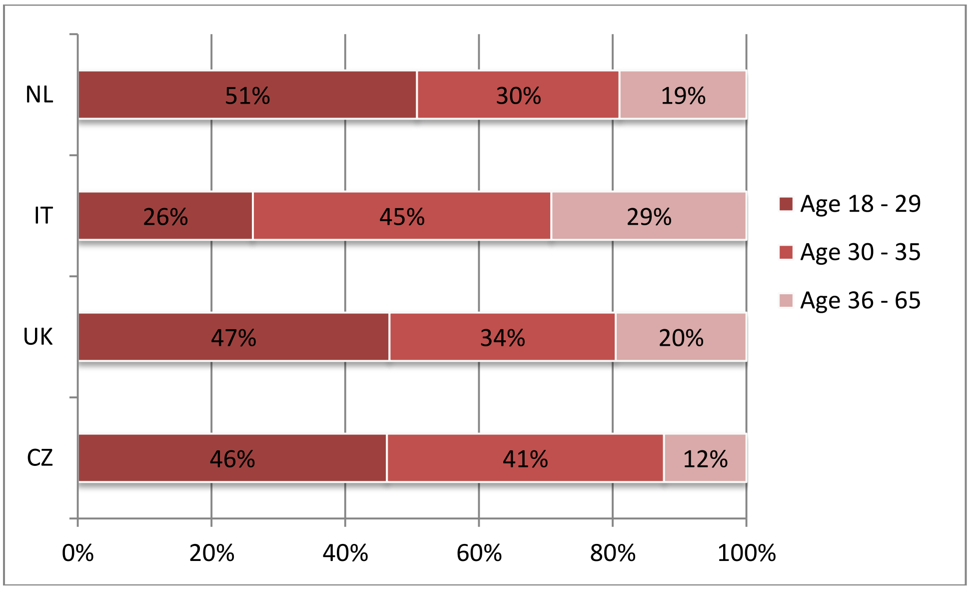
Our data do not differ from the Eurobarometer 75.4 (European Commission, 2014) in terms of the percentages of those who intend to have a child within the next 3 years according to age categories in the Netherlands and in the Czech Republic. We found slightly larger share of those who intend to have a child within the next 3 years in the oldest age category (older than 36) in the UK sample in comparison to the Eurobarometer 75.4. On the contrary, there is larger share of these people among 18 to 29 years old Italians compared to the Eurobarometer sample (see Figure 20).

Figure 20: General population: Percentages of those who intend to have a child within the next 3 years by age categories, our survey



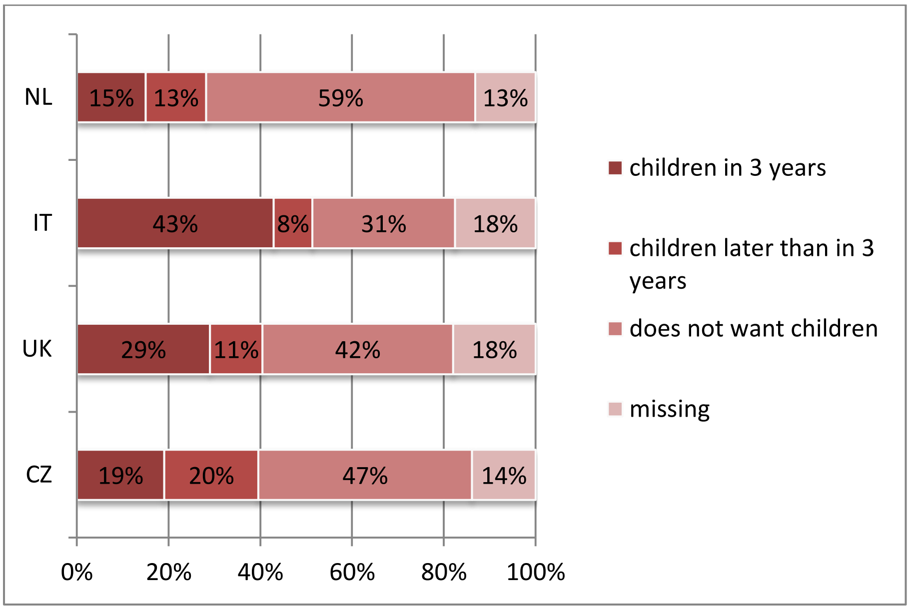
The Italian, the Czech and the UK sample of people who want a child is slightly different concerning the shares of those who intend to have a child within the next 3 years by age categories as derived from the Eurobarometer 75.4 data. While our data show higher shares for people aged 18 to 29 for the Italian and the Czech sample than in this Eurobarometer public opinion poll, this share is lower for the UK (see Figure 21). The reason is that we set the quota on age and occupation based on the 95% confidence interval of the population proportions of people who intend to have a child in three year that we estimated using data from the Eurobarometer 65.1 and 75.4 (European Commission, 2012 and 2014).

Figure 21: People who want a child: Percentages of those who intend to have a child within the next 3 years by age categories



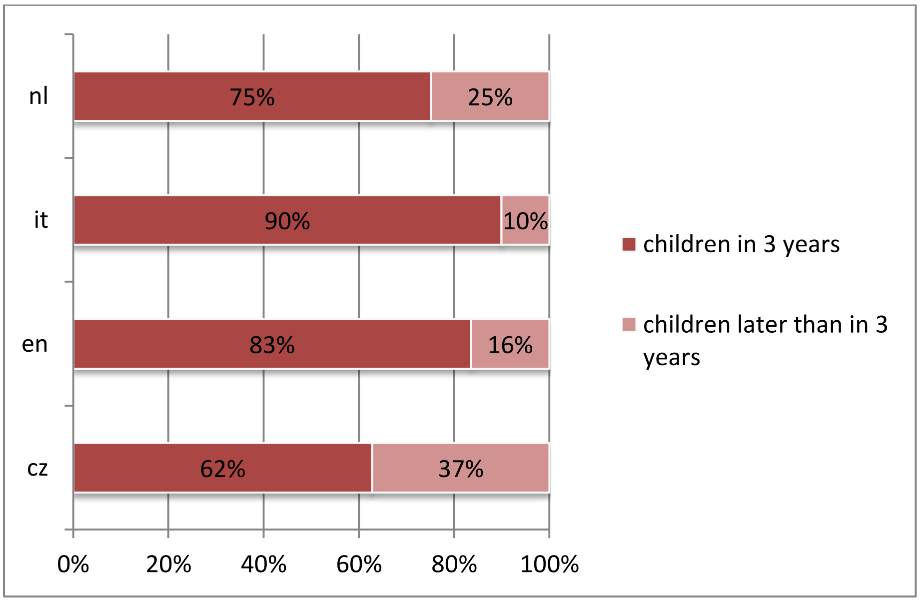
The next figures display percentages of those who intend to have a child within the next 3 years, later than in 3 years or do not want children in our datasets. In the general population, most people do not want children (43 %) and we are missing the information from 16 % of respondents. However, the shares greatly vary among the countries. While there are 59 % of respondents who would prefer not to have a child in the Netherlands, there are 43 % of respondents who want children in 3 years in Italy and 20 % of respondents who want children later than in 3 years in the Czech Republic (Figure 22).

Figure 22: General population: Percentages of those who intend to have a child within the next 3 years, later than in 3 years or do not want children in our dataset



Among people who would like to have a child, the largest shares are of those who plan a child within the next 3 years, as we intended when we defined our target population (Figure 23).

Figure 23: People who want children: Percentages of those who intend to have a child within the next 3 years, later than in 3 years or do not want children in our dataset



Most of people in both the samples tend to perceive that it will take them 1 to 3 months to conceive (about 22 %) and only a few people expect that it will take longer than 19 months (shares range from 2 % in the UK to 8 % in the Netherlands in the general sample) (see Table 28; Table 29; Figure 24; Figure 25).

Table 28 : General population: How long do you think will it take you and your (future) partner to conceive (get pregnant)?

	CZ	UK	IT	NL
We will conceive immediately.	10 %	6 %	14 %	5 %
1 to 3 months	26 %	22 %	21 %	11 %
4 to 6 months	19 %	20 %	16 %	16 %
7 to 9 months	5 %	7 %	10 %	13 %
10 to 12 months	7 %	12 %	6 %	10 %
13 to 18 months	3 %	6 %	3 %	6 %
19 to 24 months	1 %	0 %	2 %	2 %
Longer than 24 months	3 %	2 %	6 %	6 %
I don’t know.	27 %	25 %	22 %	31 %

Figure 24: General population: How long do you think will it take you and your (future) partner to conceive (get pregnant)?

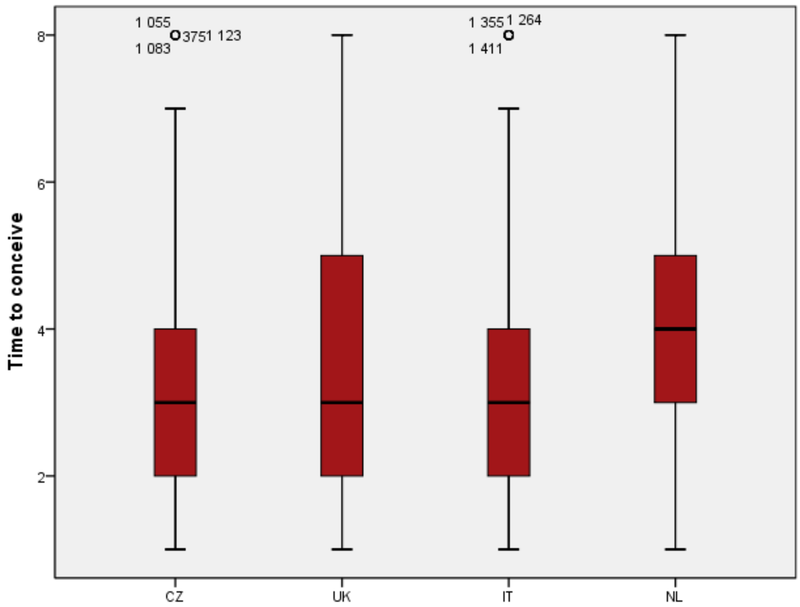
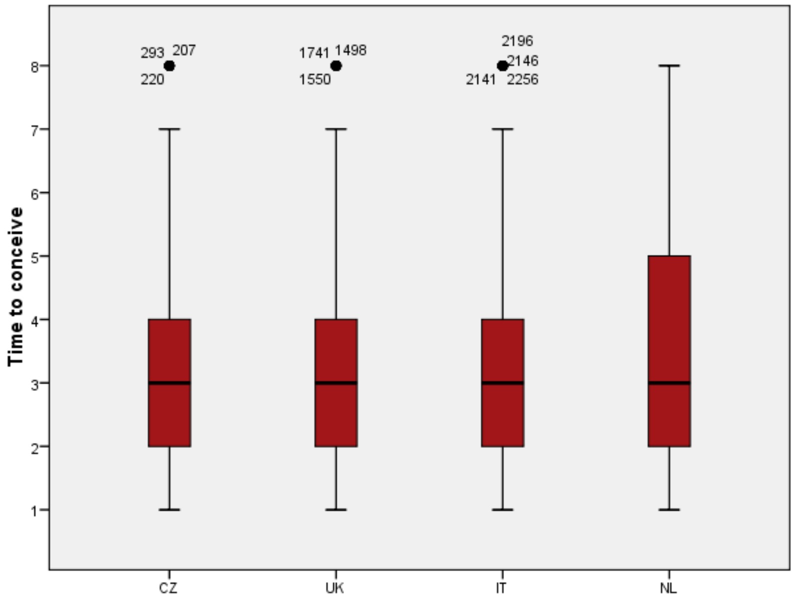


Table 29 : People who want children: How long do you think will it take you and your (future) partner to conceive (get pregnant)?

	CZ	UK	IT	NL
We will conceive immediately.	10 %	6 %	12 %	7 %
1 to 3 months	23 %	23 %	21 %	16 %
4 to 6 months	21 %	19 %	22 %	20 %
7 to 9 months	8 %	11 %	12 %	12 %
10 to 12 months	7 %	11 %	7 %	8 %
13 to 18 months	2 %	3 %	3 %	5 %
19 to 24 months	1 %	1 %	2 %	4 %
Longer than 24 months	2 %	2 %	3 %	5 %
I don't know.	25 %	23 %	17 %	23 %

Figure 25: People who want children: How long do you think will it take you and your (future) partner to conceive (get pregnant)?



7.4.3 Health conditions of respondents and their relatives

In both the samples, there are only small shares (ranging from 3 % to 7 %) of men and women who have experienced any of the health conditions that are valued in this survey (i.e. infertility, low birth weight and birth defects). The most frequently experienced health condition was miscarriage and still-birth (16 % and 12 %) (see Figure 26 and Figure 27). Percentages of respondents who reported that their children or partners have experienced any of the health conditions were also low (Figure 28 and Figure 29).

Figure 26: General population: Percentages of men and women who have experienced any of the following health conditions

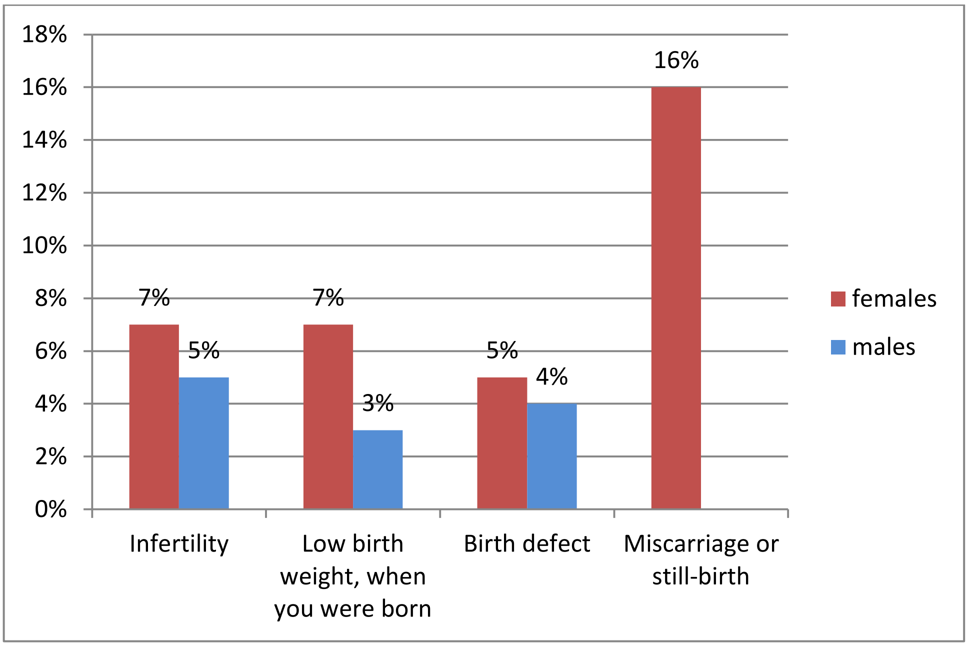


Figure 27: People who want children: Percentages of men and women who have experienced any of the following health conditions

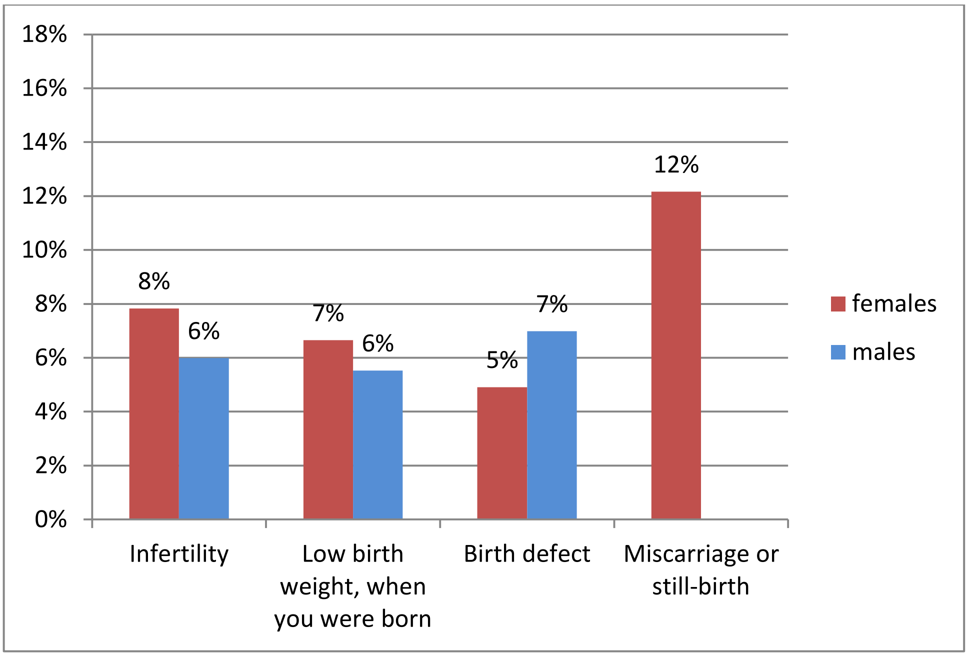


Figure 28: General population: Percentages of respondents who reported that their children or partners have experienced any of the following health conditions

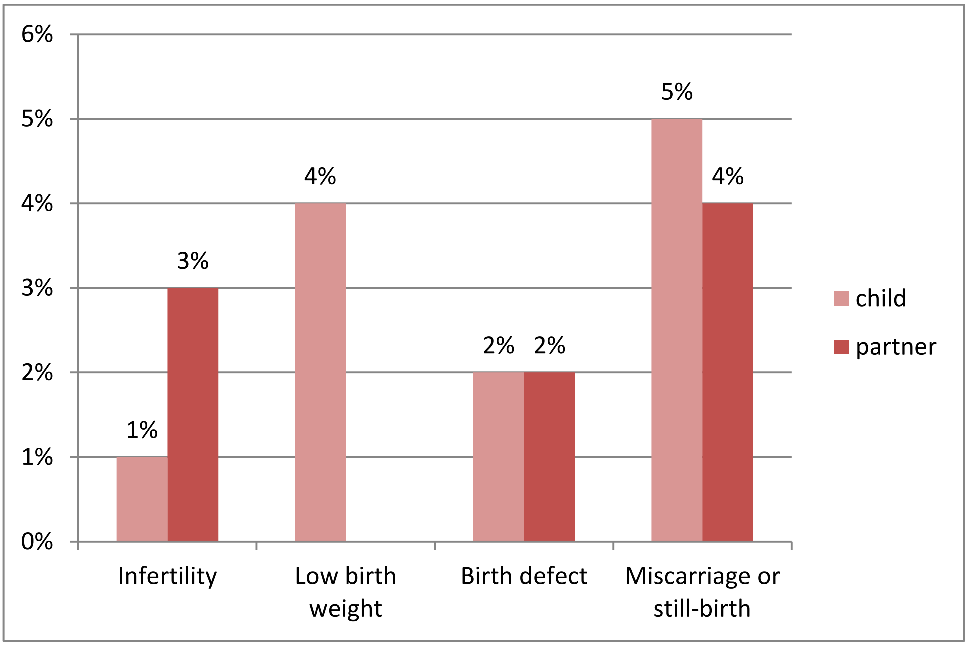
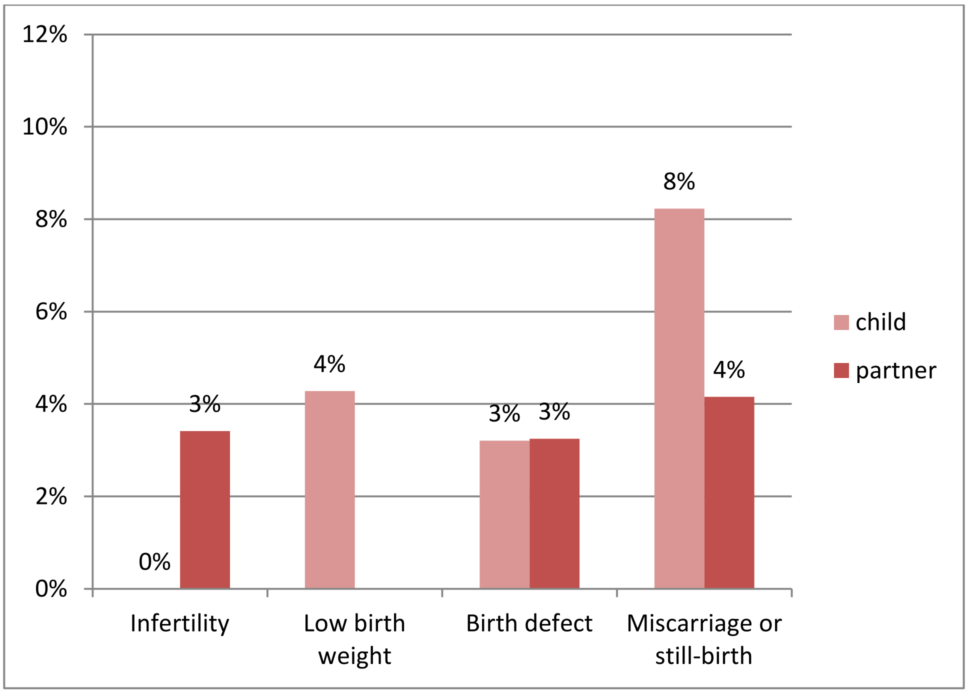


Figure 29: People who want children: Percentages of respondents who reported that their children or partners have experienced any of the following health conditions



7.4.4 Debriefing – confidence in the contingent scenarios and comprehensibility

Comprehension of the choice experiment to value the increase in probability of conception of a child under the private scenario does not differ significantly between the countries both in the general population sample and among people who would like to become parents. Comprehension was measured by Likert scale in which -3 meant difficult to understand and +3 easy to understand. On average, people perceived all the characteristics as rather easy to understand (the mean ranged from 1.2 to 2.1) (see Figure 30 and Figure 31).

Figure 30: General population: Comprehension of the choice experiment to value increase in probability of conception of a child under private scenario: "Which characteristics of the options were difficult or easy for you to understand?"

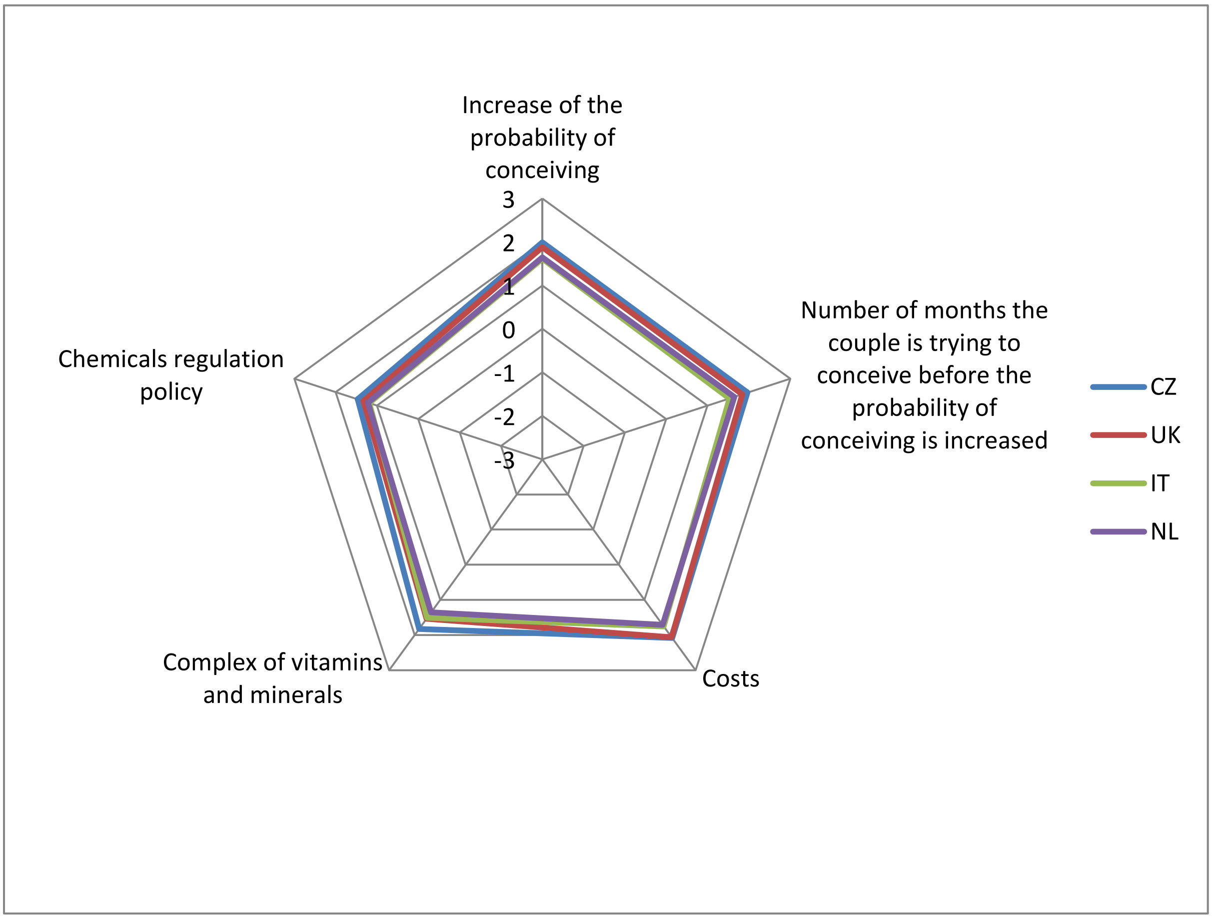
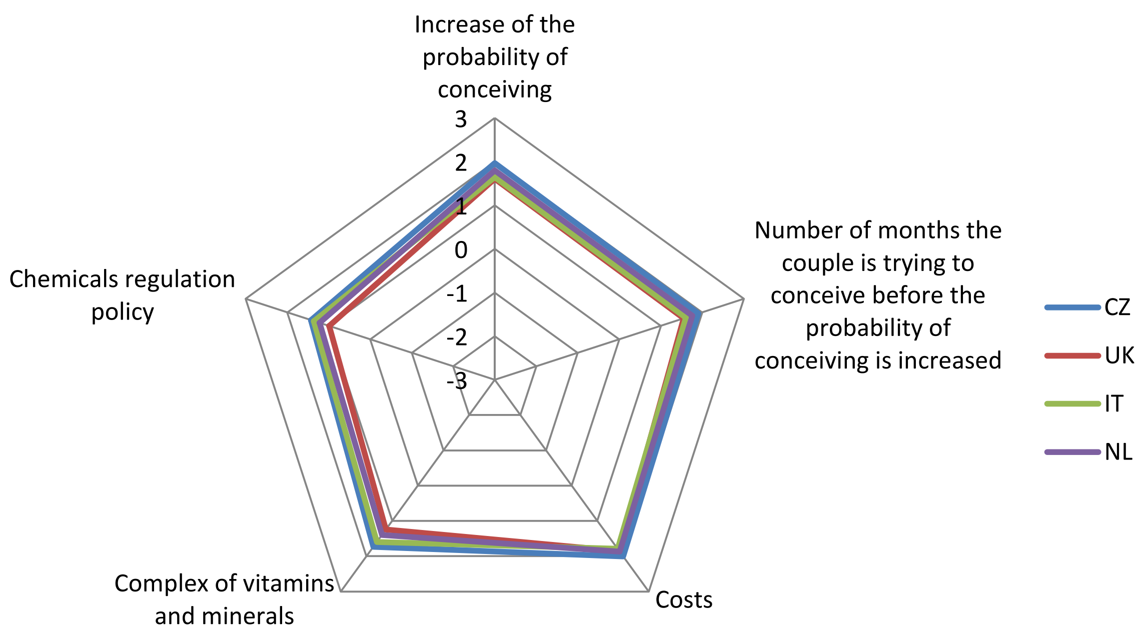


Figure 31: People who want children: Comprehension of the choice experiment to value the increase in probability of conception of a child under private scenario: “Which characteristics of the options were difficult or easy for you to understand?”



In the beginning of the questionnaire, we tested respondents’ comprehension of the figure illustrating the probability of conception by country. The results of this test are displayed in Table 30 and Table 31. Most of respondents (63 % in the general sample and 65 % among people who want children) chose the right answer, which was 75 %. Only 14 % in the general sample and 13 % among people who want children wrote down the wrong probability and 7 % or 5% answered that they didn’t know. Therefore we can conclude that a large share of respondents was able to comprehend our figure illustrating the probability of conception, which is important part of the discrete choice experiments.

Table 30: General population: Test of the comprehension of the figure illustrating the probability of conception by country: “Based on this figure, please try to read the probability of conception for a 30-year-old if the couple tries to conceive for at least 12 months.”

	CZ	UK	IT	NL	Total
Right answer (75 %)	64 %	70 %	54 %	67 %	63 %
Inattentive (70 % to 74 % or 76 % to 79 %)	14 %	16 %	21 %	13 %	16 %
Wrong answer (other probabilities)	14 %	9 %	19 %	9 %	14 %
I don’t know	8 %	5 %	7 %	11 %	7 %

Table 31: People who want children: Test of the comprehension of the figure illustrating the probability of conception by country: “Based on this figure, please try to read the probability of conception for a 30-year-old if the couple tries to conceive for at least 12 months.”

	CZ	UK	IT	NL	Total
Right answer (75 %)	66 %	68 %	57 %	72 %	65 %
Inattentive (70 % to 74 % or 76 % to 79 %)	15 %	20 %	20 %	15 %	17 %
Wrong answer (other probabilities)	14 %	7 %	18 %	7 %	13 %
I don’t know	5 %	5 %	5 %	7 %	5 %

However, we found a significant association between level of comprehension of the figure illustrating the probability of conception and education in both samples. There are significantly more university educated people who passed the test. People with lower secondary education or primary more often stated that they do not know the answer and less often were able to identify the right probability (see Table 32 and Table 33). Still, about 44 % to 64 % of lower educated people entered the right answer.

Table 32: General population: Test of the comprehension of the figure illustrating the probability of conception by education: “Based on this figure, please try to read the probability of conception for a 30-year-old if the couple tries to conceive for at least 12 months.”

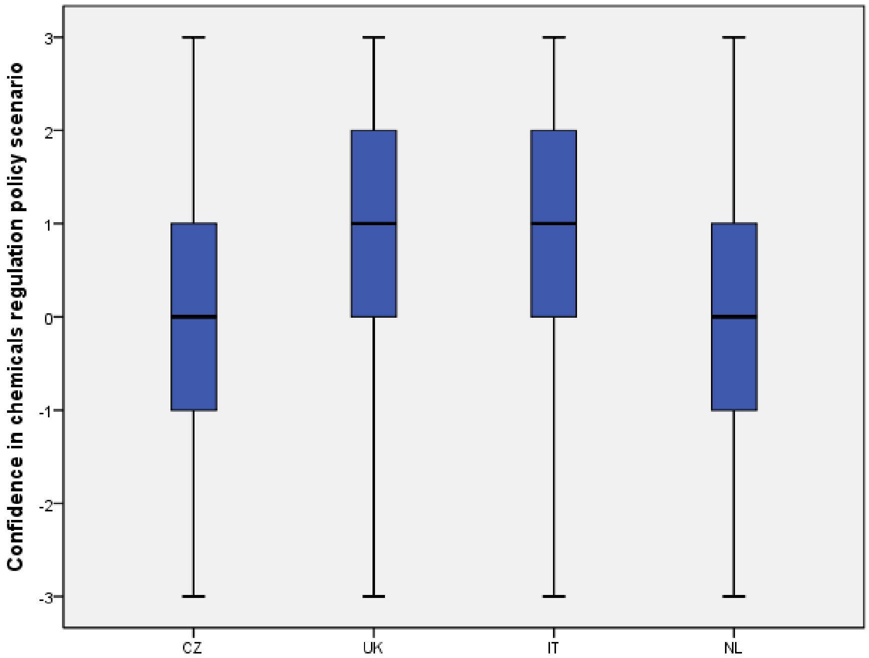
	primary	lower secondary	upper secondary	tertiary
Right answer	44 %	52 %	66 %	73 %
Inattentive	20 %	15 %	16 %	17 %
Wrong answer	19 %	21 %	12 %	7 %
I don’t know	16 %	11 %	6 %	3 %

Table 33: People who want children: Test of the comprehension of the figure illustrating the probability of conception by education: “Based on this figure, please try to read the probability of conception for a 30-year-old if the couple tries to conceive for at least 12 months.”

	primary	lower secondary	upper secondary	tertiary
Right answer	64 %	53 %	62 %	72 %
Inattentive	14 %	17 %	20 %	15 %
Wrong answer	14 %	20 %	12 %	10 %
I don’t know	9 %	10 %	5 %	4 %

Overall, people had confidence in the information about the two options (the chemicals regulation policy and the vitamins) they had been given in the questionnaire. However, there were differences in confidence in information provided between the inhabitants of different countries. People from the Netherlands had lower levels of trust in the chemicals regulation policy in the general sample and in the vitamins in the sample of people who want children. Information about valuation goods is most trusted by Italians in both samples, followed by inhabitants of the UK who tend to have higher confidence in policy than the vitamins (see Figure 32 and Figure 33).

Figure 32: General population: How much confidence do you have in the information about the two options you have been given in this questionnaire?



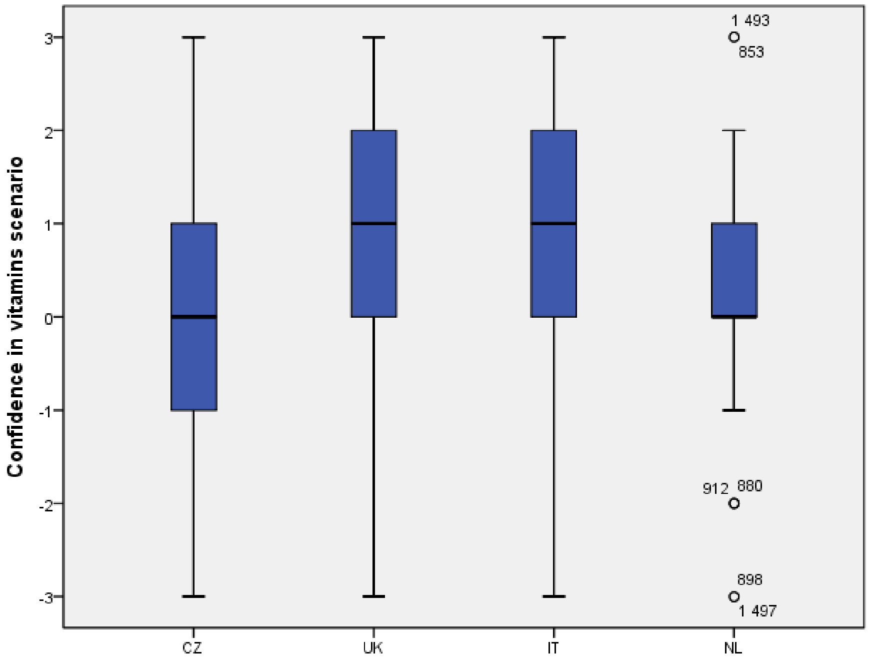
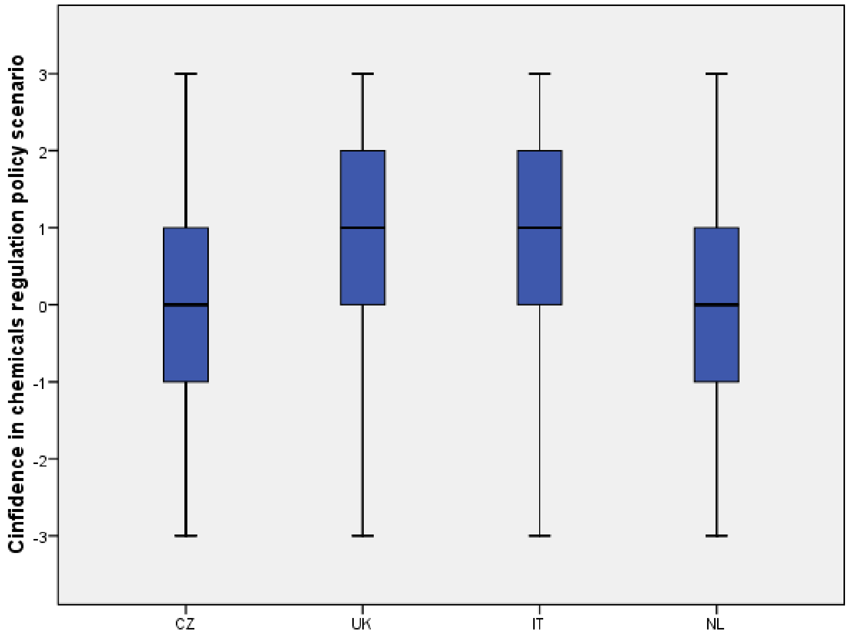
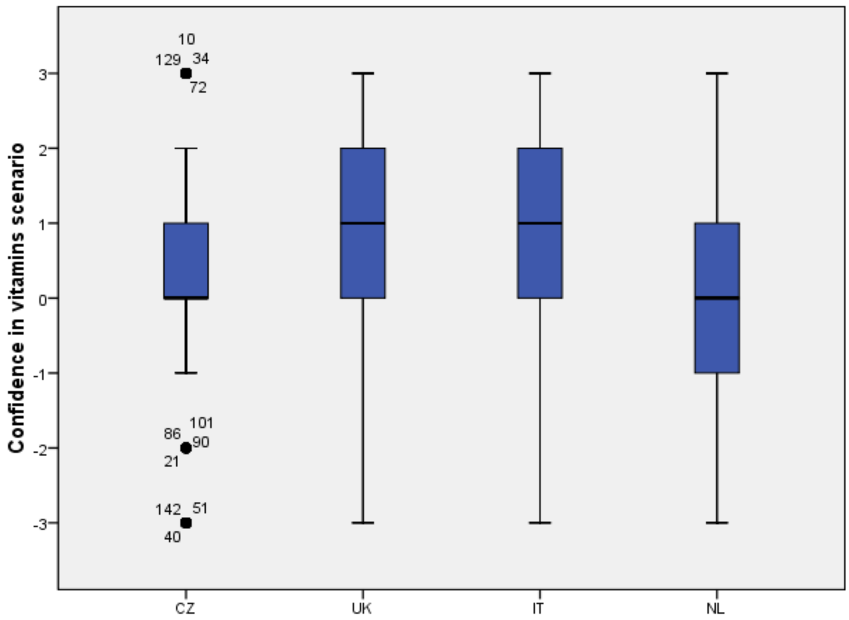


Figure 33: People who want children: How much confidence do you have in the information about the two options you have been given in this questionnaire?





8 WTP estimates

8.1 General information

This chapter reports the results for willingness to pay estimations for the following health outcomes:

i. the probability of conception,
ii. infertility,
iii. healthy child with WTP values for three types of birth defects,
iv. very low birth weight

All results for each health outcome are first reported for **the private good scenarios** and then for **the public good scenario**. The order of valued health outcomes as reported here, including valuation method, type of valuation scenario and population of our samples, is displayed in following table.

Chapter	Valuation task	Health outcome	Valuation method	Scenario	Population
8.3.1	DCE1(FERT-VIT)	probability to conceive	sequence of four discrete choice questions with 3 alternatives	Private good (novel vitamins)	WANT
8.3.2	DCE2(FERT-POL)	probability to conceive	sequence of four discrete choice questions with 3 alternatives	Public good (chemical policy)	WANT, GENPOPUL
8.4	DC(IVF)	infertility	one discrete choice question	Private good (IVF treatment)	WANT
8.5.1	DCE3(DEFECT-VIT)	healthy child (birth defects)	sequence of four discrete choice questions with 3 alternatives	Private good (novel vitamins)	WANT
8.5.2	DCE4(DEFECT-POL)	healthy child (birth defects)	sequence of four discrete choice questions with 3 alternatives	Public good (chemical policy)	WANT, GENPOPUL
8.6.1	DC1(VLBW-VIT)	very low birth weight	discrete choice question	Private good (novel vitamins)	WANT
8.6.2	DC2(VLBW-POL)	very low birth weight	discrete choice question	Public good (chemical policy)	WANT, GENPOPUL

The main models are based on the cleaned dataset from which both **speeders** and **protesters** are excluded**.** A speeder is defined by the length of time taken to complete the survey and data without the speeders are labelled as **'speeders'**. The protester is a respondent who selected at least once the protest option after relevant valuation task (data **'protesters'**) and also choose always the status quo option (data ***'protest(SQ=4)'***); see Chapter 8.2 for the details. Data that exclude both speeders and protesters who always have chosen status quo options are labelled as **'protest(SQ=4) speeders)'**. Dataset that includes only respondents who intend to have a child within next 3 years is labelled as ***'whenchild3'***.

Tables that report the estimation results are also displaying number of respondents (N ID), number of responses on the choice questions (N obs.) and statistics of the model fit (loglikelihood ratio or loglikelihood with or without covariates, Estrella R2 or McFadden loglikelihood ratio index).

We begin by reporting the results estimated from the simple **models on the pooled data** with or without excluding speeders and/or protesters. Then we will control for key covariates, such as, for instance considered co-benefits while choosing the risk-reducing alternative. **The country specific models** with the key risk attributes follow. The models using the pooled data again controlling for the associations with **socio-demographic or perception variables** are placed at the end of each sub-chapter.

The willingness to pay values derived within the public good context are estimated for two different populations: **the respondents who want a child** and the **general population**. While the WTPs derived within the private scenario are estimated from data provided by the respondents who want a child only. Hereinafter, we label the population of respondents who want a child as WANT, whereas GENPOPUL refers to the sample of general population.

Monetary variables such as income and bids were shown in the survey in respective national currencies. The nominal amounts are recalculated in **Euro purchasing power standard (PPS)** to ensure consistency and comparability across the countries. Specifically, purchasing power standard for individual consumption for the year 2012 by Eurostat is used that is CZK 17.0603, EUR 1.02356 for Italy, EUR 1.11216 for the Netherlands, and GBP 0.945661 per Euro. If we report the results in Euro expressed by market exchange rate, then these outcomes are based on the yearly average rates for the year 2013 as reported by Eurostat, which are 25.98 CZK and 0.84926 GBP per Euro. All models and the estimation results, if not explicitly mentioned otherwise, are reported in Euro PPS.

From the coefficients estimated from the models on conception (DCE1 and DCE2) and infertility (DC IVF), we derive *a Value of a "Statistical Pregnancy" (**VSP**)*, while from the models on birth defects (DCE2 and DCE3) and on very low birth weight, we derive *a Value of Statistical Case of a healthy child (**VSCHCh**)*, or *a Value of Statistical Case of a Very Low Birth Weight* (**VSCVLBW**), respectively.

Except regressors on changes in probabilities and cost, we use in our models several socio-demographic variables, indicators on past experience, actual planning and perception; see Table37.

We also control for the possible effect of considering other effects while deciding whether to pay for the risk improving alternative (*cobenefit*). These other effects might be considered mostly (*cbnmost*) or only some effects could be considered (*cbnsome*). After answering the question on whether the other effects were considered, we further asked a respondent choosing which specific other effects she considered, including improvement overall health or fitness, prevention from illness, possible negative effects associated with the vitamin usage, worries about forgetting to take the vitamins, and the effects related to policy (see the instrument in Appendix).

Table 34: Definition and descriptive statistics of explanatory variables

Respondents who want a child (WANT), speeders excluded, N= 2 625

	Description	mean	std	min	max
cze	1 if respondent is from the Czech Rep.	0.342	0.475	0	1
uk	1 if respondent is from the UK	0.184	0.387	0	1
Ita	1 if respondent is from Italy	0.313	0.464	0	1
nl	1 if respondent is from the Netherlands	0.161	0.368	0	1
Age	Age of respondent	31.354	7.449	18	65
Age18	=1 if respondent is 18 to 24 years old	0.167	0.373	0	1
Age25	=1 if respondent is 25 to 29 years old	0.267	0.442	0	1
Age30	=1 if respondent is 30 to 39 years old	0.442	0.497	0	1
Age40	=1 if respondent is 40 to 49 years old	0.097	0.296	0	1
Age50	=1 if respondent is 50 to 59 years old	0.023	0.150	0	1
Age60	=1 if respondent is older than 60	0.005	0.068	0	1
Femage30	=1 if female respondent or female partner is older than 29	0.482	0.500	0	1
Femage35	=1 if ... is older than 34	0.218	0.413	0	1
Male	=1 if respondent is male	0.496	0.500	0	1
Spouse	=1 if respondent has a spouse	0.919	0.273	0	1
Married	=1 if respondent is married	0.376	0.484	0	1
children	=1 if at least one child younger than 18 is living in a family	0.784	1.027	0	5
Eduprim	=1 if respondent has completed primary education	0.002	0.048	0	1
Eduseclow	=1 if ... lower secondary education	0.013	0.112	0	1
Edusecup	=1 if ... higher secondary education	0.062	0.242	0	1
edutert	=1 if ... tertiary education	0.084	0.277	0	1
City1	=1 if respondent lives in a village with less than 2 000	0.138	0.345	0	1
City2	=1 if respondent lives in a town with less than 20 000	0.272	0.445	0	1
City3	=1 if respondent lives in a city with less than 100 000	0.250	0.433	0	1
City4	=1 if respondent lives in a city with more than 100 000	0.251	0.433	0	1
hincpps	Household monthly net income, in EUR PPS	2087.152	1510.672	0	9 518
hincmiss	=1 if no information about household income was provided	0.135	0.342	0	1
When3	=1 if they like to have a child within next three years	0.743	0.437	0	1
When0	=1 when respondent wants a child now	0.117	0.322	0	1
When12	=1 when ... within 2 years	0.445	0.497	0	1
When34	=1 when ... within 4 years	0.318	0.466	0	1
Cncv0	=1 if they thinks a female partner will conceive immediately	0.091	0.288	0	1
Cncv16	=1 if ... will conceive within 1 to 6 months	0.415	0.493	0	1
Cnvc612	=1 if ... will conceive within 7 to 12 months	0.181	0.385	0	1
Cncv1318	=1 if ... will conceive within 13 to 18 months	0.033	0.178	0	1
Cncv19	=1 if ... will conceive in more than 18 months	0.050	0.217	0	1
Pregnant0	=1 if it took them immediately to conceive	0.088	0.284	0	1
Pregnant16	=1 if ... between 1 to 6 months to conceive	0.177	0.382	0	1
Pregnant612	=1 if ... between 6 to 12 months to conceive	0.055	0.228	0	1
Pregnant1318	=1 if ... between 13 to 18 months to conceive	0.011	0.103	0	1
infertility	=1 if respondent has experienced infertility	0.076	0.265	0	1
abortion	=1 if respondent has experienced abortion of own child	0.099	0.299	0	1
contracept	=1 if hormonal contraceptives has been used last 5 years	0.279	0.449	0	1
IVFsuccessprcp	respondent's own estimate about the probability of conceiving a child after one attempt of in vitro fertilisation	55.290	23.398	0	100
IVFhigher	=1 if respondent thinks that the chance of one attempt of IVF is larger than the chance stated in the contingent scenario	0.722	0.448	0	1
IVLlower	=1 if ... is lower than the chance stated in the scenario	0.156	0.363	0	0

General population (GENPOPUL), speeders excluded, N= 1 363

	Description	mean	std	min	max
cze	1 if respondent is from the Czech Rep.	0.354	0.478	0	1
uk	1 if respondent is from the UK	0.180	0.384	0	1
Ita	1 if respondent is from Italy	0.304	0.460	0	1
nl	1 if respondent is from the Netherlands	0.161	0.368	0	1
Age	Age of respondent	41.557	12.856	18	65
Age18	=1 if respondent is 18 to 24 years old	0.111	0.314	0	1
Age25	=1 if respondent is 25 to 29 years old	0.100	0.300	0	1
Age30	=1 if respondent is 30 to 39 years old	0.249	0.432	0	1
Age40	=1 if respondent is 40 to 49 years old	0.229	0.420	0	1
Age50	=1 if respondent is 50 to 59 years old	0.207	0.405	0	1
Age60	=1 if respondent is older than 60	0.105	0.307	0	1
Femage30	=1 if female respondent or female partner is older than 29	0.701	0.458	0	1
Femage35	=1 if ... is older than 34	0.591	0.492	0	1
Male	=1 if respondent is male	0.494	0.500	0	1
Spouse	=1 if respondent has a spouse	0.791	0.407	0	1
Married	=1 if respondent is married	0.478	0.500	0	1
children	=1 if at least one child younger than 18 is living in a family	0.666	1.004	0	5
Eduprim	=1 if respondent has completed primary education	0.011	0.104	0	1
Eduseclow	=1 if ... lower secondary education	0.032	0.175	0	1
Edusecup	=1 if ... higher secondary education	0.057	0.232	0	1
edutert	=1 if ... tertiary education	0.062	0.241	0	1
City1	=1 if respondent lives in a village with less than 2 000	0.147	0.354	0	1
City2	=1 if respondent lives in a town with less than 20 000	0.277	0.448	0	1
City3	=1 if respondent lives in a city with less than 100 000	0.254	0.435	0	1
City4	=1 if respondent lives in a city with more than 100 000	0.241	0.428	0	1
hincpps	Household monthly net income, in EUR PPS	1819.215	1391.232	0	9 518
hincmiss	=1 if no information about household income was provided	0.152	0.359	0	1
When3	=1 if they like to have a child within next three years	0.293	0.455	0	1
When0	=1 when respondent wants a child now	0.076	0.264	0	1
When12	=1 when ... within 2 years	0.145	0.353	0	1
When34	=1 when ... within 4 years	0.108	0.310	0	1
Cncv0	=1 if they thinks a female partner will conceive immediately	0.040	0.197	0	1
Cncv16	=1 if ... will conceive within 1 to 6 months	0.158	0.365	0	1
Cnvc612	=1 if ... will conceive within 7 to 12 months	0.065	0.247	0	1
Cncv1318	=1 if ... will conceive within 13 to 18 months	0.015	0.123	0	1
Cncv19	=1 if ... will conceive in more than 18 months	0.023	0.149	0	1
Pregnant0	=1 if it took them immediately to conceive	0.125	0.331	0	1
Pregnant16	=1 if ... between 1 to 6 months to conceive	0.207	0.405	0	1
Pregnant612	=1 if ... between 6 to 12 months to conceive	0.065	0.247	0	1
Pregnant1318	=1 if ... between 13 to 18 months to conceive	0.016	0.126	0	1
infertility	=1 if respondent has experienced infertility	0.076	0.264	0	1
abortion	=1 if respondent has experienced abortion of own child	0.123	0.328	0	1
contracept	=1 if hormonal contraceptives has been used last 5 years	0.113	0.317	0	1
IVFsuccessprcp	respondent's own estimate about the probability of conceiving a child after one attempt of in vitro fertilisation	55.423	23.194	0	100
IVFhigher	=1 if respondent thinks that the chance of one attempt of IVF is larger than the chance stated in the contingent scenario	0.291	0.455	0	1
IVLlower	=1 if ... is lower than the chance stated in the scenario	0.657	0.475	0	0

8.2 Identification of true and protest zeros

In this subchapter, we analyse why respondents were not willing to pay for products that were described before the valuation questions (for formulation see the questionnaire in the appendix). In the valuation questions, we should distinguish between choices of the status quo (SQ) because the product is too expensive for a respondent (i.e. true zero), or because a respondent is protesting against the valuation scenario (i.e. protest zero), meaning that under a different scenario, the respondent might be willing to pay a sum. The discrete choice tasks could be for some respondents too difficult to understand or answer, which might lead to inconsistent answers. However, if respondents stated such difficulties as reasons for choosing the status quo, we do not treat their answers as protests. We introduced for them the third category of "zero" answers (see Table 35 and Table 36).

To be able to identify true and protest zeros we asked respondents why they at least once chose "Current state" in case of the choice experiments (DCEs) or why they would not consider paying any of the sums of money in case of the single or double-bounded dichotomous choice questions (VLBW and IVF). The respondents were offered a choice of about 13 reasons for stated status quo followed by an open-ended question. The number of reasons was slightly different for valuation questions because not all statements were relevant for a health outcome. However, we tried to formulate the statements in a way that might be comparable. These reasons were classified as protest, true zero or zero answers and listed in the following tables (Table 35 and Table 36).

Table 35: Classification of reasons for choosing the status quo as protests or true zeros (private good)

Reason for choosing the status quo	**Coded as…**	**DCE1 (FERT-VIT)**	**DCE3 (DEFECT-VIT)**	**VLBW (VIT)**	**IVF**
I did not receive adequate information.	PROTEST	x	x	x	x
I don't trust the information I have been given.	PROTEST	x	x	x	x
These vitamins [IVF] should be covered by the National Health Service	PROTEST	x	x	x	x
The price increase of products should be covered by the state.	PROTEST				
The vitamins [IVF, chemical-free products] were too expensive.	true zero	x	x	x	x
The increase in the probability of conception […after one attempt; the decrease in the probability of birth defects] is too low.	true zero	x	x	x	x
My health expenses [expenditures on other things] are too high already.	true zero	x	x	x	x
I consider it unethical, immoral or unacceptable to pay for …	PROTEST	x	x	x	x
The choice was too difficult.	zero	x	x	x	
The alternatives were too similar.	zero	x	x		
I couldn't decide.	zero	x	x	x	x
I dislike the idea of taking supplements [of fertility treatment]	PROTEST	x	x	x	x
I am opposed to any strict regulations.	PROTEST				
I would like to conceive naturally.	PROTEST				
I am satisfied with my current state of health.	true zero	x	x	x	
There are more effective ways to attain the same goal (for example lifestyle changes).	PROTEST	x	x	x	x
I am not interested in increasing my probability of conceiving.	true zero	x			x
Child's prenatal development should not be affected by any means	PROTEST		x	x	
The effects associated with very low birth weight are not severe enough to pay to avoid them.	true zero			x	
I cannot imagine that I would be infertile.	PROTEST				x
I am worried about the adverse side effects of in vitro fertilization	PROTEST				x
I don't believe such a program would be introduced.	PROTEST				
I think the price would increase, but the desired results would not be achieved.	PROTEST				
I do not want to pay for others.	true zero				
There are already too many people in the world.	true zero				
Other.	zero	x	x	x	x

Table 36: Classification of reasons for choosing the status quo as protests or true zeros (public good)

Reason for choosing the status quo	Coded as…	DCE2 (FERT-POL)	DCE4 (DEFECT-POL)	VLBW (POL)
I did not receive adequate information.	PROTEST	x	x	x
I don't trust the information I have been given.	PROTEST	x	x	x
These vitamins [IVF] should be covered by the National Health Service	PROTEST			
The price increase of products should be covered by the state.	PROTEST	x	x	x
The vitamins [IVF, chemical-free products] were too expensive.	true zero	x	x	x
The increase in the probability of conception […after one attempt; the decrease in the probability of birth defects] is too low.	true zero	x	x	x
My health expenses [expenditures on other things] are too high already.	true zero	x	x	x
I consider it unethical, immoral or unacceptable to pay for …	PROTEST	x	x	x
The choice was too difficult.	zero	x	x	x
The alternatives were too similar.	zero	x	x	
I couldn't decide.	zero	x	x	x
I dislike the idea of taking supplements [of fertility treatment]	PROTEST			
I am opposed to any strict regulations.	PROTEST	x	x	x
I would like to conceive naturally.	PROTEST			
I am satisfied with my current state of health.	true zero			
There are more effective ways to attain the same goal (for example lifestyle changes).	PROTEST			
I am not interested in increasing my probability of conceiving.	true zero			
Child's prenatal development should not be affected by any means	PROTEST			
The effects associated with very low birth weight are not severe enough to pay to avoid them.	true zero			x
I cannot imagine that I would be infertile.	PROTEST			
I am worried about the adverse side effects of in vitro fertilization	PROTEST			
I don't believe such a program would be introduced.	PROTEST	x	x	x
I think the price would increase, but the desired results would not be achieved.	PROTEST	x	x	x
I do not want to pay for others.	true zero	x	x	x
There are already too many people in the world.	true zero	x		
Other.	zero	x	x	x

In the choice experiments, there were from 36 % to 49 % choices of current status from all responses. The highest share of choices of status quo (SQ) (almost half of responses) was in the discrete choice experiment for birth defects valued as a public good (DCE 4) in the both samples, while the lowest share of choices of status quo (36 % among people who want children) was in the discrete choice experiment for fertility valued as a public good (DCE 2). Most of these choices were protests zeros (see Table 37). The share of all protests ranged from 28 % for the DCE2 to 40 % for the

DCE4. However, this result does not reflect properly the real protests toward a scenario because many of people did not protest in all their choices related to a specific scenario (i.e. four times), but they choose the SQ less often, meaning that they were willing to pay at least a limited sum of money. This might be due to the fact that they had for example two important reasons; one of them was that it was too expensive and the second that they disliked something about the scenario. Therefore we consider a more accurate definition of protests as those who have protested in all four choice sets given a choice experiment (see the raw *Protests (SQ=4)* in Table 37). The percentages of these protest zeros are much lower in comparison to the previous definition. The final shares of protest zeros range from 11 % to 22 % in the subsample of people planning a child and from 6 % to 19 % in the representative samples of general populations.

Table 37: Number of respondents who answered the DCE questions, number and share of the responses to the DCEs and share of protest zeros in the both samples

	People who want children				**General population**			
	DCE1 (FERT-VIT)	**DCE2 (FERT-POL)**	**DCE3 (DEFECT-VIT)**	**DCE4 (DEFECT-POL)**	**DCE1 (FERT-VIT)**	**DCE2 (FERT-POL)**	**DCE3 (DEFECT-VIT)**	**DCE4 (DEFEC T-POL)**
No. respondents								
N	2 276	2 132	2 286	1 115	534	1 417	537	1 163
No. responses								
1	2 298	2 721	2 400	1 110	566	1 654	600	1 111
2	2 799	2 766	2 698	1 192	704	1 682	650	1 254
SQ	4 005	3 041	4 046	2 156	866	2 333	898	2 288
all	**9 102**	**8 528**	**9 144**	**4 458**	**2 136**	**5 669**	**2 148**	**4 653**
Share of responses								
1	25 %	32 %	26 %	25 %	26 %	29 %	28 %	24 %
2	31 %	32 %	30 %	27 %	33 %	30 %	30 %	27 %
SQ	**44 %**	**36 %**	**44 %**	**48 %**	**41 %**	**41 %**	**42 %**	**49 %**
Share of protests								
Protests (SQ>0)	36 %	28 %	38 %	34 %	33 %	36 %	38 %	40 %
Protests (SQ=4)	18 %	14 %	22 %	11 %	6 %	18 %	8 %	19 %

The relative shares of protest zeros according to country can be found in Table 38. In the Netherlands, people tend to protest more often against the policies and less often against the vitamins than in other countries. On the other hand, the highest shares of protest zeros against the private scenario are in the UK (27 % in the sample of people who would like to have a child and 11 % in the general sample).

Table 38: Relative shares of protest zeros for the DCEs according to countries in the samples

		People who want children				General population			
Protests (number of choices of the SQ)	**DCE**	**CZ**	**UK**	**IT**	**NL**	**CZ**	**UK**	**IT**	**NL**
Protests (SQ>0)	**DCE1 (FERT-VIT)**	39 %	33 %	35 %	34 %	34 %	35 %	36 %	19 %
	DCE2 (FERT-POL)	28 %	27 %	28 %	32 %	31 %	38 %	35 %	39 %
	DCE3 (DEFECT-VIT)	36 %	42 %	36 %	41 %	38 %	42 %	37 %	35 %
	DCE4 (DEFECT-POL)	35 %	36 %	32 %	37 %	33 %	43 %	38 %	45 %
Protests (SQ=4)	**DCE1 (FERT-VIT)**	20 %	19 %	14 %	19 %	6 %	8 %	7 %	3 %
	DCE2 (FERT-POL)	14 %	16 %	12 %	17 %	15 %	22 %	16 %	22 %
	DCE3 (DEFECT-VIT)	22 %	27 %	19 %	24 %	8 %	11 %	9 %	5 %
	DCE4 (DEFECT-POL)	12 %	11 %	10 %	12 %	13 %	23 %	16 %	26 %

8.3 Estimation results: Fertility

8.3.1 Fertility: Private good scenario

Preferences for the probability to conceive and time to conceive are elicited through the discrete choice experiments. Each respondent was asked to choose four times the best alternative out of three presented, when one was the status quo. The contingent good is a novel complex of vitamins and minerals which, if taken, will increase the probability to conceive from certain period during when a couple is attempting or will attempt to conceive. Only respondents who want a child (WANT) were asked to participate in this valuation exercise. Since cost is recoded as the monthly payment in EUR PPS, VSP is computed as the ratio of the coefficient for risk improvement, PROB, and negative COST multiplied by 12 (12 monthly payments over a year) and 100 (the probability expressed in percent).

Results from the logit model are displayed in the tables below. The results from pooled data show that respondents are willing to pay more for an increase in probability to conceive, PROB. The coefficient is positive and significant at the conventional levels as expected. The coefficient on cost is negative and statistically significant. If protesters are not excluded a statistical pregnancy is EUR 9 786, after excluding protesters, VSP increases at EUR 44 252, if only those protesters who choose always the status quo are excluded VSP is EUR 34 911. The value of VSP used further in benefit transfer is based on data that excludes speeders and protesters always choosing the status quo, which is EUR 33 019. Respondents who intend to have a baby within three years (78 % of the sample) are willing to pay for increasing the chance of conception. Resulting value of VSP is EUR 37 232.

Table 39: Estimation results DCE1 (FERT-VIT) – WTP for increasing probability to conceive and value of a statistical pregnancy

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
PROB	0.0483	<.0001	0.1564	<.0001	0.1635	<.0001	0.178	<.0001
cost	-0.005923	<.0001	-0.005376	<.0001	-0.005942	<.0001	-0.005737	<.0001
VSP	€ 9 786		€ 34 911		€ 33 019		€ 37 232	
Data excluded	speeders		protest(SQ=4)		protest(SQ=4) speeders		whenchild3	
N obs.	10 026		9 398		8 378		6 510	78%
N ID	2 507		2 350		2 095		1 628	
LL ratio	1 367.8		1 003.9		980		694.46	
Estrella	0.1333		0.1013		0.1165		0.1145	
McFadden LRI	0.063		0.0474		0.0548		0.0538	

There are about 55 % of respondents, after excluding speeders and protesters with SQ=4, who were considering other effects, positive or negative, aside from the increase in the probability of conception, while thinking about the payment. Stated willingness to pay might therefore reflect these other benefits. The next models thus derive the net effect of increasing the probability to conceive. The net effect of PROB provides more conservative estimate of value of a statistical pregnancy. After controlling for the other effects, VSP is about EUR 20 600.

The coefficient of the interaction between considering other effects and the probability (*cobenefit*) is indeed positive and significant. The value of a statistical pregnancy of those who considered other effects is EUR 20 891 larger than the VSP of those who did not consider the other effects (that is EUR

20 569). Out of those 55 %, about 18.5 % considered mostly other effects and 37 % considered some effects. Those who considered mostly effects are willing to pay for the vitamins more than those who considered only some effects. Improving overall health or fitness or prevention from illness has a positive and significant effect on willingness to pay, while the effect of other benefits is not significant.

Table 40: Estimation results DCE1 (FERT-VIT) – WTP with controlling for other benefits

	Estimate	**p value**	**Estimate**	**p value**	**Estimate**	**p value**
PROB	0.1024	<.0001	0.1024	<.0001	0.1157	<.0001
p_cobenefit	0.104	<.0001				
p_cbnmost			0.1275	<.0001		
p_cbnsome			0.0929	<.0001		
p_health					0.0546	<.0001
p_fitness					0.1295	<.0001
p_illness					0.0576	0.0291
cost	-0.005974	<.0001	-0.005976	<.0001	-0.006014	<.0001
VSP (prob)	€ 20 569		€ 20 562		€ 23 086	
+VSP	€ 20 891	*p_cobenefit*	€ 25 602	*p_cbnmost*	€ 10 895	*p_health*
+VSP			€ 18 655	*p_cbnsome*	€ 25 840	*p_fitness*
+VSP					€ 11 493	*p_illness*
N obs.	8 378		8 482		8 482	
N ID	1 849		2 121		2 121	

The next models examine whether the willingness to pay for increasing probability to conceive depends on time from when the probability will begin to be increased due to taking novel vitamins. In our scenario we use three periods of time; after 6, 12, and 18 month of trying to conceive. PROB is the marginal utility from increasing the probability and this utility coincides in this model also with the utility of increasing the probability to conceive after 6 months. Regressors PM12 and PM18 denote the increases in probability to conceive after 12 months, or 18 months, respectively, of trying to conceive. Our indirect utility has an additional form, implying that VSP after 18 months can be derived as a sum of the two coefficients for *PROB and* PM*18*.

In contrast to our prior expectations, the utility is increasing with time after when the probability will be increased. However, we informed our respondents that one is infertile only after 12 months or more of having regular unprotected intercourse, what might motivate them to prefer the improvements later. For those who want to have a child within the next three years, the willingness to pay for the probability increase is significantly larger, and, second, the preference for probability increasing after 6 months is stronger than preference to do so of those who want to have a child later. Due to the additive form of the indirect utility, VSP after 12 months for the respondents who want to have a baby within the next three years is derived as a sum of three coefficients *PROB*, PM*12* and *pm12_when3*.

Table 41: Estimation results DCE1 (FERT-VIT) – WTP for time to pregnancy and income

	Estimate	t value	Contribution to VSP	Estimate	t value	Contribution to VSP	Estimate	t value	Contribution to VSP
PROB	0.1393	12.25	€ 29 076	0.0698	3.51	€ 14 567	0.0899	4.89	€ 19 168
PM12	0.0361	3.27	+€ 7 535	0.0427	1.8	+€ 8 911	0.0299	2.88	+€ 6 375
PM18	0.0481	4.09	+€ 10 040	0.0541	2.31	+€ 11 290	0.0523	4.71	+€ 11 151
pm6_when3				0.0923	4.3	+€ 19 263			
pm12_when3				0.0835	3.75	+€ 17 426			
pm18_when3				0.0846	4.09	+€ 17 656			
p_hincpps							0.0000311	6.58	+€ 6.6
p_hincmiss							-0.0317	-1.53	NA
cost1	-0.005749	-25.03		-0.0058	-24.97		-0.005628	-25.89	
N obs.	7 394			7 394			7 394		
N ID	1 849			1 849			1 849		

The next two tables 42 and 43 display the results for several models where we include dummies on socio-demographic variables and dummy indicators on actual planning, perception about time to conceive, past experience about conception and infertility, all interacted with the changes in probability to conceive after 6, 12, and 18 months (Table 42) or with the changes in the probability without specifying time after which the probability will be changed (Table 43).

The results show the sooner a respondent would like to have a child, the greater willingness to pay is stated for the increase in probability to conceive, especially for the increases that begin sooner, after 6 months. Respondents who think it will take a shorter time to conceive, up to 12 months, are also willing to pay more. Past experience about conception did not have a significant effect on paying for the next conception, except the experience of conceiving immediately which has a negative effect on the payment.

Males are willing to pay more. Female respondents or female spouses older than 29 years are also associated with larger willingness to pay, but not as much as males would pay. However, the willingness to pay of female respondents or respondents having a female spouse older than 34 years is about same as the willingness to pay of males. Other socio-demographics, such as being married, having a spouse or children, city size, do not contribute significantly to the willingness to pay.

Table 42: Estimation results DCE1 (FERT-VIT) – models with other covariates (1)

	Estimate	t value	Contribution to VSP	Estimate	t value	Contribution to VSP
p_cz				0.0568	2.8	€ 11 639
p_uk				0.0541	2.49	€ 11 086
p_it				0.1394	6.82	€ 28 566
pm6	0.0704	2.64	€ 14 654	-0.0848	-1.67	- € 17 377
pm12	0.1386	5.19	€ 28 850	0.002925	0.06	€ 599
pm18	0.1361	5.43	€ 28 330	0.0173	0.35	€ 3 545
p_cobenefit				0.0739	5.47	€ 15 143
p_spouse				-0.0277	-1.04	- € 5 676
p_male				0.0445	3.24	€ 9 119
p_age				0.000596	0.57	€ 122
p_infertile				0.0401	1.67	€ 8 217
pm6_when0	0.1352	3.76	€ 28 142	0.0751	1.97	€ 15 389
pm6_when12	0.0934	3.20	€ 19 441	0.0295	0.94	€ 6 045
pm6_when34	0.0349	1.13	€ 7 265	0.009764	0.31	€ 2 001
pm12_when0	0.1132	3.13	€ 23 563	0.0526	1.38	€ 10 779
pm12_when12	0.0660	2.23	€ 13 738	0.008488	0.27	€ 1 739
pm12_when34	-0.0295	-0.93	- € 6 141	-0.0444	-1.36	- € 9 098
pm18_when0	0.0744	2.12	€ 15 487	0.0146	0.39	€ 2 992
pm18_when12	0.0906	3.22	€ 18 859	0.0336	1.11	€ 6 885
pm18_when34	0.0047	0.16	€ 975	-0.0171	-0.55	- € 3 504
pm6_cncv0				0.0235	0.6	€ 4 816
pm6_cncv16				0.0818	3.24	€ 16 762
pm6_cncv612				0.1317	4.44	€ 26 988
pm6_cncv1318				0.005293	0.1	€ 1 085
pm6_cncv19				0.1125	2.5	€ 23 053
pm12_cncv0				-0.0128	-0.32	- € 2 623
pm12_cncv16				0.0677	2.65	€ 13 873
pm12_cncv612				0.0795	2.6	€ 16 291
pm12_cncv1318				-0.0012	-0.02	- € 245
pm12_cncv19				0.0242	0.51	€ 4 959
pm18_cncv0				-0.0348	-0.92	- € 7 131
pm18_cncv16				0.0237	0.98	€ 4 857
pm18_cncv612				0.0786	2.72	€ 16 107
pm18_cncv1318				0.0458	0.93	€ 9 385
pm18_cncv19				0.0534	1.22	€ 10 943
p_pregnant0				-0.0945	-3.7	- € 19 365
p_pregnant16				-0.0152	-0.82	- € 3 115
p_pregnant612				0.0337	1.16	- € 6 906
p_pregnant1318				-0.00641	-0.1	- € 1 313
p_hincpps				3.12E-05	5.75	€ 6
p_hincmiss				-0.0661	-2.84	- € 13 545
cost1	-0.0058	-24.99		-0.00586	-25.09	

Table 43: Estimation results DCE1 (FERT-VIT) – models with other covariates (2)

	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value
ASC(vitamin)	0.2558	<.0001	0.2778	<.0001	0.2793	<.0001		
prob							0.0236	0.6034
pm12							0.0365	0.001
pm18							0.0472	<.0001
p_cobenefit	0.0836	<.0001	0.0849	<.0001	0.0856	<.0001	0.0800	<.0001
p_spouse	-0.0257	0.2768	-0.0184	0.4122	-0.0169	0.4496	-0.0254	0.3331
p_married	0.007508	0.633						
p_children	-0.00735	0.4222	-0.00751	0.3952	-0.0101	0.2557		
p_male	0.0498	0.0003	0.0572	<.0001	0.0539	<.0001	0.0521	0.0001
p_age	0.001145	0.1836					-0.000488	0.6973
p_femage30			0.0275	0.0636				
p_femage35					0.0545	0.0021	0.0557	0.0079
p_city1			0.001019	0.9612	0.00304	0.8847		
p_city3			0.009876	0.5638	0.009315	0.5861		
p_city4			-0.0327	0.0525	-0.0315	0.0612		
p_infertile	0.0322	0.1824	0.0325	0.1794	0.0359	0.1377	0.0365	0.1246
p_whenchild0	0.0693	0.0138	0.0736	0.0065	0.0708	0.0083	0.0695	0.0114
p_whenchild1	0.0616	0.0051	0.067	0.0014	0.0694	0.0008	0.0537	0.0146
p_whenchild2	-0.00575	0.7922	0.002402	0.9096	0.005756	0.7858	-0.001364	0.9507
p_pregnant0	-0.1203	<.0001	-0.1203	<.0001	-0.1212	<.0001	-0.1149	<.0001
p_pregnant16	-0.00517	0.8003	-0.00817	0.6891	-0.00586	0.7735	-0.0203	0.2652
p_conceive0							-0.00437	0.8695
p_conceive16							0.0522	0.0014
p_conceive612							0.0901	<.0001
p_conceive1318							0.005353	0.882
p_hincpps	2.88E-05	<.0001	2.96E-05	<.0001	0.000029	<.0001	0.0000257	<.0001
p_hincmiss	-0.0584	0.008	-0.05	0.0203	-0.048	0.026	-0.0502	0.0281
cost1	-0.00621	<.0001	-0.00619	<.0001	-0.0062	<.0001	-0.00583	<.0001

The results for the country models are reported in Table 44. The value of a statistical pregnancy is the lowest in the Netherlands (EUR 13 238) and the largest in Italy (EUR 45 427), with almost EUR 30 400 in the Czech Republic and EUR 33 634 in the United Kingdom. The results for the country models that control for the other effects considered and that include three risk variables defined by time after when the probability will be increased are displayed in Table 45 and 46.

Table 44: Estimation results DCE1 (FERT-VIT) – country models

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
prob	0.1523	<.0001	0.1719	<.0001	0.221	<.0001	0.0664	0.0003
cost	-0.006022	<.0001	-0.006133	<.0001	-0.005838	<.0001	-0.006019	<.0001
VSP (€ PPS)	€ 30 349		€ 33 634		€ 45 427		€ 13 238	
VSP (€*)	€ 19 929		€ 34 427		€ 50 522		€ 14 741	
N obs.	2 608		1 555		2 839		1 376	
N ID	652		389		710		344	

*Note: * VSP expressed in EUR by market exchange rate.*

Table 45: Estimation results DCE1 (FERT-VIT) – country models with co-benefits

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
prob	0.0853	<.0001	0.1295	<.0001	0.1841	<.0001	0.0658	0.0075
p_cobenefit	0.0946	<.0001	0.0804	0.0065	0.1084	<.0001	0.0756	0.0146
cost	-0.006113	<.0001	-0.006155	<.0001	-0.005844	<.0001	-0.006262	<.0001
VSP	€ 16 745		€ 25 248		€ 37 803		€ 12 609	
Co-benefits	€ 18 570		€ 15 675		€ 22 259		€ 14 487	
LL ratio	382.33		189.89		343.43		117.94	
Estrella	0.1489		0.1276		0.1448		0.0938	

Table 46: Estimation results DCE1 (FERT-VIT) – country models including time to conceive

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
pm6	0.1216	<.0001	0.1342	<.0001	0.187	<.0001	0.0194	0.4742
pm12	0.1524	<.0001	0.1646	<.0001	0.2198	<.0001	0.0429	0.0937
pm18	0.1648	<.0001	0.1891	<.0001	0.2338	<.0001	0.096	<.0001
cost	-0.005804	<.0001	-0.005792	<.0001	-0.005543	<.0001	-0.005385	<.0001
VSP(6M)	€ 24 141		€ 27 804		€ 40 483		NA	
VSP(12M)	€ 31 509		€ 34 102		€ 47 584		€ 9 560	
VSP(18M)	€ 34 073		€ 39 178		€ 50 615		€ 21 393	

8.3.2 Fertility: Public good scenario

Preferences for increasing the probability of conception in the general population are elicited through the discrete choice experiments. Each respondent was asked, four times, to choose the best alternative out of three presented, when one was the status quo. The probability of conception for all people in the EU would be increased thanks to chemical-free products supported by a new stricter policy.

We report the results separately for both groups of our respondents, the group of respondents who want a child (WANT) and then the respondents that are part of the general population sample (GENPOPUL). Since cost is recoded as a monthly payment in EUR PPS, VSP is computed as the ratio of coefficient for the risk improvement, PROB, and negative COST multiplied by 120 (12 monthly payments over 10 years) and 1 000, i.e. the denominator of the risk rates.

Similarly, as the results for the fertility risks described in the private good context, the results for the public good scenario show that respondents are willing to pay more for an increase in probability to conceive. PROB and COST coefficients are positive, and negative, respectively with or without excluding the speeders and/or the protesters at the conventional levels.

After excluding protesters in the sample of respondents who want a baby, we get a value of a statistical public pregnancy as high as EUR 48 204. If only protesters who choose always the status quo are excluded, public VSP is EUR 40 224. Then, after excluding both speeders and protest with SQ=4, we get VSP of EUR 38 783 that also enters into the benefit transfer exercise.

Public VSP estimated from the sample of general population is EUR 44 175 if protesters are excluded, EUR 33 742 if protesters with four status quo chosen were dropped out only, and EUR 33 018 if both speeders and protesters (SQ=4) are excluded that is the value that enters into the benefit transfer.

The coefficient of the interaction between considering other effects and the probability to conceive within population is again positive and significant. The effect of considering mostly effects or some effects on the probability of choosing the public risk reduction is the same. Considering improvement in the environmental state and improvement in people's health both increases largely the probability to choose the policy supporting chemical-free products in the both samples. Worries about adverse impacts on employment reduce the probability for voting for the policy and hence lower the willingness to pay for increasing probability to conceive in the EU.

In the WANT sample, the net value of a statistical pregnancy in the EU is lowered to EUR 19 843, and the addition of those who considered other effects to VSP is EUR 38 529. The other effects are more pronounced in general population (GENPOPUL); considering other effects is lowering VSP more with resulting addition of considered other benefits to VSP of more than EUR 41 000.

Table 47: Estimation results DCE2 (FERT-POL) – WTP for increasing probability of conception and value of a statistical pregnancy as the public good

Sample of respondents who want a child

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
PROB	0.0632	<.0001	0.2125	<.0001	0.1733	<.0001	0.1784	<.0001
Cost	-0.0502	<.0001	-0.0529	<.0001	-0.0517	<.0001	-0.0552	<.0001
VSP	€ 15 108		€ 48 204		€ 40 224		€ 38 783	
Data excluded	speeders		protesters		protest(SQ=4)		protest(SQ=4). speeders	
N obs.	9 296		7 868		9 040		8 048	
N ID	2 324		1 967		2 260		2 012	

General population

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
prob	0.00485	0.6105	0.1686	<.0001	0.1285	<.0001	0.1351	<.0001
cost	-0.0436	<.0001	-0.0458	<.0001	-0.0457	<.0001	-0.0491	<.0001
VSP	NA		€ 44 175		€ 33 742		€ 33 018	
Data excluded	Speeders		protesters		protest(SQ=4)		protest(SQ=4). speeders	
N obs.	5 219		4 420		4 831		4 371	
N ID	1 304.75		1 005		1 207.75		1 092.75	
LL ratio	327.87		287.98		266.88		273	
Estrella	0.0617		0.0702		0.0544		0.0614	
McFadden's LRI	0.0286		0.0326		0.0251		0.0284	

The next two tables display the results for several models where we control for the effect of socio-demographic variables on the probability of choosing a policy to support chemical-free products in order to increase the probability of conception in the EU. Table 49 displays the results for the sample of respondents who want a child (WANT), while Table 50 displays the results for the general population (GENPOPUL).

For the WANT sample, having a spouse or children, being male and being younger than 40 all decrease the probability for paying for the chemical-free products and thus for increasing the probability of conception for all people in the EU. Household income increases the probability of paying for the policy, while not providing information about income does not have a significant effect.

In the general population (GENPOPUL sample), while males are less likely to pay for the chemical-free products, primary school educated respondents (*p_eduprim*) are more likely to pay than respondents with lower secondary education. Further, respondents who live in villages with less than 2 000 inhabitants (*city1*) are willing to pay less compared to those living in cities with more than 100 000 inhabitants. Again, household income has a positive effect and not providing income does not influence willingness to pay for the policy.

The results for the country models are reported in Table 51. For the respondents who want a baby, the value of a statistical pregnancy for the public good context is the largest in the Czech Republic (EUR 50 339), followed by Italy with EUR 48 567 and EUR 25 784 in the United Kingdom. The lowest value of a statistical pregnancy is in the Netherlands (EUR 17 370).

For the samples of general populations, the value of a statistical pregnancy for the public good context is lower and in the United Kingdom (EUR 12 050) and are larger in Italy (EUR 46 427) and in the Czech Republic (EUR 59 570). The coefficient of probability of conceiving is not significant for the Netherlands; thus we do not report the value of a statistical pregnancy. This order is the same if we control for the other effects considered, which are summarised in Table 52.

Table 48: Estimation results DCE2 (FERT-POL) – models controlling for other effects of chemical-free policy

	Sample of respondents who want a child				**General population**			
	Estimate	**t value**	**Estimate**	**t value**	**Estimate**	**t value**	**Estimate**	**t value**
prob	0.0926	<.0001	0.0926	<.0001	0.0453	0.0135	0.0453	0.0135
p_cobenefit	0.1798	<.0001			0.1726	0.0171		
p_cbnmost			0.1757	<.0001			0.1487	0.0242
p_cbnsome			0.1826	<.0001			0.1838	0.0189
cost	-0.056	<.0001	-0.056	<.0001	-0.0499	0.003321	-0.0499	0.003321
VSP (prob)	€ 19 843		€ 19 843		€ 10 894		€ 10 894	
+VSP	€ 38 529	*cobenefit*	€ 37 650	*cbnmost*	€ 44 507	*cobenefit*	€ 35 760	*cbnmost*
+VSP			€ 39 129	*cbnsome*			€ 44 200	*cbnsome*
N obs.	8 048		8 048		4 371		4 371	
N ID	2 012		2 012		1 093		1 093	

	WANT		**GENPOPUL**	
	Estimate	**t value**	**Estimate**	**t value**
prob	0.1141	<.0001	0.0488	0.0127
p_bnf_env	0.0958	<.0001	0.1186	0.0236
p_bnf_phealth	0.1089	<.0001	0.1295	0.0218
p_bnf_species	0.008071	0.6689	0.0416	0.027
p_bnf_economy	0.0829	<.0001	0.0558	0.0236
p_bnf_unempl	-0.006269	0.7949	-0.0115	0.0317
p_bnf_income	-0.0338	0.4405	0.1838	0.0952
cost	-0.0561	<.0001	-0.0505	0.003332
N obs.	8048		4 371	
N ID	2012		1 093	
LL ratio			432.01	
Estrella			0.0962	

Table 49: Estimation results DCE2 (FERT-POL) WANT – models controlling for socio-demographic effects on the chemical-free products

Sample of respondents who want a child

	Estimate	t value	p value	∆VSP	Estimate	t value	p value	∆VSP	Estimate	t value	p value	∆VSP
chempol	0.6678	12.1	<.0001	€ 1 529								
prob					-0.0371	-0.5	0.6152	- € 7 743				
p_cz	0.1108	2.85	0.0044	€ 25 374	0.2981	4.45	<.0001	€ 62 212	0.261	7.39	<.0001	€ 54 470
p_uk	-0.006544	-0.16	0.8707	- € 1 499	0.1909	2.82	0.0048	€ 39 840	0.1537	4.23	<.0001	€ 32 077
p_it	0.091	2.19	0.0285	€ 20 840	0.2784	4.14	<.0001	€ 58 101	0.2413	6.35	<.0001	€ 50 358
p_nl	-0.2103	-2.68	0.0073	- € 48 160					-0.0371	-0.5	0.6152	- € 7 743
p_cobenefit	-0.198	-4.14	<.0001	- € 45 344	-0.1805	-3.95	<.0001	- € 37 670	-0.1805	-3.95	<.0001	- € 37 670
p_spouse	-0.0473	-1.65	0.0995	- € 10 832	-0.043	-1.57	0.1167	- € 8 974	-0.043	-1.57	0.1167	- € 8 974
p_children	-0.0593	-7.15	<.0001	- € 13 580	-0.0536	-6.78	<.0001	- € 11 186	-0.0536	-6.78	<.0001	- € 11 186
p_male	-0.032	-2.13	0.033	- € 7 328	-0.0293	-2.04	0.0416	- € 6 115	-0.0293	-2.04	0.0416	- € 6 115
p_eduprim	0.2612	1.34	0.1806	€ 59 817	0.2581	1.37	0.1717	€ 53 864	0.2581	1.37	0.1717	€ 53 864
p_edusecup	0.1361	1.83	0.0665	€ 31 168	0.1244	1.75	0.0802	€ 25 962	0.1244	1.75	0.0802	€ 25 962
p_edutert	0.2301	3.13	0.0017	€ 52 695	0.2125	3.02	0.0025	€ 44 348	0.2125	3.02	0.0025	€ 44 348
p_age25	0.00487	0.21	0.8311	€ 1 115	0.004344	0.2	0.8423	€ 907	0.004344	0.2	0.8423	€ 907
p_age30	0.0135	0.61	0.5403	€ 3 092	0.0111	0.53	0.5975	€ 2 317	0.0111	0.53	0.5975	€ 2 317
p_age40	0.0823	2.46	0.0138	€ 18 847	0.0742	2.32	0.0201	€ 15 485	0.0742	2.32	0.0201	€ 15 485
p_age50	0.229	4.2	<.0001	€ 52 443	0.2059	3.94	<.0001	€ 42 970	0.2059	3.94	<.0001	€ 42 970
p_age60	0.1726	1.65	0.0987	€ 39 527	0.1558	1.55	0.1209	€ 32 515	0.1558	1.55	0.1209	€ 32 515
p_city1	-0.0293	-1.27	0.2042	- € 6 710	-0.0268	-1.22	0.2243	- € 5 593	-0.0268	-1.22	0.2243	- € 5 593
p_city2	0.0129	0.69	0.4927	€ 2 954	0.0121	0.67	0.5031	€ 2 525	0.0121	0.67	0.5031	€ 2 525
p_city3	0.0288	1.48	0.1382	€ 6 595	0.0262	1.41	0.1589	€ 5 468	0.0262	1.41	0.1589	€ 5 468
p_hincpps	3.59E-05	5.69	<.0001	€ 8.2	0.000033	5.47	<.0001	€ 6.9	0.000033	5.47	<.0001	€ 7
p_hincmiss	-0.0123	-0.47	0.6364	- € 2 817	-0.0114	-0.46	0.6452	- € 2 379	-0.0114	-0.46	0.6452	- € 2 379
cost1	-0.0524	-20.06	<.0001		-0.0575	-22.14	<.0001		-0.0575	-22.14	<.0001	
N obs.	7 164				7 164				7 164			
N ID	1 791				1 791				1 791			
LL ratio	1051.4				906.47				906.47			
Estrella	0.1409				0.1222				0.1222			

Table 50: Estimation results DCE2 (FERT-POL) GENPOPUL – models controlling for socio-demographic effects on the chemical-free products

General population

	Estimate	t value	p value	∆VSP	Estimate	t value	p value	∆VSP	Estimate	t value	p value	∆VSP
chempol	0.4676	6.54	<.0001	€ 1 164								
prob					-0.0538	-0.92	0.3596	- € 12 487				
p_cz	0.072	1.61	0.1064	€ 17 925	0.2363	4.81	<.0001	€ 54 847	0.1826	4.56	<.0001	€ 42 383
p_uk	-0.133	-2.86	0.0042	- € 33 112	0.0432	0.85	0.3955	€ 10 027	- 0.0106	-0.26	0.7978	- € 2 460
p_it	0.0135	0.3	0.7662	€ 3 361	0.1799	3.66	0.0003	€ 41 756	0.1262	3.08	0.0021	€ 29 292
p_nl	-0.1765	-2.78	0.0054	- € 43 942					-0.0538	-0.92	0.3596	- € 12 487
p_cobenefit	0.1641	8.85	<.0001	€ 40 855	0.1547	8.64	<.0001	€ 35 907	0.1547	8.64	<.0001	€ 35 907
p_spouse	0.008197	0.34	0.7309	€ 2 041	0.008355	0.36	0.7177	€ 1 939	0.008355	0.36	0.7177	€ 1 939
p_children	-0.003963	-0.39	0.6965	- € 987	-0.003622	-0.37	0.7132	- € 841	-0.003622	-0.37	0.7132	- € 841
p_male	-0.0487	-2.67	0.0077	- € 12 124	-0.0457	-2.58	0.0099	- € 10 607	-0.0457	-2.58	0.0099	- €10 607
p_eduprim	0.3072	2.64	0.0084	€ 76 481	0.2965	2.61	0.009	€ 68 820	0.2965	2.61	0.009	€ 68 820
p_edusecup	-0.0361	-0.59	0.5575	- € 8 988	-0.0333	-0,56	0.5761	- € 7 729	- 0.0333	-0.56	0.5761	- € 7 729
p_edutert	-0.0454	-0.76	0.4474	- € 11 303	-0.0428	-0.74	0.4586	- € 9 934	- 0.0428	-0.74	0.4586	- € 9 934
p_age25	0.001937	0.05	0.9618	€ 482	0.001882	0.05	0.9618	€ 437	0.001882	0.05	0.9618	€ 437
p_age30	-0.0221	-0.64	0.5195	- € 5 502	-0.0221	-0.66	0.5064	- € 5 130	- 0.0221	-0.66	0.5064	- € 5 130
p_age40	-0.0377	-1.09	0.2747	- €9 386	-0.037	-1.11	0.2689	- € 8 588	- 0.037	-1.11	0.2689	- € 8 588
p_age50	-0.0437	-1.27	0.2058	- € 10 880	-0.0427	-1.27	0.2026	- € 9 911	- 0.0427	-1.27	0.2026	- € 9 911
p_age60	0.05	1.26	0.2088	€ 12 448	0.0447	1.16	0.2467	€ 10 375	0.0447	1.16	0.2467	€ 10 375
p_city1	-0.0637	-2.17	0.0303	- € 15 859	-0.06	-2.11	0.0352	- € 13 926	-0.06	-2.11	0.0352	- € 13 926
p_city2	-0.008889	-0.37	0.7089	- € 2 213	-0.009178	-0.4	0.691	- € 2 130	-0.009178	-0.4	0.691	- € 2 130
p_city3	-0.0223	-0.91	0.3606	- € 5 552	-0.0215	-0.91	0.3644	- € 4 990	- 0.0215	-0.91	0.3644	- € 4 990
p_hincpps	0.0000287	3.32	0.0009	€ 7.1	0.000027	3.24	0.0012	€ 6.3	0.000027	3.24	0.0012	€ 6.3
p_hincmiss	-0.0343	-1.09	0.2764	- € 8 539	-0.0329	-1.08	0.2816	- € 7 636	-0.0329	-1.08	0.2816	- € 7 636
cost1	-0.0482	-14.27	<.0001		-0.0517	-15.42	<.0001		-0.0517	-15.42	<.0001	
N obs.	4 339				4 339				4 339			
N ID	1 085				1 085				1 085			
LL ratio	566.3				523.98				523.98			
Estrella	0.1259				0.1168				0.1168			

Table 51: Estimation results DCE2 (FERT-POL) – country models

Sample of respondents who want a child

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
prob	0.2131	<.0001	0.1431	<.0001	0.2056	<.0001	0.1103	<.0001
cost	-0.0508	<.0001	-0.0666	<.0001	-0.0508	<.0001	-0.0762	<.0001
VSP (€ PPS)	€ 50 339		€ 25 784		€ 48 567		€ 17 370	
VSP (€. exch.rate)	€ 33 056		€ 26 391		€ 54 014		€ 19 342	
N obs.	2 799		1 500		2 538		1 211	
N ID	700		375		635		303	

General population

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
prob	0.2245	<.0001	0.0721	0.0036	0.1594	<.0001	0.017	0.5319
cost	-0.0453	<.0001	-0.0718	<.0001	-0.0412	<.0001	-0.0857	<.0001
VSP (€ PPS)	€ 59 570		€ 12 050		€ 46 427		NA	
VSP (€. exch.rate)	€ 39 052		€ 12 334		€ 51 634		NA	
N obs.	1 602		792		1 298		679	
N ID	401		198		325		170	
LL ratio	180.82		86.911		76.235		89.899	
Estrella	0.1094		0.1065		0.0578		0.1276	

Table 52: Estimation results DCE2 (FERT-POL) – country models with co-benefits

Sample of respondents who want a child

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
prob	0.165	<.0001	0.081	0.0016	0.1585	<.0001	0.0448	0.078
p_cobenefit	0.0836	0.0166	0.0893	0.0268	0.064	0.0546	0.0607	0.0736
cost	-0.0435	<.0001	-0.0648	<.0001	-0.0395	<.0001	-0.0677	<.0001
VSP	€ 45 517		€ 15 000		€ 48 152		€ 7 941	
Co-benefits	+ € 23 062		+ € 16 537		+ € 19 443		+ € 10 759	
N obs.	1 091		912		1 654		1 080	
N ID	272.75		228		414		270	
LL ratio	109.59		86.614		111.66		81.373	
Estrella	0.0977		0.863		0.0663		0.0738	

General population

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
prob	0.1192	<.0001	0.0513	<.0001	0.0517	<.0001	-0.0165	0.6092
p_cobenefit	0.1695	<.0001	0.0433	0.0007	0.2176	<.0001	0.0846	<.0526
cost	-0.0459	<.0001	-0.0719	<.0001	-0.042	<.0001	-0.0857	<.0001
VSP	€ 31 163		€ 8 562		€ 14 771		NA	
Co-benefits	€ 44 314		NA		€ 62 171		NA	
N obs.	1 602		792		1 298		679	
N ID	400.5		198		325		170	
LL ratio	212.94		88.12		123.58		93.662	
Estrella	0.1281		0.1079		0.0927		0.1328	

8.4 Infertility: WTP for in vitro fertilisation

Preference for reducing infertility is elicited from the respondents who want a child (WANT) through a single-bounded discrete choice question (formerly Contingent Valuation Method). Willingness to pay for an in vitro fertilisation treatment is elicited.

There are about 30 % of protesters, ranging between 21 % in the United Kingdom to 34 % in the Netherlands.

Responses to the discrete choice question on the IVF treatment, after excluding speeders and protesters, are displayed in Table 53. We highlight that we do not use full factorial design to define our discrete choice sets, but efficient design was computed after analysis of the priors from the pilot data instead (and hence not whole universe of *bid* and *IVF chance* combinations are utilised in our choice sets). As a consequence, the external scope test on the share of positive responses is not possible to perform.

Table 53: Positive responses to the discrete choice question on IVF

bid	**€ 500**	**€ 1 000**	**€ 2 000**	**€ 3 000**	**€ 5 000**	**€ 7 500**
incl. pilot	48.2 %	77.9 %	68.7 %	60.1 %	58.4 %	57.9 %
excl. pilot	NA	82.5 %	74.7 %	66.2 %	58.4 %	57.9 %
IVF chance	**20%**	**30%**	**50%**			
incl. pilot	73.9 %	58.3 %	65.5 %			
excl. pilot	73.9 %	66.9 %	65.5 %			

Note: In the efficient design, we use following bids {€ 1 000, € 2 000, € 3 000} for 20%, {€ 1 000, € 5 000, € 7 500} for 30%, and {€ 2 000, € 1 300, € 5 000, € 7 500€} for 50%.

Still, the responses satisfy the external scope test with respect to bids if data from the pilot are excluded. As a result, the share of no responses does not monotonically increase with the bids for data that includes the pilot, and we need to pool responses for two lowest bids to estimate the mean willingness to pay by Turnbull model. The cumulative distribution function monotonically increases with respect to the bids for data excluding the pilot, however. The resulting lower bound of mean willingness to pay by Turnbull model is EUR 4 786, or EUR 4 809, respectively (Table 54). Considering the average chance of IVF success (34.1 %, or 34.8 %, resp.), it yields a value of a statistical pregnancy, as derived from WTP for IVF treatment, of about EUR 14 000.

Table 54: Estimation results DC (IVF) – lower bound of mean WTP, Turnbull model

	LB WTP	average d%	VSC
incl. pilot	€ 4 786	34.1%	€ 14 030
excl. pilot	€ 4 809	34.8%	€ 13 821

Willingness to pay for the IVF treatment estimated from the logit model, with intercept and bid in EUR PPS (*IVFbid1*), is reported in Table 55. Willingness to pay is EUR 9 890 and the corresponding value of a statistical pregnancy is about EUR 29 000.

Table 55: Estimation results DC (IVF) – WTP for IVF, logit model

	including pilot data		excluding pilot data	
	Estimate	**p-value**	**Estimate**	**p-value**
Intercept	0.989	<.0001	1.4573	<.0001
IVFbid1	-0.0001	<.0001	-0.00017	<.0001
WTP	€ 9 890		€ 8 572	
VSP	€ 28 994		€ 24 636	
N obs.	1 626		1 394	
2 Log L (wo/w covariates)	-2107.839	-2082.974	-1736.873	-1681.129
Chi2 LR	24.8656		55.7443	

The next model replaces the intercept by a continuous variable on probability of conceiving a child for one attempt of in vitro fertilisation treatment. Table 56 reports the results from this model using several datasets different by excluding criteria. After excluding speeders and protesters, our base model VSP is EUR 28 000. Excluding the observations from the pilot study, the resulting VSP is EUR 26 545. We found that the respondents who intend to have a child within the next three years are willing to pay more for the IVF treatment, and hence have a larger value of a statistical pregnancy that is EUR 36 833.

Table 56: Estimation results DC(IVF) – WTP for increasing chance to conceive by IVF

	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
PROB	0.0221	<.0001	0.0224	<.0001	0.0292	<.0001	0.0221	<.0001
cost	-0.00007	0.0007	-0.00008	0.0002	-0.00011	<.0001	-0.00006	<.0001
VSP	€ 31 571		€ 28 000		€ 26 545		€ 36 833	
Data excluded	protesters		protests, speeders		protests, speeders, pilot		[whenchild=3]: protests, speeders	
N obs.	2 078		1 830		1 586		1 368	

Last models using the pooled data control for the effect of socio-demographic variables, past experience about infertility, abortion, taking contraceptives and special effort taken to conceive in the past; see table 57.

Among socio-demographic variables, older respondents, or respondents who already have a child are willing to pay for IVF treatment less than younger people, or people without a child. Being infertile in the past increases the probability to pay for IVF treatment.

Considering the effort to conceive in the past, those who have already tried IVF treatment (*effort_ivf*) or taken vitamins (*effort_vit*) are both willing to pay more, while changing lifestyle (*effort_lifestyle*) has a negative, albeit not significant, effect. Those who would like to have a child within the next three years (when3) are not willing to pay more or less than those who likes to have a baby later or do not know when they like to conceive.

We also regress the willingness to pay for a respondent's own estimate about the probability of conceiving a child for a person like her who undergoes one attempt of in vitro fertilisation (*IVFchance*). Using a scale from 0 % to 100 %, on average, the respondents think IVF success is 56 %, ranging from 53 % in the Czech Republic to 59 % in Italy. The average perception of the IVF success in fact overstates the statistical success rate of in vitro fertilisation that ranges about 30 % to 40 %. Respondents' perception about the IVF success estimate is also on average larger than the chance we explicitly stated in our contingent scenario (from 30 % to 50 %). Additionally, we also define two dummies that equal to one if the respondent thinks that the chance of one attempt of IVF is larger (*IVFhigher*), or lower (*IVFhigher*), respectively, than the chance of one attempt of IVF as stated in our scenario.

In fact, those who think that the chance of one attempt of IVF is larger are also willing to pay more (IVFchance gets values from 0 to 100). Particularly, those who think that the chance is smaller than the chance we presented in the scenario (dummy *IVFlower*) are willing to pay much less.

Country-specific estimates of the willingness to pay for one attempt of in vitro fertilisation and for the chance to conceive after one attempt of in vitro fertilisation are reported in tables 58 and 59. Willingness to pay for one attempt of IVF is about EUR 6 900 in the Czech Republic, EUR 7 450 in the Netherlands, EUR 10 400 in the UK, and the largest WTP is stated by Italian respondents, EUR 22 500. The implicit value of a statistical pregnancy is derived for the average chance of conception, as derived for each country sample, and ranges from EUR 20 000 in the Czech Republic to EUR 31 000 in the UK.

The results for the model with bid and the chance of conception are displayed in table 59. Implicit VSP is more-less same as VSP derived for the average chances of conception in the previous models.

Table 57: Estimation results DC(IVF) – model with socio-demographic variables and indicators on experience and perception.

	Estimate	p value	Estimate	p value	Estimate	p value
Intercept	0.0313	0.9634	0.0918	0.807	0.1437	0.6821
cze	0.3146	0.5633	0.1505	0.3723	0.1417	0.4004
uk	0.4728	0.3878	0.3232	0.0765	0.3058	0.093
ita	0.7895	0.1496	0.635	0.0004	0.6748	0.0001
IVFincr	0.00693	0.1727	0.00703	0.1657	-0.00124	0.8016
IVFbid1	-0.0001	<.0001	-0.0001	<.0001	-0.0001	<.0001
male	-0.1401	0.3564				
age	-0.0131	0.1545	-0.0154	0.0788	-0.0234	0.0043
spouse	-0.1012	0.6368				
children	-0.2334	0.0006	-0.2353	0.0003	-0.2022	0.0003
eduprim	-0.053	0.9698				
edusecup	0.197	0.7333				
edutert	0.1455	0.7968				
infertile	0.9786	<.0001	0.966	<.0001	0.9799	<.0001
abortion	-0.0987	0.6011				
contracept	-0.0418	0.7986				
when3	0.2187	0.1141	0.2121	0.114	0.2024	0.1337
effort_ivf	1.1427	0.1389	1.1514	0.1354	1.3437	0.0799
effort_lifestyle	-0.2441	0.5117	-0.2446	0.51	-0.1993	0.5881
effort_vit	0.9623	0.0642	0.9519	0.066	0.9309	0.0685
IVFhigher	0.2615	0.1252	0.2567	0.1291		
IVFlower	-0.6128	0.0044	-0.6015	0.005		
IVFchance					0.00989	<.0001
hincpps	0.00028	<.0001	0.000277	<.0001	0.000285	<.0001
hincmiss	0.3921	0.0488	0.3931	0.0467	0.4444	0.0256
N	1 626		1 626		1 615	
AIC	2 109.84	1 990.277	2 109.839	1 973.16	2 094.18	1 971.38
-2 Log L	2 107.84	1 937.513	2 107.839	1 939.16	2 092.18	1 935.38

Table 58: Estimation results DC(IVF) – WTP for one attempt of IVF, country specific models

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
intercept	0.8286	<.0001	1.1407	<.0001	1.1258	<.0001	0.7448	0.0011
IVFbid1	-0.00012	0.0002	-0.00011	0.0213	-0.00005	0.2746	-0.0001	0.0827
VSP (€ PPS)	**€ 6 905**		**€ 10 370**		**€ 22 516**		**€ 7 448**	
VSP (€)	**€ 19 905**		**€ 31 277**		**€ 64 972**		**€ 22 461**	
N obs.	558		355		463		250	
AIC	758.95	746.94	446.17	442.90	547.95	548.76	337.68	336.66
-2 LogL	756.95	742.94	444.17	438.90	545.95	544.76	335.68	332.66

Table 59: Estimation results DC(IVF) – WTP for the probability to conceive after one attempt of IVF, country specific models

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
chance	0.0182	<.0001	0.0327	<.0001	0.0274	<.0001	0.0187	0.0072
IVFbid1	-0.0001	0.0053	-0.00011	0.0242	-0.00003	0.5481	-0.00009	0.1648
VSP (€ PPS)	€ 18 200		€ 29 727		€ 91 333		€ 20 778	
VSP (€)	€ 11 951		€ 30 428		€ 101 577		€ 23 136	
N obs.	558		355		463		250	
-2 LogL	773.552	755.181	492.134	442.219	641.854	558.364	346.574	336.174

8.5 Healthy child

8.5.1 Healthy child: Private good scenario

Preferences for reducing the probability of a new born child with defects are elicited through the discrete choice experiments. Each respondent was asked to choose four times the best alternative out of the three presented, where one was the status quo. The contingent good presents a novel complex of vitamins and minerals which, if taken, will reduce the probability of birth defects.

Only respondents who want a child (WANT) were asked to participate in this valuation exercise.

Since the costs are recoded as the monthly payment in EUR PPS, the Value of a statistical case of healthy child (VSCHC) is computed as the ratio of coefficient for the risk improvement and negative COST multiplied by 12 (i.e. 12 monthly payments over a year) and 1 000 (the denominator in which the risks are expressed).

We value three types of birth defects: minor birth defects (MINOR), birth defects of internal organs, metabolic and genetic disorders (INTERNAL), and birth defects of external body parts (EXTERNAL). Most of the respondents (81 % or 83 %) consider minor birth defects the least severe. About 65 % think that birth defects of internal organs are the most severe ones. Birth defects of external organs are in the middle of ranking (ranked by 56 %), still with about 35 % who think that the defects of external body parts are more severe than defects of internal organs; see table 60.

Table 60: Ranking of birth defects from the least to the most severe one (%), speeders excluded

	minor birth defects	birth defects of internal organs	birth defects of external body parts	minor birth defects	birth defects of internal organs	birth defects of external body parts
	want a child (WANT)			general population (GENPOPUL)		
the least severe	81.33	6.31	8.62	83.47	6.05	7.33
the second most severe	11.19	28.55	56.14	9.81	28.83	57.19
the most severe	7.49	65.14	35.24	6.72	65.12	35.48

Results from the logit model are displayed in the tables below. The results from pooled data show that respondents are willing to pay more for reductions in probabilities of birth defects. The coefficients are positive and significant at the conventional levels as expected. The coefficient of cost is negative and statistically significant.

Marginal utility is the largest for reducing defects of internal organs (INTERNAL), utility of reducing defects of external body parts (EXTERNAL) is slightly smaller than utility attributable to defects of internal organs. Marginal willingness to pay for reducing minor defects is one order of magnitude smaller than the utilities of remaining two types of defects.

If protesters are excluded, the VSCHC is about EUR 16 323 for minor birth defects, the VSCHC for defects of internal organs is EUR 221 220, and the VSCHC for defects of external body parts is EUR 182 427.

Our base model for the benefit transfer is based on data with speeders and protesters (SQ=4) excluded; the resulting VSCHCs are EUR 11 537 (minor), EUR 169 456 (internal), and EUR 103 168 (external).

Respondents who intend to have a baby within three years (80 %) are more willing to pay for vitamins to reduce the probability of birth defects; the VSCHCs are EUR 12 318 (minor), EUR 182 885 (internal), and EUR 110 311 (external).

Table 61: Estimation results DCE3 (DEFECT-VIT) – WTP for reducing the probability of birth defects

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.008205	<.0001	0.006824	<.0001	0.007101	<.0001	0.006789	<.0001
internal	0.1112	<.0001	0.0982	<.0001	0.1043	<.0002	0.1008	<.0001
external	0.0917	<.0001	0.0648	<.0001	0.0635	<.0003	0.0608	<.0001
cost1	-0.006032	<.0001	-0.006363	<.0001	-0.007386	<.0004	-0.006614	<.0001
VSCHC(minor)	€ 16 323		€ 12 869		€ 11 537		€ 12 318	
VSCHC(internal)	€ 221 220		€ 185 196		€ 169 456		€ 182 885	
VSCHC(external)	€ 182 427		€ 122 207		€ 103 168		€ 110 311	
Data excluded	protesters		protest(SQ=4)		protest(SQ=4). speeders		[whenchild3]	
N obs.	8 096		9 292		8 332		6 644	80 %
N ID	2 024		2 323		2 083		1 661	

There are about 49 % of respondents, after excluding speeders and protesters with SQ=4, who were considering other effects, positive or negative, aside from reducing the probability of birth defects, while thinking about the payment. Stated willingness to pay might reflect these other benefits, and thus the next models derive a net effect of reducing the probability of birth defects. After controlling for the other co-benefits, the VSCHCs are EUR 12 400 (minor), EUR 199 000 (internal), and EUR 139 000 (external).

Table 62 then reports the marginal utility for three specific co-benefits; improving overall health, improving fitness, and prevention from illness, that have all positive and significant effect on the probability to pay for vitamins only while stating WTP for minor birth defects.

Table 62: Estimation results DCE3(DEFECT-VIT) – WTP with controlling for other benefits

	Estimate	p value	∆VSCHC	Estimate	p value	∆VSCHC
minor	0.00721	<.0001	€ 12 381	0.007525	<.0001	€ 12 922
m_cobenefit	0.006502	<.0001	+ € 11 165			
m_health				0.004807	0.0067	+ € 8 255
m_fit				0.006236	0.0038	+ € 10 709
m_ill				0.004356	0.0223	+ € 7 480
internal	0.1159	<.0001	€ 199 027	0.1132	<.0001	€ 194 390
i_cobenefit	0.0345	0.0104	+ € 59 244			
i_health				0.000432	0.8137	+ € 742
i_fit				-0.001876	0.5406	- € 3 222
i_ill				0.0504	0.0041	+ € 86 548
external	0.081	<.0001	€ 139 096	0.0828	<.0001	€ 142 187
e_cobenefit	0.0573	0.0146	+ € 98 397			
e_health				0.004535	0.832	+ € 7 788
e_fit				0.0519	0.0077	+ € 89 124
e_ill				-0.0102	0.5781	- € 17 516
cost	-0.006988	<.0001		-0.0155	0.6224	
N obs.	7 012			7 012		
N ID	1 753			1 753		
LL ratio	646.39			681.94		
Estrella	0.0899			0.0947		

Table 63 displays the results for a model that includes country dummies to allow for systematic differences in WTP across them and various interactions between socio-demographic variables and each of the three birth defect covariates. The results show that males are willing to pay for reducing minor birth defects and defects of external body parts. The effect of age is not significant, except age 25 to 29 that is associated with lower willingness to pay for reducing the probability of birth defects of the external body parts. Being married, having a spouse, or having children do not have any effect on WTP. In the case of paying for reducing defects of internal organs, respondents with a spouse and having children are likely to be willing to pay less. City size only has a significant effect in one case; respondents living in cities with more than 20 000 and less than 200 000 people are willing to pay more for avoiding minor birth defects. More educated people, with higher secondary or tertiary education, are willing to pay more, especially for reducing more severe birth defects. Household income is significant and positive, each thousands Euro of income contributes to VSCHC by EUR 4 400 (minor), EUR 22 800 (internal) and EUR 38 600 (external).

Table 63: Estimation results DCE3(DEFECT-VIT) – model with the interactions with socio-demographic controls

	minor			internal			external		
	Estimate	t value	p value	Estimate	t value	p value	Estimate	t value	p value
cz	0.005933	1.39		0.1925	4.71	***	0.1555	2.12	**
uk	0.001191	0.27		0.1696	4.1	***	0.0282	0.38	
it	0.007993	1.89	*	0.2098	5.23	***	0.1272	1.76	*
nl	-0.002058	-0.27		-0.0817	-0.92		-0.3947	-2.39	**
male	0.002987	2.07	**	0.0196	1.37		0.0468	1.88	*
age18	-0.001073	-0.36		-0.024	-0.82		0.004893	0.1	
age25	-0.002122	-0.81		-0.0342	-1.32		-0.074	-1.67	*
age30	-0.002463	-1.04		-0.0275	-1.19		-0.0448	-1.12	
spouse	-0.000157	-0.05		-0.0615	-2.29	**	-0.0444	-0.95	
children	-0.00094	-1.23		-0.0179	-2.29	**	-0.007619	-0.53	
city1	-0.000292	-0.13		0.0287	1.3		0.0137	0.35	
city2	0.00077	0.42		0.0288	1.6		-0.0461	-1.48	
city3	0.005361	2.87	***	0.0168	0.91		0.0272	0.84	
eduprim	-0.003353	-0.22		0.0295	0.15		-0.0962	-0.16	
edusecup	0.005247	0.75		0.2240	2.63	***	0.4233	2.67	***
edutert	0.003919	0.57		0.2503	3	***	0.4098	2.62	***
hincmiss	-0.000337	-0.13		-0.0143	-0.57		0.0349	0.77	
hincpps	2.534E-06	4.22	***	0.0000132	2.28	**	0.0000223	2.27	**
cost1	-0.006935	-17.06	***						
N obs.	7 012								
N ID	1 753								
LL ratio	767.69								
Estrella	0.1062								
McFadden LRI	0.0498								

The results for the country-specific models are reported in Table 64. Coefficient EXTERNAL is not significant for the UK and the Netherlands due to very small sample sizes. If we keep speeders in the dataset, statistical significance of the estimates is improved.

The lowest value of a statistical case of healthy child is in the Netherlands, the largest willingness to pay was stated by the respondents from Italy. The WTP for birth defects of internal organs is the largest one among the three valued types of birth defects in the Netherlands, the UK and Italy. Only Czechs are willing to pay most for birth defects of external body parts.

Table 64: Estimation results DCE3(DEFECT-VIT) – country-specific models

Protests and speeders excluded

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.009792	<.0001	0.002972	0.0567	0.007423	<.0001	0.006304	<.0001
internal	0.1403	<.0001	0.0744	<.0001	0.1044	<.0001	0.0683	<.0001
external	0.1541	<.0001	0.001939	0.9416	0.0548	0.0039	-0.0205	0.4764
cost1	-0.008473	<.0001	-0.008409	<.0001	-0.003785	<.0001	-0.0129	<.0001
VSCHC(minor)	€ 13 868		€ 4 241		€ 23 534		€ 5 864	
VSCHC(internal)	€ 198 702		€ 106 172		€ 330 991		€ 63 535	
VSCHC(external)	€ 218 246		NA		€ 173 738		NA	
N obs.	2 632		1 532		2 832		1 336	
N ID	658		383		708		334	

Protests excluded

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.0109	<.0001	0.007739	<.0001	0.0113	<.0001	0.009658	<.0001
internal	0.1442	<.0001	0.1128	<.0001	0.1389	<.0001	0.0893	<.0001
external	0.1715	<.0001	0.0503	0.0463	0.1305	<.0001	0.0473	0.082
cost1	-0.007555	<.0001	-0.005804	<.0001	-0.002709	<.0001	-0.009951	<.0001
VSCHC(minor)	€ 17 313		€ 16 001		€ 50 055		€ 11 647	
VSCHC(internal)	€ 229 040		€ 233 218		€ 615 282		€ 107 688	
VSCHC(external)	€ 272 402		€ 103 997		€ 578 073		€ 57 039	
N obs.	2 544		1 560		2 468		1 380	
N ID	636		390		617		345	
LL ratio	0.0109	<.0001	0.007739	<.0001	0.0113	<.0001	0.009658	<.0001

8.5.2 Healthy child: Public good scenario

Marginal utility for reducing the probability of birth defects for all EU residents who are expecting a child was elicited through the same discrete choice experiments as preferences for reducing birth defects within the private good context. Again, each respondent – from the both samples, WANT as well as GENPOPUL – was asked four times to choose the best alternative out of three presented options. One of these options was the status quo. The probability of birth defects is reduced thanks to usage of chemical-free products as a result of a new stricter policy.

We report the results separately for the both groups of our respondents, the group who want a child (WANT) and then the respondents that are part of the general population sample (GENPOPUL). Since costs are recoded as the monthly payment in EUR PPS, the VSCHC is computed as the ratio of the coefficient for the risk improvement and the negative of COST multiplied by 120 (12 monthly payments over 10 years) and 1 000, i.e. the denominator of the risk rates.

The results for valuing the birth defects within the public good context are qualitatively similar to the results of birth defects valuation within the private good context. The coefficients for the three birth defects are all positive and significant, whereas the coefficient on cost is significantly negative (see Table 65).

After excluding speeders and protesters in case of four status quo responses, we get a value of a statistical case of healthy child as high as EUR 39 763 (minor), EUR 677 778 (internal) and EUR 314 074 (external). These values enter into the benefit transfer to get the EU-wide WTP values.

Table 65: Estimation results DCE4 (DEFECT-POL) – WTP for reducing birth defects and VSC of a healthy child

Sample of respondents who want a child

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.005368	<.0001	0.004647	0.0002	0.005368	<.0001	0.005086	0.0009
internal	0.088	<.0001	0.081	<.0001	0.0915	<.0001	0.0957	<.0001
external	0.0588	<.0001	0.0384	0.0028	0.0424	<.0018	0.0563	0.0004
cost1	-0.013	<.0001	-0.0147	<.0001	-0.0162	<.0001	-0.0146	<.0001
VSCHC(minor)	€ 49 551		€ 37 935		€ 39 763		€ 41 803	
VSCHC(internal)	€ 812 308		€ 661 224		€ 677 778		€ 786 575	
VSCHC(external)	€ 542 769		€ 313 469		€ 314 074		€ 462 740	
Data excluded	protesters		protest(SQ=4)		protest(SQ=4). speeders		[when3] protest(SQ=4). speeders	
N obs.	3 834		4 338		3 834		2 824	
N ID	959		1085		959		706 (74% of all)	

General population

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.005942	<.0001	0.005942	<.0001	0.006	<.0001	0.008684	0.0017
internal	0.0849	<.0001	0.0849	<.0002	0.0913	<.0002	0.1197	<.0001
external	0.047	0.0006	0.047	0.0006	0.0537	<.0003	0.0643	0.0204
cost1	-0.0156	<.0001	-0.0156	<.0001	-0.0163	<.0004	-0.0211	<.0001
VSCHC(minor)	€ 45 708		€ 45 708		€ 44 172		€ 49 388	
VSCHC(internal)	€ 653 077		€ 653 077		€ 672 147		€ 680 758	
VSCHC(external)	€ 361 538		€ 361 538		€ 395 337		€ 365 687	
Data excluded	protesters		protest(SQ=4)		protest(SQ=4). speeders		[when3] protest(SQ=4). speeders	
N obs.	3 712		3 712		3 404		924	
N ID	928		928		851		231 (27% of all)	
LL ratio	187.93		187.93		194.69		83.87	

The next two tables display the results for the model that controls for the effects of socio-demographic variables on the probability to pay for chemical-free products (all controls are interacted with each of the three birth defects separately). Table 66 displays the results for the sample of respondents who want a child (WANT), while Table 67 displays the results for general population (GENPOPUL).

For the WANT sample, having a spouse (or being married) does not change willingness to pay for reducing birth defects for all EU residents who are expecting a child. Having one's own children and being below the age of 40 both reducing respondent's preference for avoiding birth defects in population. Education has a positive effect, but significantly affects WTP for minor defects only. City size does not have an effect either. Household income is positive and significant in two out of three cases.

In the general population (GENPOPUL sample), gender and having a spouse (or being married) do not have significant effects on the probability to pay for chemical-free products. Respondents under 50 years of age are willing to pay less for avoiding external birth defects in population than the older respondents. People living in municipalities with less than 2 000 inhabitants are particularly willing to pay less for reducing birth defects of external body parts compared to those living in a city with more than 100 000 inhabitants (the reference variable). People who have children have lower willingness to pay for reducing the probability of minor and internal birth defects. Primary school educated respondents are less likely to pay for avoiding external birth defects than people with lower secondary education. The effect of household income is strongly significant and positive.

Table 66: Estimation results DCE4(DEFECT-POL) – models with socio-demographic controls, respondents who want a child

X	minor*X			internal*X			external*X		
	Estimate	t value	p value	Estimate	t value	p value	Estimate	t value	p value
cz	0.0226	2.86	***	0.1173	2.15	**	0.1966	2.23	**
uk	0.0128	1.58		0.0871	1.59		0.0995	1.12	
it	0.0242	3.06	***	0.1683	3.1	***	0.1899	2.18	**
nl	-0.003906	-0.4		0.062	0.95		-0.0258	-0.24	
male	0.005007	1.98	**	0.000648	0.03		0.0628	2.1	**
age18	-0.0126	-2.26	**	-0.1131	-2.79	***	-0.1577	-2.44	**
age25	-0.009301	-1.8	*	-0.0947	-2.59	***	-0.1439	-2.49	**
age30	-0.0137	-2.91	***	-0.1045	-3.18	***	-0.175	-3.34	***
spouse	-0.006352	-1.23		0.0307	0.9		-0.0499	-0.9	
children	-0.002313	-1.52		-0.0309	-2.94	***	-0.0257	-1.51	
city1	0.001527	0.35		-0.0111	-0.36		0.0385	0.8	
city2	0.000921	0.28		-0.008301	-0.35		0.03	0.78	
city3	0.005033	1.53		-0.0151	-0.64		0.0315	0.83	
eduprim	0.6043	0.34		-0.1119	-0.46		-0.6325	-0.95	
edusecup	0.011	0.83		-0.1610	-1.17		0.007535	0.04	
edutert	0.0206	2.8	***	0.037	0.74		0.0411	0.47	
hincmiss	-0.00483	-1.04		0.0708	2.21	**	0.009163	0.17	
hincpps	3.1063E-06	2.87	***	5.455E-06	0.7		0.00003	2.41	**
cost1	-0.016	-10.14							
N obs.	7 012								
N ID	1 753								
LL ratio	767.69								
Estrella	0.1062								
McFadden LRI	0.0498								

Table 67: Estimation results DCE4(DEFECT-POL) – models with socio-demographic controls, general population

X	minor*X			internal*X			external*X		
	Estimate	t value	p value	Estimate	t value	p value	Estimate	t value	p value
cz	0.019	3.02	***	0.1097	2.35	**	0.2847	4.01	
uk	0.001956	0.31		-0.011	-0.24		0.046	0.66	
it	0.0237	3.77	***	0.0977	2.06	**	0.2526	3.54	***
nl	0.006973	0.89		-0.1467	-2.40	**	0.0296	0.34	
male	0.00049	0.2		0.0236	1.26		0.0276	0.94	
age18	-0.008122	-1.44		0.0147	0.35		-0.0759	-1.16	
age25	-0.004366	-0.78		-0.0362	-0.84		-0.2287	-3.24	***
age30	-0.007938	-1.71	*	0.0196	0.56		-0.1446	-2.68	***
age40	-0.006642	-1.54		-0.0132	-0.40		-0.1478	-2.87	***
age50	-0.00818	-1.98	**	-0.0135	-0.43		-0.1162	-2.44	**
spouse	0.001772	0.5		0.0181	0.72		0.0182	0.45	
children	-0.002631	-1.68	*	-0.0218	-1.98	**	0.005403	0.31	
city1	-0.04255	-1.01		-0.0223	-0.76		-0.1041	-2.2	**
city2	-0.003333	-1.04		0.002148	0.09		-0.0567	-1.47	
city3	-0.001395	-0.42		-0.0383	-1.50		-0.0533	-1.36	
eduprim	-0.00768	-0.53		0.0572	0.58		-0.6676	-2.32	**
edusecup	-0.0153	-1.63		0.0433	0.64		-0.1192	-1.13	
edutert	-0.005585	-0.75		0.0924	1.54		-0.0546	-0.6	
hincmiss	-0.004689	-1.05		0.0188	0.56		-0.0634	-1.24	
hincpps	1.983E-06	1.65	*	1.43E-05	1.57		0.0000303	2.17	**
cost1	-0.0162	-10.33							
N obs.	3 376								
N ID	844								
LL ratio	400.32								
Estrella	0.1148								
McFadden LRI	0.054								

The results for the country samples can be found in Table 68. These results should be interpreted with caution due to quite small country sample sizes.

Table 68: Estimation results DCE4 (DEFECT-POL) – country-specific models

Sample of respondents who want a child

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.008496	0.0001	0.001751	0.6047	0.006233	0.0083	0.003572	0.2717
internal	0.1019	<.0001	0.0681	0.0007	0.1227	<.0001	0.0532	0.0179
external	0.1099	<.0001	0.001193	0.9708	0.0737	0.002	-0.1091	0.0055
cost1	-0.0158	<.0001	-0.0233	<.0001	-0.006652	0.01	-0.0399	<.0001
VSCHC(minor)	€ 64 527		NA		€ 112 441		NA	
VSCHC(internal)	€ 773 924		€ 350 730		€ 2 213 470		€ 160 000	
VSCHC(external)	€ 834 684		NA		€ 1 329 525		- € 328 120	
N obs.	1 338		677		1 240		579	
N ID	335		169		310		145	

General population

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
minor	0.008379	0.0002	0.004095	0.2366	0.0105	<.0001	-0.002458	0.5073
internal	0.142	<.0001	0.0795	0.0005	0.1259	<.0001	-0.0491	0.0498
external	0.1359	<.0001	-0.0158	0.6581	0.1183	<.0001	-0.1377	0.0005
cost1	-0.0161	<.0001	-0.0405	<.0001	-0.005368	0.053	-0.024	<.0001
VSCHC(minor)	€ 62 452		NA		€ 234 724		NA	
VSCHC(internal)	€ 1 058 385		€ 235 556		€ 2 814 456		NA	
VSCHC(external)	€ 1 012 919		NA		€ 2 644 560		NA	
N obs.	1296		612		964		532	
N ID	324		153		241		133	
LL ratio	128.28		119.9		58.394		79.012	

8.6 Estimation results: Very low birth weight

For valuation of very low birth weight risk reduction, we utilized double-bounded dichotomous choice questions. However, we run models using only the single discrete questions (the first questions) in this report because single discrete choice question is usually recommended as it is incentive compatible in many circumstances and because it reduces many biases (for example by the NOAA Panel on Contingent Valuation; Arrow et al. 1993; for discussion of the issue of elicitation format see Carson and Groves, 2007; 2011). On one hand, an advantage of the double-bounded model can be that confidence intervals decrease considerably. On the other hand, the double-bounded model can be inadequate and can give inconsistent results. One of the well-known biases that may arise with double-bounded dichotomous choice questions is starting point bias.

The first contingent good is a novel complex of vitamins and minerals with the same basic characteristics as in the previous case, but it reduces the probability of very low birth weight and therefore it also lowers the probabilities of associated adverse health effects. The vitamins have an effect only during the period of usage but no effect on future pregnancies and are taken during pregnancy (for 8 months) once a week. Only respondents who want a child (WANT) and only females or males who have steady life partner were asked to participate in this valuation exercise, which we further label as CVM1.

Second, we estimate the WTP for "chemical-free products", which have the same basic characteristics as before, but they reduce the probability of very low birth weight across the whole EU and therefore they also lower the probabilities of associated described adverse health effects. Let us now introduce label CVM2 for this valuation exercise.

The next table (Table 69) shows descriptive statistics of CVM1 and CVM2 for the sample of people who want children, specifically percentages of respondents who were willing to pay a sum of money. About 41 % of respondents would pay for one of the levels of risk reduction of very low birth weight under the private scenario. Although more people (46 %) would pay for a policy than for the vitamins to reduce the probability of very low birth weight, there are higher shares of people who would pay the lowest bids. Under the public good scenario, people are willing to pay smaller sums of money, however, for much longer period (10 years) than under the private good scenario (8 months).

Table 69: People who want children: Descriptive statistics of the single discrete choice questions for very low birth weight valued as a private (CVM1) and public good (CVM2)

	CVM1 yes (%)	**CVM 2 yes (%)**			**CVM1 yes (%)**	**CVM 2 yes (%)**
bid1 (€ 10 or € 1)	58.0	60.9		**dR=2**	37.7	38.4
bid2 (€ 30 or € 3)	42.4	56.9		**dR=3**	43.6	50.6
bid3 (€ 50 or € 5)	36.1	45.8		**dR=5**	39.1	47.0
bid4 (€ 80 or € 10)	33.4	36.8		**dR=7**	43.1	47.0
bid5 (€ 100 or € 25)	30.3	24.3				
all bids	40.8	45.9		**all dRs**	40.8	45.9

In the general population sample, the share of people who answered "yes" to the public policy reducing probability of very low birth weight (44 %) is similar to the share found in the sample of people who want children (see Table 70).

Table 70: General population: Descriptive statistics of the single discrete choice questions for very low birth weight valued as a public good (CVM2)

	CVM2 yes			CVM2 yes
bid1 (€ 10 or € 1)	64.3		**dR=2**	38.0
bid2 (€ 30 or € 3)	49.7		**dR=3**	45.5
bid3 (€ 50 or € 5)	39.7		**dR=5**	48.4
bid4 (€ 80 or € 10)	36.6		**dR=7**	44.0
bid5 (€ 100 or € 25)	25.8			
all bids	44.0		**all dRs**	44.0

8.6.1 Very low birth weight: Private good scenario

Estimation results for very low birth weight under the private scenario from the logit models are displayed in the following tables. Using the pooled dataset, we find that willingness to pay is higher for the higher reduction of probability of having a very low birth weight infant (the coefficient for CVM1 reduction is positive and significant). As expected, there is negative significant effect of costs on the WTP (see Table 71). Based on the model in which only speeders were excluded and thus protesters are included, value of a statistical case is EUR 30 074, which is much lower than the values estimated from the remaining models in which protest zeros are excluded (models in Table 71). As the standard approach is to include only true zeros in the analysis (see Freeman, 1986 for original explanation and Jorgensen et al., 1999 for discussion), we do not recommend utilizing results from the first model that includes protest zeros. The mean value of a statistical case used further in benefit transfer is EUR 120 165 and is based on data in which protesters who always choose the status quo and speeders are removed. Respondents who intend to have a baby within three years (76 % of the sample) are willing to pay for reducing the probability of very low birth weight more than the whole sample of people who want children and the value of a statistical case is only slightly not significantly higher (EUR 129 682).

When there are concerns about the distribution of responses, the sample mean can be estimated using the Turnbull lower bound and then the exponential willingness to pay function can be obtained, which is a conservative approach (Haab and McConnell, 2002). Based on data from which we removed protests and speeders, the Turnbull lower bound of the mean WTP per month is EUR 50.69. Using the lower bound of the WTP, the value of a statistical case of very low birth weight is EUR 95 417.

Table 71: People who want children: Estimation results for CVM1 – WTP for reducing the probability of very low birth weight and value of a statistical case

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
CVM1reduction	0.1388	<.0001	0.14540	<.0001	0.1436	<.0001	0.148	<.0001
CVM1bid1	-0.00884	<.0001	-0.00968	<.0001	-0.00856	<.0001	-0.00913	<.0001
VSC(VLBW)	€ 125 611		€ 120 165		€ 134 206		€ 129 682	
Data excluded	protesters		protests. speeders		protest. speeders. pilot		[whenchild=3]: protests. speeders	
N obs.	2 026		1 803		1 588		1 433	

Using data without protests (SQ=4) and speeders, we calculated value for a statistical case of very low birth weight separately for all countries and converted the values utilizing a Purchase Power Standard (PPS) (see Table 72). There are large differences in the estimated values among countries. The VSC is highest in Italy (EUR 245 157). The VSC equals EUR 120 558 for the Czech Republic and EUR 94 076 for the UK. We do not report value for a statistical case for the Netherlands because the coefficient for reduction of probability of very low birth weight is not significant and the sample size is small.

Table 72: People who want children: Estimation results for CVM1 – country models

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
CVM1reduction	0.1944	<.0001	0.0888	0.0151	0.1664	<.0001	0.0624	0.1276
CVM1bid1	-0.0129	<.0001	-0.00887	0.0007	-0.00543	0.0134	-0.0116	0.0007
VSC(VLBW). €PPS	€ 120 558		€ 80 090		€ 245 157		NA	
VSC(VLBW). €	€ 79 167		€ 81 977		€ 272 653		NA	
N obs.	574		349		605		275	

8.6.2 Very low birth weight: Public good scenario

Regarding the findings for very low birth weight under the public scenario, we present estimations from logit models in the following tables.

First, we analyse the WTP of people who would like to have children. As in the case of the private scenario, the effect of reduction of probability of having a very low birth weight infant on the WTP is significant and positive and effect of costs on the WTP is negative significant (see Table 73). As before, we propose rather not to use the results of the first model in the Table 73 in which the protests are included. All estimates of VSC from models in which we removed the protests from dataset are similar and range from EUR 373 443 to EUR 402 293. We suggest using in benefit transfer the mean value of a statistical case estimated from the third model (model without protests and speeders) that is EUR 386 114. Based on the Turnbull lower bound of the mean WTP, the VSC is much lower (EUR 230 000). When we look at the last model, we notice that the VSC for respondents who intend to have a baby within three years is higher (EUR 440 151).

Table 73: People who want children: Estimation results for CVM2 – WTP for reducing the probability of very low birth weight and value of a statistical case

	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
CVM2reduction	0.1889	<.0001	0.18630	<.0001	0.1988	<.0001	0.1944	<.0001
CVM2bid1	-0.0607	<.0001	-0.0579	<.0001	-0.0593	<.0001	-0.053	<.0001
VSC(VLBW)	€ 373 443		€ 386 114		€ 402 293		€ 440 151	
Data excluded	protesters		protests. speeders		protest. speeders. pilot		[whenchild=3]: protests. speeders	
N obs.	1 350		1 229		1 119		893	

The results of the country models are shown in Table 74. Contrary to estimates for very low birth weight under the private scenario, the lowest VSC under the public scenario was found for the Czech Republic (EUR 405 517) and the highest in the Netherlands (EUR 620 842). The results do not differ so widely as under private scenario. The VCS for the UK is EUR 420 130 and for Italy EUR 532 549.

Table 74: People who want children: Estimation results for CVM2 – country models

	CZ		UK		IT		NL	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
CVM2reduction	0.2646	<.0001	0.1621	0.0004	0.2716	<.0001	0.1966	0.0003
CVM2bid1	-0.0783	<.0001	-0.0463	0.0032	-0.0612	<.0001	-0.038	0.0577
VSC(VLBW). €PPS	€ 405 517		€ 420 130		€ 532 549		€ 620 842	
VSC(VLBW). €	€ 266 291		€ 430 028		€ 592 280		€ 691 315	
N obs.	400		177		284		156	
-2 Log L (wo/w covariates)	554.518	476.181	245.374	230.751	393.708	341.091	216.262	200.533

Second, we estimate the VSC under the public scenario using data representative for general populations. For the pooled sample, the mean VSC is EUR 477 838 (see the third model in Table 75) and VSC computed using the Turnbull lower bound is EUR 377 032. To be consistent with previous model selections, again for benefit transfer we chose the model without protests and speeders. When we look at the last model, we can notice that VSC is even lower for people planning children in three years (EUR 386 465) in comparison to complete data set.

Table 75: General population: Estimation results for CVM2 – WTP for reducing the probability of very low birth weight and value of a statistical baby

	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
CVM2reduction	0.0795	<.0001	0.1712	<.0001	0.17680	<.0001	0.1802	<.0001	0.1913	<.0001
CVM2bid1	-0.0535	<.0001	-0.0431	<.0001	-0.0444	<.0001	-0.0431	<.0001	-0.0594	<.0001
VSC(VLBW)	€ 178 318		€ 476 659		€ 477 838		€ 501 717		€ 386 465	
Data excluded	speeders		protesters		protests. speeders		protest. speeders. pilot		[whenchild=3]: protests. speeders	
N obs.	1 154		963		883		817		216	
-2 Log L (wo/w covariates)	1 599.784	1 530.09	1 335.001	1 255.18	1 224.098	1 146.832	1 132.602	1 058.21	299.44	274.409

Regarding estimates for the general populations (see Table 76), Italians are willing to pay the most for risk reduction of very low birth weight (the VCS is EUR 669 255) followed by Czechs (the VSC is EUR 546 737). On the other hand, the VCS is lowest for the UK (EUR 316 092). The VCS for the Netherlands is again not presented due to an insignificant estimate and small sample size.

Table 76: General population: Estimation results for CVM2 – country samples

	CZ		UK		IT		NL	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
CVM2reduction	0.2597	<.0001	0.1375	0.0096	0.2097	<.0001	0.0105	0.8331
CVM2bid1	-0.057	<.0001	-0.0522	0.0066	-0.0376	0.01	-0.033	0.2055
VSC(VLBW). €PPS	€ 546 737		€ 316 092		€ 669 255		NA	
VSC(VLBW). €	€ 359 026		€ 323 539		€ 744 319		NA	
N obs.	331		139		280		133	
-2 Log L (wo/w covariates)	458.863	400.871	192.695	183.84	388.162	353.827	184.827	182.047

8.6.3 Very low birth weight: Socio-demographic variables

The next table (Table 77) shows the results for models where we examined effects of the socio-demographic variables, countries and planning a child in three years on the willingness to pay.

The willingness to pay for risk reduction of very low birth weight depends on household income in the both samples and under both the private and the public scenario. As can be expected, the higher household income the higher willingness to pay. University educated people in comparison to people with lower secondary education are more likely to pay for the vitamins among people who want children.

Males who want children are willing to pay more for the vitamins. Among people who want children, respondents with a spouse are less likely to be willing to pay under both the private and the public scenario. The willingness to pay for the chemicals policy increases with age in the both samples. Similarly, people aged 30 to 39 are significantly more likely to have lower WTP for the vitamins than people older than forty. The effects of dummies for age categories of people younger than 30 are also negative, albeit not significant. If at least one child younger than 18 is living in a household, the willingness to pay is lower in comparison to other households for the general sample.

However, we found no significant effects of the city size. Planning a child in three years does not contribute significantly to explanation of the willingness to pay for vitamins or public policy in the both samples.

Table 77: People who want children and general population: Estimation results for CVM1 and for CVM2 – models with other covariates

Sample	People who want a child			People who want a child			General population		
CV scenario	VLBW private (CVM1)			VLBW public (CVM2)			VLBW public (CVM2)		
	Estimate	s.e.	p value	Estimate	s.e.	p value	Estimate	s.e.	p value
Intercept	-0.525	0.7021		0.1169	0.8895		-1.3791	0.0119	**
cze	1.7262	0.5948	***	0.0531	0.9435		1.5889	0.0001	***
uk	1.25	0.5966	**	-0.5352	0.4801		0.6147	0.1577	
ita	1.8626	0.5937	***	-0.0281	0.9703		1.2923	0.0019	***
CV Risk reduction	0.0472	0.028	*	0.0978	0.0092	***	0.00968	0.8137	
CV bid (PPS)	-0.0146	0.00155	***	-0.0725	0.0001	***	-0.0641	<.0001	
male	0.4092	0.1127	***	-0.0439	0.7658		-0.0897	0.5608	
age				0.0241	0.0425	**	0.0253	0.0001	***
age18	-0.3564	0.2412							
age25	-0.2614	0.2074							
age30	-0.4006	0.1859	**						
spouse	-0.5433	0.2752	**	-0.4142	0.0937	*	-0.0603	0.7587	
children	0.0364	0.0628		-0.0588	0.4812		-0.1714	0.0331	**
eduprim	13.9732	495.6		12.0043	0.9797		-0.5414	0.5564	
edusecup	0.9598	0.6228		-0.0514	0.9482		0.316	0.5326	
edutert	1.158	0.611	*	-0.4499	0.5629		0.4549	0.3563	
city1	-0.00421	0.1751		-0.2104	0.3263		-0.3127	0.19	
city3	-0.1485	0.14		-0.2523	0.1803		-0.1162	0.5665	
city4	-0.1909	0.1412		-0.1613	0.3852		0.00216	0.9916	
when3	0.1085	0.1461		0.2854	0.1088		0.0178	0.9247	
hincpps	0.000156	4.5E-05	***	0.000189	0.0021	***	0.000269	0.0005	***
hincmiss	0.1157	0.199		0.2023	0.4233		0.2784	0.2854	
-2 Log L (wo / w covariates)	2 197.253	2 026.7		1 327.758	1 202.722		1 154.363	1022.609	
N	1 596			1 017			876		

9 Benefit transfer

The ultimate goal of this study rests in the development of an average EU-wide WTP value for each health outcome being valued in this study.

In many benefit transfer applications, the study and policy sites are not fully compatible with respect to time, currency, and the population's income. Therefore, welfare estimates need to be properly adjusted for these discrepancies. Differences in price levels are usually corrected for using consumer price index, while different currencies are converted using market (nominal) exchange rate. However, similar market goods may cost different amounts of money in different countries – the relationship formally illustrated by Ready et al. (2004). To account for these differences purchasing power parity (PPP) corrected exchange rate is preferable. Additional differences in values may come from divergence in income between two sites. This issue may become critical in benefit transfer between countries heavily differentiated in income (Ready and Navrud 2006; Wilson and Hoehn 2006). The possible effect of income differences might be controlled for by using income elasticity of WTP approach, following the formula:

$$\boldsymbol{WTP_{PS=}WTP_{SS}} \cdot \left(\frac{\boldsymbol{INC_{PS}}}{\boldsymbol{INC_{SS}}}\right)^{\varepsilon}$$

where WTP is the willingness to pay, the two subscripts PS and SS denote the policy site and the study site respectively, INC is income and ε represents income elasticity of WTP between the income levels observed at the two sites.

Even though some evidence indicates that non-market goods, such as environmental or health related, might be luxury goods, implying income elasticity of demand to be higher than one (Ghalwash 2008), Flores and Carson (1997) show that the relation between income elasticity of demand and income elasticity of WTP is not straightforward, and, in the case of rationed (public) goods, knowledge of the one does not allow us to draw conclusions about the other (Czajkowski and Ščasný, 2010). A considerable number of studies provide evidence that the income elasticity of WTP for non-market goods may be less than one; see Czajkowski and Ščasný (2010) for the review. They also estimated the income elasticity of WTP as a function of monthly income; considering the range of median household income in the EU (which ranges between about 1 000 and 3 000 PPS Euro a month), the income elasticity would likely lie between 0.3 and 1.2, with the elasticity of 0.7 for the EU average household monthly income. In our first study on skin sensitisation and dose toxicity, the income elasticity of WTP was estimated between 0.21 (for less severe endpoints) and 0.31 (more severe endpoints).

The EU-wide WTP values are computed through benefit transfer technique using the following inputs:

- the mean WTP value for respective health end-point derived from the aggregate pooled data (PPP-adjusted);
- the income elasticity of WTP of 0.70, and with the elasticity of 0.31 and 1.0 that represent the lower and upper bound of their range;
- the mean of household income for the EU-28 countries retrieved from Eurostat.[5] Household incomes reported by survey respondents were equalised according to the OECD-modified scale and are expressed in PPS Euro.[6]

[5] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en

[6] cf. http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Equivalised_income

Table 78: Equalized annual household income and household size – ECHA Fertility survey, speeders excluded

WANT – People who want a child

	N obs.	Equalized household income (PPS)				Equalized household size
		Mean	Median	Min	Max	mean
pooled data	2 606	€ 15 780	€ 13 200	€ 771	€ 75 360	1.85
cz	890	€ 8 885	€ 8 008	€ 771	€ 33 757	1.86
en	479	€ 23 043	€ 21 924	€ 1 615	€ 75 360	1.85
it	817	€ 16 236	€ 15 667	€ 1 714	€ 59 200	1.88
nl	420	€ 21 993	€ 20 857	€ 1 833	€ 74 769	1.77

GENPOPUL – General population

	N obs.	Equalized household income (PPS)				Equalized household size
		Mean	Median	Min	Max	mean
pooled data	1 349	€ 13 904	€ 11 600	€ 1 018	€ 84 784	1.82
cz	479	€ 8 254	€ 7 506	€ 1 018	€ 33 757	1.82
en	238	€ 19 634	€ 17 117	€ 1 615	€ 84 784	1.78
it	413	€ 15 218	€ 14 190	€ 2 000	€ 48 000	1.88
nl	219	€ 18 167	€ 16 360	€ 2 160	€ 61 846	1.77

Applying the income elasticity of WTP, the country-specific mean WTP values were derived for each EU Member State for each valued health outcome by transferring benefit values from the WTP estimate from the pooled survey data. Next, for each health outcome, a EU28-wide WTP value is derived by calculating the population-weighted mean WTP from the 28 individual country-specific values. The following table reports the EU28-wide WTP values for each respective health outcome.

Table 79: EU28-wide WTP values (in EUR PPS, population weighted mean)

People who want a child

Health outcome	Pooled data	EU28 (weighted)		
		Income elasticity=.31	Income elasticity=.7	Income elasticity=1.0
VSP (private good)	**33 019**	33 452	34 675	36 066
VSP (private good) (no co-benefits)	**20 569**	20 839	21 601	22 467
VSP (public good)	**38 783**	39 292	40 728	42 362
VSP (public good) (no co-benefits)	**19 843**	20 103	20 838	21 674
VSC Healthy Child: **MINOR birth defects** (private good)	**11 537**	11 688	12 116	12 601
VSC Healthy Child: defects in **INTERNAL organs** (private good)	**169 456**	171 678	177 955	185 092
VSC Healthy Child: defects in **EXTERNAL body parts** (private good)	**103 168**	104 521	108 343	112 688
VSC Healthy Child: **MINOR birth defects** (private good) (no co-benefits)	**4 079**	4 133	4 284	4 456
VSC Healthy Child: defects in **INTERNAL organs** (private good) (no co-benefits)	**122 070**	123 671	128 193	133 333
VSC Healthy Child: defects in **EXTERNAL body parts** (private good) (no co-benefits)	**24 447**	24 767	25 673	26 702
VSC Healthy Child: **MINOR birth defects** (public good)	**39 763**	40 284	41 757	43 432
VSC Healthy Child: defects in **INTERNAL organs** (public good)	**677 778**	686 667	711 774	740 317
VSC Healthy Child: defects in **EXTERNAL body parts** (public good)	**314 074**	318 193	329 827	343 054
VSC VLBW (private good)	**120 165**	121 741	126 193	131 253
VSC VLBW (public good)	**386 114**	391 178	405 481	421 741
VSP (IVF)	**28 000**	28 367	29 404	30 584

Note: WTP values derived within the public good context are shaded.

General population

Health outcome	Pooled data	EU28 (weighted)		
		Income elasticity=.31	Income elasticity=.7	Income elasticity=1.0
VSP (public good)	**33 018**	34 790	37 887	40 932
VSP (public good) (no co-benefits)	**10 894**	11 478	12 500	13 505
VSC Healthy Child: **MINOR birth defects** (public good)	**44 172**	46 542	50 686	54 759
VSC Healthy Child: defects in **INTERNAL organs** (public good)	**672 147**	708 217	771 265	833 245
VSC Healthy Child: defects in **EXTERNAL body parts** (public good)	**395 337**	416 553	453 635	490 090
VSC VLBW (public good)	**477 838**	503 481	548 302	592 364

For sensitivity analysis we also calculated the mean WTP from the 28 individual country-specific values, without population weighting. The differences between population-weighted and unweighted WTP estimates are relatively small, between 3.7% (income elasticity of WTP = 0.31) and 9% (income elasticity of WTP = 1.0). The unweighted estimates are reported in Table 80.

Table 80: EU28-wide WTP values (in EUR PPS, unweighted mean)

People who want a child

Health outcome	Pooled data	EU28 (unweighted)		
		Income elasticity=.31	Income elasticity=.7	Income elasticity=1.0
VSP (private good)	**33 019**	32 099	31 866	32 293
VSP (private good) (no co-benefits)	**20 569**	19 996	19 850	20 117
VSP (public good)	**38 783**	37 702	37 428	37 930
VSP (public good) (no co-benefits)	**19 843**	19 290	19 150	19 407
VSC Healthy Child: **MINOR birth defects** (private good)	**11 537**	11 215	11 134	11 283
VSC Healthy Child: defects in **INTERNAL organs** (private good)	**169 456**	164 733	163 536	165 730
VSC Healthy Child: defects in **EXTERNAL body parts** (private good)	**103 168**	100 293	99 564	100 900
VSC Healthy Child: **MINOR birth defects** (private good) (no co-benefits)	**4 079**	3 966	3 937	3 990
VSC Healthy Child: defects in **INTERNAL organs** (private good) (no co-benefits)	**122 070**	118 667	117 806	119 386
VSC Healthy Child: defects in **EXTERNAL body parts** (private good) (no co-benefits)	**24 447**	23 765	23 593	23 909
VSC Healthy Child: **MINOR birth defects** (public good)	**39 763**	38 655	38 374	38 889
VSC Healthy Child: defects in **INTERNAL organs** (public good)	**677 778**	658 887	654 101	662 876
VSC Healthy Child: defects in **EXTERNAL body parts** (public good)	**314 074**	305 320	303 103	307 169
VSC VLBW (private good)	**120 165**	116 816	115 968	117 523
VSC VLBW (public good)	**386 114**	375 352	372 626	377 625
VSP (IVF)	**28 000**	27 220	27 022	27 384

General population

Health outcome	Pooled data	EU28 (unweighted)		
		Income elasticity=.31	Income elasticity=.7	Income elasticity=1.0
VSP (public good)	**33 018**	33 382	34 817	36 650
VSP (public good) (no co-benefits)	**10 894**	11 014	11 487	12 092
VSC Healthy Child: **MINOR birth defects** (public good)	**44 172**	44 659	46 579	49 031
VSC Healthy Child: defects in **INTERNAL organs** (public good)	**672 147**	679 565	708 772	746 082
VSC Healthy Child: defects in **EXTERNAL body parts** (public good)	**395 337**	399 700	416 879	438 824
VSC VLBW (public good)	**477 838**	483 111	503 875	530 399

10 Conclusion

This survey elicited preferences for improvement in six different health outcomes:

- conception of a child;
- minor birth defects;
- birth defects of internal organs, metabolic and genetic disorders;
- birth defects of external body parts;
- very low birth weight;
- infertility.

Our study provides in principle two sets of results; marginal willingness to pay for unit change of the risk and value of a statistical case of respective health outcome. Overall, we provide these values for six health outcomes, derived within two different contexts, and elicited from two different populations, yielding in total 16 different values of benefits[7]. Our base models are based on samples from which speeders and protesters who always chose the status quo option are excluded. The speeder is defined by time of the survey completion, i.e. if the survey was completed in less than the certain minimal time needed to read the texts.

Our study elicited preferences from two different target populations: the first sample comprises people who want to have a child; the second sample represents the general population. Preferences for the risk improvement of contingent private goods are elicited from people who want a child only, while preferences for the risk improvements within public goods are elicited from both samples of our two target populations.

The willingness-to-pay values were elicited in both samples from the adult population in four EU Member States: the Czech Republic, the United Kingdom, the Netherlands and Italy. In total, 3 913 respondents were interviewed, and after the cleaning dataset and allocating the respondents into the two samples, our two datasets consist of 1 500 valid observations (sample of the general population) and 2 924 valid observations (sample of people who want a child, plus respondents who intend to have a child in the sample of the general population are also used in the sample of people who want a child).

Based on the simple benefit transfer that adjust the values by purchasing power parity, and assuming the income elasticity of WTP equal to 0.7, the EU-wide values for each health outcome valued in this study are provided (see Table 81). The EU WTP values are derived from the simplest models, which are the models that contained the risk variables and costs as only covariates, in order to get gross marginal utility of risk reductions and marginal utility of income. The EU-wide values are computed as a weighted average of the WTP values transferred to each EU country from the WTP values estimated from the pooled study dataset. The EU-wide WTP values are also derived when arithmetic average is computed and with different magnitudes of the income elasticity of WTP, which can be used in the sensitivity analysis.

[7] In total, 6 x 2 x 2 would give 24 options, however, our six health outcomes cannot be valued within the private context from a sample of the general population, and then infertility was only elicited within the private context from the sample of people who want a child (two options for the public context are thus missing), resulting in 16 combinations.

To sum up the results of this study:

- The coefficients for all risk variables and costs are all significant and show the expected signs. The implicit value of a statistical case of the outcomes valued in this study vary between EUR 4 300 and EUR 771 300, when the value of a statistical case of pregnancy derived from the public context is the lowest one, and the value of a statistical case of birth defects of internal organs has the highest value;
- The preferences for fertility estimated within two different private good scenarios are quite stable. Marginal utility for a percentage change in probability of conception are very close each other when preferences are elicited either through the private good scenario to increase probability to conceive, or through in vitro fertilisation treatment that would decrease infertility. The implicit value of a statistical case of pregnancy is estimated as EUR 21 600, or EUR 29 400, respectively;
- The implicit values of statistical cases derived within the public context are always larger than their counterparts derived within the private good context. For example, the value of a statistical case of pregnancy derived from the public contexts (not in vitro fertilisation) is about EUR 16 000 higher than the value derived within the public context;
- Considering other impacts than health effects reduces the marginal utility of risk reduction and hence the implicit value of a statistical case of respective health outcomes. The co-benefits attributable to other non-health impacts are larger for the public context, and dominate the value when birth defects are valued. The effect of considering other impacts were however controlled during elicitation preferences for increasing the probability of conception and for reducing the chance of birth defects, while consideration of the other impacts were not questioned in the remaining valuation questions.

Recommendation for using the benefit values estimated in this study in the cost-benefit analysis and any policy impact assessment:

1. We provide the benefit estimates for two different populations – general population and population of people who want have a baby – while the former group also includes a part, but not all, of respondents from the latter group. To avoid double-counting, **the benefits** associated with a certain health outcome that were **derived from preferences of individuals from the general population** and **the benefits** associated with the same outcome but **derived from preferences of people who want a child should not be summed up.**

2. Since we elicited preferences of individuals within two different valuation contexts, we can also deliver two sets of WTP values for same health outcome. **The two values of willingness to pay for the same health outcome** (for instance, the probability to conceiving) that were **elicited within both the private context and the public good context should not be compared** to **one other,** because the two WTP values – and hence the two values of a statistical case –, are derived from preferences that were elicited in different valuation contexts (private vs. public good), within different contingent scenarios (novel vitamins vs. stricter EU regulation), with different payment mechanisms (off-pocket payment for the vitamin vs. increase in price of goods), and durations of the payment (twelve or eight monthly payments vs. increase in expenditures over ten years).

3. If we consider the public good scenario, it would be hard to imagine that there would not be any other effects of the stricter regulation of chemicals besides the effects on fertility, birth defects or birth weight. If the cost-benefit analysis assesses the impacts resulting from a public project or public program, the analysis of costs and benefits should not consider a narrow range of effects only, but it should rather address all possible effects and related benefits. Therefore, **considering the other effects while stating willingness to pay for improving public health risks by a respondent within the public good context should not devalue the estimation results. The other effects** can be considered as additional benefits of health improvement by a public program. It should be, however, clearly noted while providing the results from a CBA that **the WTP values as derived in our study within the public context might reflect some aspects of the utility attributable to other effects and hence the benefit estimates may also capture these non-health impacts**. If the costs-benefit analysis uses the benefit estimates as derived in our study, then one **should take care to avoid double-counting** when other non-health impacts and benefits were separately considered in the cost-benefit analysis. For such cases, the benefit estimates which do not include the part of co-benefits related to the other considered effects should be used instead in the CBA.

4. If we consider the private good scenario, it is the same story regarding the potential co-benefits, but we provide a different recommendation. First, it is hard to imagine that the effect of a novel complex of vitamins and minerals (i.e. our contingent product) would be limited only to fertility, or the birth of a healthy child, respectively. As a consequence, some of the respondents might think about other benefits or disbenefits when the novel complex of vitamins and minerals is purchased and taken in order to reduce certain health risks. Indeed, we found there are a large number of respondents who have considered these other effects – aside from the improvement in the probabilities of conception, birth defects or very low birth weight – while stating their willingness-to-pay for the vitamin. In our study, however, we are interested in deriving a value for health risks, and not for a novel complex of vitamins and minerals. Considering the main purpose of our study, if the benefit estimates derived from the private good context shall be used in the CBA, we recommend **using the willingness to pay values elicited within the private good context after subtracting the benefit component attributable to the other effects**. Subtracting this part of benefits from the WTP value of respective health outcome would provide a conservative value of the benefits for the cost-benefit analysis. **The gross values of the willingness to pay, i.e. those that include the benefits linked to the other effects, can be used in the sensitivity analysis of cost-benefit assessment.**

5. If **impacts of a public program with long-lasting effects were to be analysed, we recommend using the WTP values as derived within the public good scenario**. Also considering the duration of the payment we used in our contingent scenario, these values would correspond more to a situation arising after the introduction of a stricter public regulation.

6. Certain projects might have, however, a short-term, or immediate, impact on fertility and/or development. In such cases, we think that such **acute, immediate effects might be better valued by using the benefit values as estimated within the private good context**. In this case, however, the benefits attributable to other non-health impacts should be subtracted from the WTP values used in cost-benefit analysis.

Table 81: Recommended EU28 WTP values for the health outcomes (EUR PPS, 2013)

People who want a child – private good

Health outcome	Base value *	Sensitivity analysis
Value of a statistical pregnancy	21 600	34 700
Value of a statistical case of Healthy Child: MINOR birth defects	4 300	12 100
Value of a statistical case of Healthy Child: defects in INTERNAL organs	128 200	178 000
Value of a statistical case of Healthy Child: defects in EXTERNAL body parts	25 700	108 300
Value of a statistical case of VLBW	126 200	
Value of a statistical infertility (in vitro fertilisation treatment)	29 400	

General population – public good

Health outcome	Base value	Sensitivity analysis
Value of a statistical pregnancy	37 900	12 500* 20 800*[c] 40 700[c]
Value of a statistical case of Healthy Child: MINOR birth defects	50 700	41 800[c]
Value of a statistical case of Healthy Child: defects in INTERNAL organs	771 300	711 800[c]
Value of a statistical case of Healthy Child: defects on EXTERNAL body parts	453 600	329 800[c]
Value of a statistical case of VLBW	548 300	405 500[c]

Note:

** The value based on WTP estimates after controlling the effect of considering other co-benefits while stating the WTP for improving health risks within the private good valuation scenarios .*

[c] Values estimated from preferences as stated for the public good improvement by people who want a child.

References

Agee, M. D., & Crocker, T. D. (1996). Parental Altruism and Child Lead Exposure: Inferences from the Demand for Chelation Therapy. *The Journal of Human Resources*, 31(3), 677. doi:10.2307/146271

Alderman, H., Behrman, J. R. (2006). Reducing the incidence of low birth weight in low-income countries has substantial economic benefits. *WORLD BANK RESEARCH OBSERVER*, 21(1), 25-48. DOI: 10.1093/wbro/lkj001 Published: SPR 2006

Bateman, I., & Great Britain. (2002). *Economic valuation with stated preference techniques : a manual.* Cheltenham UK ;Northampton MA: Edward Elgar.

Bateman, I. J., Carson, R. T., Day, B., & Hanemann, W. M. (2004). Economic Valuation with Stated Preference Techniques: A Manual (p. 458). Edward Elgar Pub.

Black, S. E., Devereux, P. J.. Salvanes, K. G. (2007). From the cradle to the labor market? The effect of birth weight on adult outcomes. *QUARTERLY JOURNAL OF ECONOMICS*, 122(1), 409-439. DOI: 10.1162/qjec.122.1.409

Boyle, M. H., Torrance, G. W., Sinclair, J. C., & Horwood, S. P. (1983). Economic Evaluation of Neonatal Intensive Care of Very-Low-Birth-Weight Infants. *New England Journal of Medicine*, 308(22), 1330 –1337. doi:10.1056/NEJM198306023082206

Canavari, M., Nocella, G., Scarpa, R. (2005), Stated Willingness-to-Pay for Organic Fruit and Pesticide Ban: An Evaluation Using Both Web-Based and Face-to-Face Interviewing. *Journal of Food Products Marketing*, 11(3): 107-134.

Carson, R. T., & Louviere, J. J. (2011). A Common Nomenclature for Stated Preference Elicitation Approaches. *Environmental and Resource Economics*, 49(4), 539–559. doi:10.1007/s10640-010-9450-x

Case, A. P., & Canfield, M. A. (2009). Methods for developing useful estimates of the costs associated with birth defects. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 85(11), 920–924. doi:10.1002/bdra.20637

Champ, P. A., Boyle, K. J., & Brown, T. C. (2003). *A Primer on Nonmarket Valuation*. Springer Science & Business Media.

Couper, M.P., Kapteyn, A., Schonlau, M., Winter, J. (2007). Noncoverage and nonresponse in an Internet survey. *Social Science Research*, 36(1): 131-148.

Czajkowski, M., Ščasný, M. (2010). Study on benefit transfer in an international setting. How to improve welfare estimates in the case of the countries' income heterogeneity? *Ecological Economics* 69 (2010) 2409–2416.

Czech statistical office (2011). *Census Results*. [Date set].

Davies, K. (2005). How Much Do Environmental Diseases and Disabilities Cost? *Northwest Public Health.*

Dalton, M. & Lilford, R. (1989). Benefits of in vitro fertilization. *Lancet* 1989; 334, 1327.

Dastgiri, S., Imani, S., Kalankesh, L., Barzegar M., & Heidarzadeh M. (2007). Congenital anomalies in Iran: a cross-sectional study on 1574 cases in the North-West of country. *CHILD CARE HEALTH AND DEVELOPMENT*, 33(3) 257-261 DOI: 10.1111/j.1365-2214.2006.00720.x

Diamanti-Kandarakis, E., Bourguignon, J.-P., Giudice, L. C., Hauser, R., Prins, G. S., Soto, A. M., … Gore, A. C. (2009). Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement. *Endocrine Reviews*, 30, 293–342. doi:10.1210/er.2009-0002

Dockins, C., Jenkins, R. R., Owens, N., Simon, N. B., & Wiggins, L. B. (2002). Valuation of childhood risk reduction: the importance of age, risk preferences, and perspective. *Risk Analysis: An Official Publication of the Society for Risk Analysis, 22*(2), 335–346.

Dunson, D. B., Baird, D. D., & Colombo, B. (2004). Increased Infertility With Age in Men and Women. *Obstetrics & Gynecology*, 103(1), 51–56. doi:10.1097/01.AOG.0000100153.24061.45

EUROCAT (2004). Special Report: A Review of Environmental Risk Factors for Congenital Anomalies. EUROCAT Central Registry, University of Ulster. Retrieved from: http://www.eurocat-network.eu/content/Special-Report-Env-Risk-I-and-II.pdf

EUROCAT (2009a). Special Report: Congenital Anomalies are a Major Group of Mainly Rare Diseases. EUROCAT Central Registry, University of Ulster.
EUROCAT (2009b). Special Report: The Status of Health in the European Union: Congenital Malformations. EUROCAT Central Registry, University of Ulster.
EUROCAT (2012), EUROCAT Special Report: Congenital Anomalies are a Major Group of Mainly Rare Diseases. EUROCAT Central Registry, University of Ulster.
European Commission. (2012). Eurobarometer 65.1 (Feb-Mar 2006). [Date set]. doi:10.4232/1.10973
European Commission. (2014). Eurobarometer 75.4 (2011). [Date set]. doi:10.4232/1.11851
Eurostat (2011): *Population and housing census (cens)*. [Date set].
Eurostat (2014): *Information society statistics (t_isoc).* [Date set]. Retrieved from http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/data/main_tables
Flores, N.E., Carson, R.T .(1997). The Relationship between the Income Elasticities of Demand and Willingness to Pay. *Journal of Environmental Economics and Management* 33: 287-295.
Freeman, A. M. (1986). Chapter 10: On Assessing the State of the Arts of the Contingent Valuation Method of Valuing Environmental Changes. In Ronald G. Cummings, David S. Brookshire, and William D. Schulze, *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*, Rowman & Allanheld, Totowa, NJ. http://yosemite.epa.gov/ee/epa/eerm.nsf/vwGA/7f93e744c654707b8525644d0053bdfc!OpenDocument&ExpandSection=4
Gardino, S. L., Sfekas, A., & Dranove, D. (2010). Anticipating Ovarian Tissue Cryopreservation in the Health-Care Marketplace: A Willingness to Pay Assessment. In *Oncofertility* (pp. 363-370). Springer US. Retrieved from http://www.springerlink.com/index/10.1007/978-1-4419-6518-9_27
Ghalwash, T. (2008). Demand for Environmental Quality: An Empirical Analysis of Consumer Behavior in Sweden. *Environmental and Resource Economics* 41(1): 71-87.
Granberg, M., Wikland, M., Nilsson, L., & Hamberger, L. (1995). Couples' willingness to pay for IVF/ET. *Acta Obstetricia et Gynecologica Scandinavica*, 74(3), 199–202. doi:10.3109/00016349509008938
Grosse, S. D., Matte, T. D., Schwartz, J., & Jackson, R. J. (2002). Economic gains resulting from the reduction in children's exposure to lead in the United States. *Environmental Health Perspectives*, 110(6), 563–569.
Haab, T. C., & K. E. McConnell K. E. (2002). *Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation*. Edward Elgar.
Hack M., Klein N.K., Taylor H.G. (1995): Long-Term Developmental Outcomes of Low Birth Weight Infants. The Future of Children. Journal Issue: *Low Birth Weight*, 5 (1); Spring 1995
Hanley, N., Mourato, S., & Wright, R. E. (2001). Choice Modelling Approaches: A Superior Alternative for Environmental Valuatioin? *Journal of Economic Surveys*, 15(3), 435–462. doi:10.1111/1467-6419.00145
van der Heide, C. M., van den Bergh, J. C. J. M., van Ierland, E. C., Nunes, P. A. L. D. (2008), Economic valuation of habitat defragmentation: A study of the Veluwe, the Netherlands. *Ecological Economics*, 67, 205-216.
Hook E.B., Marden P.M.,Reissi N.P., Smith D. (1975): Some Aspects of the Epidemiology of Human Minor BirthDefects and Morphological Variants in a Completely Ascertained Newborn Population (Madison Study). *TERATOLOGY*, 3, 47-56.
van Houtven, G. & Kerry Smith, V. (1999). Willingness to Pay for Reductions in Infertility Risks: A Contingent Valuation Study. In Shi-Ling Hsu (Ed.), *Valuing Health for Environmental Policy with Special Emphasis on Children's Health Protection*, Proceedings of the Second Workshop in the Environmental Policy and Economics Workshop Series. Silver Spring, Maryland, March 24-25.
Hutchings, S., & Rushton, L. (2007). *Estimation of the Burden of Childhood Disease in Europe due to Environmental Risk Factors*. Copenhagen, Denmark: Draft Report to the EEA.
Jarbrink, K., & Knapp, M. (2001). The Economic Impact of Autism in Britain. *Autism*, 5(1), 7–22. doi:10.1177/1362361301005001002

Jorgensen, B. S., Syme, G. J., Bishop, B. J., & Nancarrow, B. E. (1999). Protest Responses in Contingent Valuation. *Environmental and Resource Economics*, 14(1), 131–150. doi:10.1023/A:1008372522243

Joyce, T. J., Grossman, M., & Goldman, F. (1989). An assessment of the benefits of air pollution control: The case of infant health*. Journal of Urban Economics*, 25(1), 32–51. doi:10.1016/0094-1190(89)90042-9

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263. doi:10.2307/1914185

Knapp, M., Foundation for People with Learning Disabilities, Shirley Foundation, & King's College London. (2007). The economic consequences of autism in the UK. London: Foundation for People with Learning Disabilities. Retrieved from http://www.lse.edu/collections/pressAndInformationOffice/PDF/EconomicCostsofAutism.pdf

Korfmacher, K. (2003). *Long-term Costs of Lead Poisoning: How Much Can New York Save by Stopping Lead?* Report for Alliance for Healthy Homes. Retrieved from: www.afhh.org/ a/aa_state%20_local_lead_costs_NYrep.pdf.

Kovacheva, K. (2009). Trends and Causes of Congenital Anomalies in the Pleven Region, Bulgaria. Balkan Journal of Medical Genetics, 2009, Vol.12(1), 12(1). Retrieved from: https://exlibris-pub.s3.amazonaws.com/aboutCrossref.html

Kuchler, F., & Golan, E. H. (1999). *Assigning Values To Life: Comparing Methods For Valuing Health Risks* (Agricultural Economics Reports No. 34037). United States Department of Agriculture, Economic Research Service. Retrieved from http://ideas.repec.org/p/ags/uerser/34037.html

Kumar, P., & Burton, B. K. (2008). *Congenital malformations: Evidence-based evaluation and management*. New York: McGraw-Hill Medical.

Lancaster, K.J. (1966), A New Approach to Consumer Theory. *Journal of Political Economy*, 1966, 74(2): 132-157.

Landrigan, P. J., Schechter, C. B., Lipton, J. M., Fahs, M. C., & Schwartz, J. (2002). Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. *Environmental Health Perspectives*, 110(7), 721–728.

Lewit, E. M., Baker, L. S., Corman, H., & Shiono, P. H. (1995). The Direct Cost of Low Birth Weight. *The Future of Children*, 5(1), 35. doi:10.2307/1602506

Lindhjem, H., Navrud, S. (2011), Using Internet in Stated Preference Surveys: A review and comparison of survey modes. *Review paper for the International Review of Environmental and Resource Economics*. Date of draft: July 31, 2011.

Mahram, M., Mousavinasab, N., Urimei, A. G. (2009) Intelligence Quotient (IQ) and Growth Indices in Children with the History of Low Birth Weight*. IRANIAN JOURNAL OF PEDIATRICS*, 19(4)

Massey, R., & Ackerman, F. (2003). Costs of Preventable Childhood Illness: The Price We Pay for Pollution. Tufts University: Global Development and Environment Institute Working Paper No. 03-09.

McCormick, M. C., Bernbaum, J. C., Eisenberg, J. M., Kustra, S. L., & Finnegan, E. (1991). Costs incurred by parents of very low birth weight infants after the initial neonatal hospitalization. *Pediatrics*, 88(3), 533–541.

Miller, T., Rauh, V. A., Glied, S. A. M., Hattis, D., Rundle, A., Andrews, H., & Perera, F. (2006). The Economic Impact of Early Life Environmental Tobacco Smoke Exposure: Early Intervention for Developmental Delays. *Environmental Health Perspectives*, 114(7), 1585–1588. doi:10.1289/ehp.9165

Msall, M. E., Tremont, M. R. (2002). Measuring functional outcomes after prematurity: Developmental impact of very low birth weight and extremely low birth weight status on childhood disability. MENTAL RETARDATION AND DEVELOPMENTAL DISABILITIES RESEARCH REVIEWS, 8(4), 258-272. DOI: 10.1002/mrdd.10046

Nastis, S. A., & Crocker, T. D. (2003) *Pregnant Mother's Valuation of Own and Child Health*.Paper presented at EAERE. Retrieved from http://www.webmeets.com/files/papers/EAERE/2008/157/157.pdf

Nastis, S. A., & Crocker, T. D. (2012). Valuing mother and child health: The intrauterine environment. *Economics & Human Biology, 10*(3), 318–328. doi:10.1016/j.ehb.2011.03.003

Neumann, P. J., & Johannesson, M. (1994). The willingness to pay for in vitro fertilization: a pilot study using contingent valuation. *Medical care*, 32(7), 686–699.

OECD (2012). Infant health: Low birth weight. In *Health at a Glance: Europe 2012*. OECD Publishing

Olesen, J., Gustavsson, A., Svensson, M., Wittchen, H.-U., Jönsson, B., on behalf of the CDBE2010 study group, & the European Brain Council. (2012). The economic cost of brain disorders in Europe. *European Journal of Neurology*, 19(1), 155–162. doi:10.1111/j.1468-1331.2011.03590.x

Palumbo, A., De La Fuente, P., Rodrı´guez, M., Sánchez, F., Martínez-Salazar, J., Muñoz, M., Marqueta, J., Hernández, J., Espallardo, O., Polanco, C., Paz, S. & Lizán, L. (2011). Willingness to pay and conjoint analysis to determine women's preferences for ovarian stimulating hormones in the treatment of infertility in Spain. *Human Reproduction*, 26 (7), 1790–1798. doi:10.1093/humrep/der139

Platt, M. J., Cans, C., Johnson, A., Surman, G., Topp, M., Torrioli, M. G., & Krageloh-Mann, I. (2007). Trends in cerebral palsy among infants of very low birthweight (<1500 g) or born prematurely (<32 weeks) in 16 European centres: a database study. *Lancet*, 369(9555), 43–50. doi:10.1016/S0140-6736(07)60030-0

Prüss-Ustün, A., Vickers, C., Haefliger, P., & Bertollini, R. (2011). Knowns and unknowns on burden of disease due to chemicals: a systematic review. *Environmental Health*, 10(1), 9. doi:10.1186/1476-069X-10-9

Ready, R., Navrud, S. (2006). International benefit transfer: Methods and validity tests. *Ecological Economics* 60(2): 429-434.

Ready, R., Navrud, S., Day, B., Dubourg, R., Machado, F., Mourato, S., Spanninks, F., Rodriquez, M.X.V. (2004). Benefit Transfer in Europe: How Reliable Are Transfers between Countries? *Environmental and Resource Economics* 29(1): 67-82.

Rudnai, P., Varró, M. J., Mácsik, A., Szabó, E., Vaskövi, E., Szalkai, M., … Lászlóné, B. (2007). Air Pollution During Pregnancy and Low Birth Weight in Dorog, Hungary. *Central European Journal of Public Health*, S12–S12.

Russo C. A., Elixhauser, A. (2007). Hospitalizations for birth defects, 2004. *Report No. 24.* U.S. Agency for Healthcare Research and Quality: Rockville. Retrieved from: http://www.hcup-us.ahrq.gov/reports/statbriefs/sb24.pdf accessed on 24 January 2007

Ryan, M. (1996). Using willingness to pay to assess the benefits of assisted reproductive techniques. *Health Economics*, 5(6), 543–558. doi:10.1002/(SICI)1099-1050(199611)5:6<543::AID-HEC230>3.0.CO;2-R

Ryan, M. (1997). Should government fund assisted reproductive techniques? A study using willingness to pay. *Applied Economics*,29, 841-849.

Ryan, M. (1998). Valuing psychological factors in the provision of assisted reproductive techniques using the economic instrument of willingness to pay. *Journal of Economic Psychology*, 19, 179-204.

Ryan, M. (1999). Using conjoint analysis to take account of patient preferences and go beyond health outcomes: an application to in vitro fertilisation. *Social science & medicine* (1982), 48(4), 535–546.

Ryan, M., Gerrard, K., Amaya-Amaya, M. (2008), Using discrete choice experiments to value health and health care. *Dordrecht : Springer*, 2008. ISBN: 9781402057533.

Scasny, M., Alberini, A. (2011), Valuation of Mortality Risk: Investigating the Effect of a Survey Mode Administration On a Value of Statistical Life, International Journal of Environmental Research and Public Health, Special Issue "Climate Change and Human Health Impacts and Adaptation" (ISSN 1660-4601). (forthcoming in 2011).

Schwartz, R. M. (1989). What Price Prematurity? *Family Planning Perspectives*, 21(4), 170. doi:10.2307/2135808

von Stackelberg, K., & Hammitt, J. (2009). Use of Contingent Valuation to Elicit Willingness-to-Pay for the Benefits of Developmental Health Risk Reductions. *Environmental and Resource Economics*, 43(1), 45–61. doi:10.1007/s10640-009-9267-7

Stavinoha, T., & Barner, J. (2001). Assessment of the relationship between quality of life and willingness to pay for in vitro fertilization in patients undergoing treatment for infertility. Research in Human Capital and Development, 14, 299-314.

Survey Sampling International. (2013). Speeding (SSI POV). Retrieved from http://www.surveysampling.com/ssi-media/Corporate/POVs-2012/Speeding_POV

Trasande, L., Landrigan, P. J., & Schechter, C. (2005). Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain. *Environmental Health Perspectives*, 113(5), 590–596. doi:10.1289/ehp.7743

US EPA (1985). *Costs and Benefits of Reducing Lead in Gasoline: Final Regulatory Impact Analysis.* Washington, D.C. : United States Environmental Protection Agency.

US EPA (1997). *The Benefits and Costs of the Clean Air Act, 1970 to 1990*. Washington, D.C. : United States Environmental Protection Agency.

US EPA (1998). *Cost of Illness Handbook*. Internal Review Draft. United States Environmental Protection Agency.

US EPA (2013). *America's Children and the Environment* (Third Edition). Washington, D.C.: United States Environmental Protection Agency.

Waitzman, N. (1996). *The cost of birth defects: estimates of the value of prevention*. Lanham, Md: University Press of America.

Weber, M. A., & Sebire, N. J. (2010). Genetics and developmental pathology of twinning. *Seminars in Fetal and Neonatal Medicine*, 15(6), 313–318. doi:10.1016/j.siny.2010.06.002

WHO (2010): *SIXTY-THIRD WORLD HEALTH ASSEMBLY A63/10*, Provisional agenda item 11.7. 1 April 2010. Report by the Secretariat. World Health Organisation.

Wigle, D. T., Arbuckle, T. E., Turner, M. C., Bérubé, A., Yang, Q., Liu, S., & Krewski, D. (2008). Epidemiologic Evidence of Relationships Between Reproductive and Child Health Outcomes and Environmental Chemical Contaminants. *Journal of Toxicology and Environmental Health*, Part B, 11(5-6), 373–517. doi:10.1080/10937400801921320

Wilson, M.A., Hoehn, J.P. (2006). Valuing environmental goods and services using benefit transfer: The state-of-the art and science. *Ecological Economics* 60(2): 335-342

Appendix 1: Review of WTP estimates for fertility end-point

Health outcome	**Study (In-text reference)**	**Target population**	**Country**	**Survey year / year of paper submission indicated by***	**Sample size (N)**	**Survey method (CAPI, CAWI, CATI..)**	**Sampling (Quota, Stratified, Cluster, Multistage, Systematic random)**	**Subsample**	**Preferences - stated (SP) / revealed (RP)**	**Elicitation techniques (see Notes)**
Chance to conceive or deliver a child	Ryan (1999)	individuals attending the Assisted Reproductive Unit (ARU) in Aberdeen who were on the waiting list for IVF, individuals who had had a `failed' attempt at IVF and were still trying, as well as those users who had left the service both with a child and childless	UK	1998*	331	CAWI - EMAIL SURVEY	Nonprobability Sampling		SP	Choice experiments
Chance to conceive or deliver a child	Neumann and Johannesson (1994)	6 populations: economics class Harvard School of Public Health; administrative staff at the Harvard School of Public Health; nurses attending a conference in Boston; Harvard University Health Service administrative staff; parents at a day care centre at the Harvard Business School; and a group of young physicians attending a weekly medical seminar	USA	1992	231 of 389 distributed	PAPI CAWI - EMAIL SURVEY	Nonprobability Sampling		SP	CV, Combination of open-ended and close-ended technique

Chance to conceive or deliver a child	Gardino et al. (2010)	young women (ages 18-25) from the Chicago area	USA	2010*	75	Face-to-Face interview	Nonprobability Sampling	third of responden ts- Success rate 25%	SP	CV, Open-ended technique
								third of responden ts-Success rate 50%		
								third of responden ts-Success rate 100%		
Chance to conceive or deliver a child	Ryan (1998)	individuals who had gone through IVF treatment at Aberdeen's Assisted Reproduction Unit (ARU) since its opening in 1989	UK	1996*	307	mail survey	Nonprobability Sampling	ex ante group (currently undergoing treatment or willing to have another attempt N=78)	SP	CV, Dichotomous choice
								ex post group (not willing to undergo another attempt N=229)		
Chance to conceive or deliver a child	Ryan (1996)	women at Integrated Fertility Services (IFS), a private infertility service in Sydney + random sample of their partners	Common wealth of Australia	1995*	339	mail survey	Nonprobability Sampling		SP	CV, Payment card

Chance to conceive or deliver a child	Palumbo et al. (2011)	patients ready to receive, or receiving, COS therapies for infertility from seven specialized private centres in six autonomous communities in Spain	Kingdom of Spain	2010* Face –to-face interview	160	Face –to-face interview	Nonprobabilit y Sampling		SP	CV, Combination of open-ended and close-ended technique: combination of double-bounded (closed-ended) and open questions
Chance to deliver a (healthy) child	Van Houtven and Smith (1999)	individuals of child-bearing age who were in a long-term relationship with a partner of the opposite sex but who were also uncertain as to in a whether they would be able to successfully conceive a child	USA	1998	188	CASI	Nonprobability Sampling		SP	CV, Close-ended technique
Chance to conceive or deliver a child	Stavinoha and Barner (2001)	infertile women undergoing treatment for infertility in five physicians' offices	USA	1999-2000	86	Self-administe red mail survey	Nonprobability Sampling		SP	CV, Payment card

Chance to conceive or deliver a child	Ryan (1997)	individuals who had been through IVF treatment at Aberdeen's Assisted Reproduction Unit (ARU) since its opening in 1989	UK	1996*	307	mail survey	Nonprobability Sampling		SP	CV, Dichotomous choice
Chance to conceive or deliver a child	Dalton & Lilford (1989)	general public and patients attending a subfertility clinic	n.a.	1989*	48	Question-naire survey	Nonprobability Sampling	general population (n=32] infertility population (n=12)	SP	SG
Chance to conceive or deliver a child	Granberg et al. (1995)	couples referred for IVF / ET or seeking treatment	Sweden (currency in GBP)	1992 - 1993	40	Question-naire survey	Nonprobability Sampling		SP	CV, Open-ended technique

Note: CV – contingent valuation method, DCE – discrete choice experiment, SG – standard gamble

			Description of good					
Health outcome	**Study (In-text reference)**	**Type of good (prevention, treatment, …)**	**Medical treatment costs included (Y/ N/ n.a.)**	**Loss of productivity included (Y/ N/ n.a.)**	**Prevalence**	**Quality of life**	**Others**	**Outlook**
Chance to conceive or deliver a child	Ryan (1999)	in vitro fertilisation (IVF)	YES	NO			Attitudes of staff toward you; Continuity of contact with same staff; Time on waiting list for IVF attempt (months); Follow-up support; Cost to you of IVF attempt (£)	Chance of taking home a baby (5%, 10%, 15%, 25%, 35%)
Chance to conceive or deliver a child	Neumann and Johannesson (1994)	in vitro fertilisation (IVF)	YES	NO	of infertility	drug injections, outpatient surgery side effects: pain, mood swings, nausea	proportion of population provided with IVF	Probability of conceiving a child (10%; 25%, 50%; 100%)

Chance to a deliver child	Gardino et al. (2010)	ovarian tissue cryopreservation (OC)	YES				percentage of candidates for OC	Success rate (25%, 50%, 100%)
Chance to conceive or deliver a child	Ryan (1998)	in vitro fertilisation (IVF)	NO	NO				one attempt at IVF
Chance to conceive or deliver a child	Ryan (1996)	in vitro fertilisation (IVF)	NO	NO				one attempt at IVF
Chance to conceive or deliver a child	Palumbo et al. (2011)	controlled ovarian stimulation (COS)	NO	NO			Administration of treatment (interference with social and work activities), Patient–doctor safer and comfortable admission, lesser discomfort at injection site, safer (allergies, infections, ovarian hyperstimulation syndrome)	1-2% gain in probability in successful pregnancy
Chance to conceive or deliver a child	Van Houtven and Smith (1999)	prevention of infertility through hypothetical medication	YES		of infertility		primary risk factors associated with infertility types, costs and success rates of treatment	delay the increase in infertility risk for up to five years

							with and without medication scenarios of increase of risk	
Chance to conceive or deliver a child	Stavinoha and Barner (2001)	in vitro fertilisation (IVF)	NO	NO		daily injections, ultrasound procedures, outpatient surgery, minimize physical activity, nausea, back pain, mood swings	chance of pregnancy, taking home a baby	
Chance to conceive or deliver a child	Ryan (1997)	in vitro fertilisation (IVF)	NO	NO				one IVF attempt
Chance to conceive or deliver a child	Dalton & Lilford (1989)	in vitro fertilisation (IVF)	n.a.	n.a.				have a child
Chance to conceive or deliver a child	Granberg et al. (1995)	in vitro fertilisation (IVF)	YES	NO				have a child

		Estimates							
Health outcome	**Study (In-text reference)**	**Categories**	**WTP for attribute**	**Median**	**Mean**	**Mean in USD 2010 - PPP exchange rate**	**Mean in USD 2010 - Market exchange rate**	**Std.**	**Marginal WTP**
Chance to conceive or deliver a child	Ryan (1999)	Income1 <£15 000	Chance of having a child (% increase)		£ 133	$ 242.53	$ 248.95	£ 12	
		income2 = £15 001±30 000	Chance of having a child (% increase)		£ 160	$ 291.77	$ 299.49	£ 12	
		income3 = £31 001 +	Chance of having a child (% increase)		£ 267	$ 486.89	$ 499.78	£ 31	

Chance to conceive or deliver a child	Neumann and Johannesson (1994)	Ex Post - purchase IVF in the event respondents were infertile (only respondents who indicated that they definitely or possibly wanted (more) children)	Probability of Success - 10%		$ 17 730 (Ex Post); $ 865 (Ex Ante); $ 32 (Public program)	$ 27 552.84 (Ex Post); $ 1 344.23 (Ex Ante); $ 49.73 (Public program)	$ 27 552.84 (Ex Post); $ 1 344.23 (Ex Ante); $ 49.73 (Public program)		$ 177 300 (Ex Post); $ 1 730 000 (Ex Ante); $ 980 000 (Public Ex Ante)
		Ex Ante - purchase lifetime insurance coverage for IVF (only respondents who indicated that they definitely or possibly wanted (more) children)	Probability of Success - 25%		$ 28 054 (Ex Post); $ 1 055 (Ex Ante); $ 38 (Public program)	$ 43 596.58 (Ex Post); $ 1 639.50 (Ex Ante); $ 59.05 (Public program)	$ 43 596.58 (Ex Post); $ 1 639.50 (Ex Ante); $ 59.05 (Public program)		$ 68 827 (Ex Post); $ 253 333 (Ex Ante); $ 112 000 (Public Ex Ante)

		Public program- pay in taxes for public IVF program	Probability of Success - 50%		$ 43 576 (Ex Post); $ 1 466 (Ex Ante); $ 46 (Public program)	$ 67 718.14 (Ex Post); $ 2 278.20 (Ex Ante); $ 71.49 (Public program)	$ 67 718.14 (Ex Post); $ 2 278.20 (Ex Ante); $ 71.49 (Public program)		$ 62 088 (Ex Post); $ 328 000 (Ex Ante); $ 100 800 (Public Ex Ante)
		Public Ex Ante- pay in taxes for public IVF program (only respondents who indicated that they definitely or possibly wanted (more) children)	Probability of Success - 100%		$ 63 896 (Ex Post); $ 2 006 (Ex Ante); $ 62 (Public program)	$ 99 295.91 (Ex Post); $ 3 117.37 (Ex Ante); $ 96.35 (Public program)	$ 99 295.91 (Ex Post); $ 3 117.37 (Ex Ante); $ 96.35 (Public program)		$ 40 640 (Ex Post); $ 216 000 (Ex Ante); $ 112 000 (Public Ex Ante)
Chance to conceive or deliver a child	Gardino et al. (2010)	OC (Ex-post)	25% success rate	$ 7 000 (OC); $ 100 (insurance)	$ 16 304 (OC); $ 644 (insurance)	$ 21 342.79 (OC); $ 843.03 (insurance)	$ 21 342.79 (OC); $ 843.03 (insurance)	$ 20 538 (OC); $ 1 363 (insurance)	
		lifetime insurance to cover the costs of OC (EX Ante)	50% success rate	$ 10 000 (OC); $ 320 (insurance)	$ 17 360 (OC); $ 573 (insurance)	$ 22 725.15 (OC); $ 750.09 (insurance)	$ 22 725.15 (OC); $ 750.09 (insurance)	$ 17 300 (OC); $ 932 (insurance)	
			100% success rate	$ 20 000 (OC); $ 150 (insurance)	$ 33 160 (OC); $ 565 (insurance)	$ 43 408.19 (OC); $ 739.61 (insurance)	$ 43 408.19 (OC); $ 739.61 (insurance)	$ 50 745 (OC); $ 936 (insurance)	

Chance to conceive or deliver a child	Ryan (1998)	ex ante general reg. model	one attempt at IVF	£ 3 947	£ 6 552	$ 12 353.60	$ 12 680.60		
		ex ante specific reg. model	one attempt at IVF	£ 3 902	£ 6 829	$ 12 875.88	$ 13 216.70		
		ex post general reg. model	one attempt at IVF	£ 1 926	£ 1 983	$ 3 738.90	$ 3 837.85		
		ex post specific reg. model	one attempt at IVF	£ 2 423	£ 2 641	$ 4 979.53	$ 5 111.33		
Chance to conceive or deliver a child	Ryan (1996)	average one attempt raw data	one attempt at IVF	$ 2 250	$ 2 506	$ 2 309.52	$ 3 161.48	$ 2 097	
		one attempt reg. model	one attempt at IVF	$ 1 952	$ 2 360	$ 2 174.97	$ 2 977.29		
Chance to conceive or deliver a child	Palumbo et al. (2011)	COS therapy per cycle	most recent hormonal treatment 1-2% increase in probability of successful pregnancy	€ 800	€ 1 442.29	$ 1 858.22	$ 11.22	€ 4 093.57	

Chance to conceive or deliver a child	Van Houtven and Smith (1999)	hypothetical medication delaying increase in infertility risk for up to five years	annual WTP for the hypothetical medication		$ 324	$ 433.41	$ 433.41		
			total (5 years) discounted WTP value for infertility risk reductions varying between 3 and 9 %		$ 1 484	$ 1 985.14	$ 1 985.14		
Chance to conceive or deliver a child	Stavinoha and Barner (2001)	Pay for IVF	20%-25% chance of success IVF	$ 8 000	$ 10 277	$ 13 013.68	$ 13 013.68	$ 13 210	
Chance to conceive or deliver a child	Ryan (1997)	general model	general model	£ 3 356	£ 5 101	$ 9 617.78	$ 9 872.36		
		specific model	specific model	£ 3 315	£ 5 035	$ 9 493.34	$ 9 744.63		
Chance to conceive or deliver a child	Dalton & Lilford (1989)	General population	100% success		38% of year's PTI- post tax income			22	
			50% success		29% of year's PTI			25	

			Years of end of life to be pregnant once		12			5,2	
			Risk of death to have a child		20%			21	
		Infertility population	100% success		38% of year's PTI			28	
			50% success		34% of year's PTI			25	
			surrender years off end of life to be pregnant once		11,6			7,7	
			risk of death to have one child		35%			35	
Chance to conceive or deliver a child	Granberg et al. (1995)	WTP for having a child	having a child (55% of parents)					10 000 or more	
		WTP for IVF at different price levels	price of 1 IVF: 1 000	£ 6 000.00					
			price of 1 IVF: 1 500	£ 6 000.00					
			price of 1 IVF: 2 000	£ 6 000.00					
			price of 1 IVF: 2 500	£ 7 500.00					

Appendix 2: Overview of cost-of-illness values for developmental endpoint

	Summary of Estimates for Values of Health Effects Related to Developmental End-point Based on Cost-of-illness Method							
Type of Effect	**Description of Health Effect Studied**	**Author(s)**	**Methodology and Type of Estimate**	**Country**	**Population**	**Key Findings (Description)**	**Estimated Value (2010$)**	**Year of Estimates**
Birth Defects	**Costs Associated with Birth Defects**	Case, Canfield (2009)	CI- direct and indirect costs	USA	live birth cohort of spina bifida cases in Texas	Applying a recently published average lifetime medical cost of $ 635 000 per case of spina bifida to the average annual birth cohort of 120 Texas cases, an estimated $ 76 million in direct and indirect medical and other costs will be incurred in Texas over the life span of that cohort. Examples of estimated medical costs for one year are $ 5 million for infants using actual employer-paid insurance claims data and $ 6 million combined for children in two public sector programs.	Lifetime medical cost of $ 652 949.3 per case of spina bifida, direct and indirect costs in Texas over the life span of the cohort- $ 78.15 million	2009

	Birth Defects - Lifetime Cost of Effect	Waitzman et al. (1996)	CI- direct and indirect costs	USA		Eighteen of the most clinically significant birth defects: total cost of these eighteen birth defects is more than 8 billion dollars (in 1992 dollars): Spina bifida $ 336 336 per case Truncus arteriosus $ 577 720 per case Transposition / DORV $ 305 448 per case Single ventricle $ 393 536 per case Tetralogy of Fallot $ 299 728 per case Cleft lip or palate $ 115 544 per case Tracheoesophageal fistula $ 165 880 per case Atresia of the small intestine $ 85 800 per case Colorectal atresia $ 140 712 per case Renal agenesis $ 286 000 per case Urinary tract obstruction $ 96 096 per case Upper-limb reduction $ 113 256 per case Lower-limb reduction $ 227 656 per case Diaphragmatic hernia $ 286 000 per case Gastroschisis $ 123 552 per case Omphalocele $ 201 344 per case Down syndrome $ 515 944 per case Cerebral palsy $ 575 432 per case	cost of eighteen birth defects - $ 13.8 billion; Low birth weight infants (below 2 500 g) - $ 1 570 441 943 per year; Figures range from $ 147 871 per case (atresia of the small intestine) to $ 995 668 per case (truncus arteriosis).	1992

Low Birth Weight	**Very Low Birth Weight**	Boyle et al. (1983)	CI- direct and indirect costs	Canada	Infants with birth weight 500-999g and birth weight 1000-1499g	For neonatal intensive care unit for infants with birth weight 500-999g: incremental cost per life saved was 125 000 (discounted at 5%); incremental cost per life-year gained was 11 400 (costs and benefits discounted at 5%), with a value of 6 240 when costs and benefits were not discounted. The incremental cost per QALY: was 27 400 (costs and benefits discounted at 5%), with a value of 11 100 when costs and benefits were not discounted. The range of incremental cost per QALY a lowest value of 17 700, and highest value of 55 700. For neonatal intensive care unit for infants with birth weight 1 000-1 499g: incremental cost per life saved was 72 800 (discounted at 5%); incremental cost per life-year gained was 3 550 (costs and benefits discounted at 5%), with a value of 1 100 when costs and benefits not discounted. The incremental cost per QALY was 3 910 (costs and benefits discounted at 5%), with a value of 1 100 when costs and benefits were not discounted. The range of incremental cost per QALY was a lowest value of 1 200, and highest value of 6 100.	Costs incurred through hospital discharge, per survivor: $ 184 797 (100-1 499 g). $ 318 327 (500-999 g) Lifetime Cost per life year: $ 8 993 (1 000-1 499 g). $ 69 571 (500-999 g) Lifetime Cost per QALY: $ 9 957 (1 000-1 499 g), $ 69 571 (500-999 g).	1978
	Low Birth Weight - Hospital Costs	Schwartz (1989)	CI - direct costs	USA	28 perinatal centres	total estimated cost for inpatient hospital care among neonates who went home - $ 1 585 448 343. Low birth weight infants (below 2,500 g) represent 9 % of neonates who went home but they cost $ 911 223 389 per year (57 % of the total acute impatient cost for all infants)	cost for inpatient hospital care among neonates who went home - $ 3 628 905 115	1985

	Very Low Birth Weight - Direct medical costs in year after hospital discharge	McCormick et al. (1991)	CI - direct costs	USA	32 VLBW infants discharged from the Infant Intensive Care Unit of the Children's hospital of Philadelphia from July 1983 to October 1984	VLBW infants averaged $ 10 139 in direct medical charges compared with $ 1 179 for the term infants.	direct medical charges of VLBW infants - $ 18 133	1991
	Low Birth Weight - Prevalent Population under age 17	Lewitt et al. (1995)	CI- direct costs	USA	data from several national surveys in 1988 - costs associated with low birth weight among children ages 0 to 15	The incremental costs associated with low birth weight exceeded $ 5.4 billion in 1988. 75% ($ 4.0 billion) were due to the health care cost of infants.	costs associated with low birth weight - over $ 10.76 billion	1988

	Low Birth Weight	US EPA (1998)	CI- direct and indirect costs	USA	the Lewit et al. Data and Waitzman et al., 1996 data and the Health Care Financing Administration (HCFA) data	Incremental Cost per LBW Child in 1996 Dollars during 1st year of Life - 24 697; Total Costs in 1996 Dollars (billions) - 6.6. total incremental direct costs in 1996 dollars is $ 8.91 billion. The total estimated cost for special education, grade repetition, and medical care for ages 0 to 15 years is $ 85 447 (undiscounted in $ 1996). The total estimated cost for special education, grade repetition, and medical care is $ 436 514 for a full lifetime of 75 years (undiscounted in $ 1996).	Incremental Cost per LBW Child during 1st year of Life - $ 37 052; Total Costs - $ 9.9 billions Total incremental direct costs- $ 13.37 billion. The total cost for special education, grade repetition, and medical care for ages 0 to 15 years - $ 128 194 The total estimated cost for special education, grade repetition, and medical care - $ 654 893 (full lifetime of 75 years)	1996
Neurobehavioral Disorders, Exposure to Chemicals, Birth Defects	**Paediatric environment-related diseases**	Landrigan et al. (2002)	CI- direct and indirect costs	USA	American children, current cohort of 5-year-old children (For childhood cancer, there is a broad range of age of onset	Lead poisoning costs were € 43.3 billion; asthma costs were € 1.8 billion; cancer costs were € 0.27 billion; neurobehavioral disorders costs were € 8.2 billion. Total annual costs were estimated to be € 49 billion, which represented 2.8% of total US health care costs at that time. Total annual costs are estimated to be $ 54.9 billion (range $ 48.8-64.8 billion): $ 43.4 billion for lead poisoning, $ 2.0 billion for asthma, $ 0.3 billion for childhood cancer, and	lead poisoning costs - € 52.99 billion; neurobehavioral disorders costs were € 10.04 billion. Total annual costs - $ 67.19	2002

					among cases)	$ 9.2 billion for neurobehavioral disorders	billion	
	Costs associated with five major environment-related health problems that significantly affect children: cancer, asthma, lead poisoning, neurobehavioral disorders and birth defects	Massey and Ackerman (2003)	CI - direct and indirect costs	USA	children from Massachusetts	Direct and indirect costs ranges from $ 1.1 to $ 1.6 billion annually in Massachusetts, The cost comes out at over $ 1 billion for medical care, special education, and other direct costs associated with caring for children with these illnesses, and is over $ 3.4 billion if we include estimates of school days lost and future income foregone. Medical, care, education, and lost future income Neurobehavioral costs - $ 2 060 800 000, Lead exposure costs - $ 972 000 000, Selected birth defects costs - $ 80 668 000	direct and indirect costs - $ 1.35 to $ 1.96 billion annually in Massachusetts, Neurobehavioral costs - $ 2 522 013 967 Lead exposure costs - $ 1 189 536 867 Selected birth defects costs - $ 98 721 769.54	2002

	Environmental diseases that affect children	Davies (2005)	CI - direct and indirect costs	USA	Washington State	Cost of Birth defects - € 3.8-5 Neurobehavioral disorders - € 64.7-273, the annual cost of childhood diseases and disabilities (asthma, cancer, lead exposure, birth defects, and neurobehavioral effects) attributable to environmental contaminants in Washington State is about $ 1 875 million in 2004 dollars, comprising $ 310.6 million in direct health care costs and $ 1 565 million in indirect costs. It also found that the best estimate of the annual cost of combined adult/childhood diseases and disabilities attributable to environmental contaminants (asthma, cardiovascular disease, cancer, lead exposure, birth defects, and neurobehavioral effects) in Washington State is about $ 2 734 million, comprising $ 782.1 million in direct health care costs and $ 1 953 million in indirect costs. The range of costs is $ 2 800 million to $ 3 500 million a year. Best Estimate (2004 $ million) of Birth Defects $ 4.2 - $ 5.5; of Neurobehavioral Disorders - $ 72.4 - $305.6 Direct Costs (2004 $ million) of Birth Defects - $ 1.5; of Neurobehavioral Disorders - $ 265.9 Indirect Costs (2004 $ million) of Birth Defects - $ 4.0; of Neurobehavioral Disorders - $ 39.7	The annual cost of childhood diseases and disabilities (asthma, cancer, lead exposure, birth defects, and neurobehavioral effects) - $ 2 127 (direct health care costs - $ 352 million, indirect costs - $ 1 775 million). Best Estimate: Birth Defects - $ 4.76 - $ 6.24 million; Neurobehavioral Disorders - $ 82.13 - $ 346.66 million Direct Costs: Birth Defects - $ 1.7 million; Neurobehavioral Disorders - $ 301.62 million Indirect Costs: Birth Defects - $ 4.54 million; Neurobehavioral Disorders - $ 45.03 million	2004

	Economic burden of childhood diseases in Europe	Hutchings and Rushton (2007)	CI- indirect costs	EU		Total costs were estimated to be above € 6 billion with € 174 million for cancer, EUR 3 billion for asthma, € 3 billion for neurodevelopmental disorders, and € 9.9 billion for lead poisoning (discount rate 3%) (2007)	Total costs - € 28.29 billion (€ 5.3 billion for neurodevelopmental disorders, and € 17.5 billion for lead poisoning (discount rate 3%)	2007*
Brain Disorders	**Cost of brain disorders in Europe**	Olesen et al. (2012)	CI - direct and indirect costs	Europe	30 European countries (literature reviews, national statistics from Eurostat)	Total European 2010 cost of brain disorders was € 798 billion, of which direct health care cost 37%, direct non-medical cost 23%, and indirect cost 40%. The average cost per inhabitant was € 5 550. The European average cost per person with a disorder of the brain ranged between € 285 for headache and € 30 000 for neuromuscular disorders. Total annual cost per disorder (in billion € 2010) was as follows: addiction 65.7; anxiety disorders 74.4; brain tumour 5.2; child/adolescent disorders 21.3; dementia 105.2; eating disorders 0.8; epilepsy 13.8; headache 43.5; mental retardation 43.3; mood disorders 113.4; multiple sclerosis 14.6; neuromuscular disorders 7.7; Parkinson s disease 13.9; personality disorders 27.3; psychotic disorders 93.9; sleep disorders 35.4; somatoform disorder 21.2; stroke 64.1; and traumatic brain injury 33.0.	Total European cost of brain disorders - $ 1 454 billion. Average cost per inhabitant - $ 10 114. Total annual cost: mental retardation 78.91; neuromuscular disorders 14.03	2010

Autism	**The economic impact of autism in Britain**	Jarbrink, K; Knapp, M (2001)	CI- direct and indirect costs	UK	based on published evidence and on the reanalysis of data holdings at the CEMH.	With an assumed prevalence of 5 per 10 000, the annual societal cost for the UK was estimated to exceed £ 1 billion. The lifetime cost for a person with autism exceeded £ 2.4 million. The main costs were for living support and day activities. Family costs account for only 2.3 percent of the total cost, but a lack of relevant information limited our ability to estimate these costs.	Annual societal cost for the UK - £ 2.62 billion; The lifetime cost for a person - £ 6.28 million.	2001
	The Economic consequences of autism in the UK	Knapp et al. (2007)	CI - direct and indirect costs	UK	national surveys, published research, our own previous studies and expert advice	Annual costs for children with low-functioning ASD who are living in residential or foster placements were estimated to be £ 16 185 (for children aged 0-3 years), £ 40 578 (aged 4-11) and £ 62 536 (aged 12-17). Costs were considerably lower if children with low-functioning ASD lived with their families: £ 585 (if aged 0-3), £ 23 869 (aged 4-11) and £ 36 474 (aged 12-17). Average annual costs for children with high-functioning ASD ranged from £ 1 214 to £21 090; an adult with high-functioning ASD living in a private household cost £ 32 681 per annum. For a high-functioning adult living in supported accommodation or a care home, costs are much higher (£ 84 703 and £ 87 299 respectively). Mean annual costs for low-functioning adults were found to be £ 36 507 for those living in private households, £ 87 652 in supported accommodation, £ 88 937 in residential care, and £ 97 863 in hospital. The aggregate national costs of supporting children with ASD were estimated to be £ 2.7 billion each year; The lifetime cost for someone with high-functioning autism was found to be £ 3.1 million and £ 4.6 million for someone with low-functioning autism	Annual costs - £ 25 060 (for children aged 0-3 years), £ 62 829 (aged 4-11) and £ 96 828 (aged 12-17). Costs of children living with their families: £ 906 (if aged 0-3), £ 36 958 (aged 4-11) and £ 56 474 (aged 12-17). The aggregate national costs - £ 4.18 billion / year; The lifetime cost - £ 4.8 million (high-functioning autism) and £ 7.12 million (low-functioning autism)	2007

Exposure to Chemicals	**Exposure to lead**	US EPA (1985)	CI- direct and indirect costs	USA	U.S. children with elevated blood, children needing compensatory education	medical cost per child found over 25 ug/dl at screening - $ 900 - (have not included welfare losses) 3 year compensatory education (cognitive effects and behavioural problems = poorer performance in school = compensatory education [repeat a grade or be referred for psychological counselling]) - $ 4 290 in $ 1983); average cost per child over 25 ug/dl = $ 2 574 / year (20 % of all children over 25 ug/dl are affected severely enough that compensatory education would be appropriate. Compensatory education + medical costs = $ 3 500 per case avoided of a child's blood-lead level exceeding 25 ug/dl.	medical cost per child found over 25 ug/dl at screening - $ 2 358 total compensatory education - $ 11 240 average cost per child over 25 ug/dl = $ 6 744 / year Compensatory education + medical costs = benefit estimate of $ 9 170 per case	1983
	Exposure to lead	US EPA (1997)	CI- indirect costs	USA		Effect of higher IQ on expected lifetime income - $ 3 000 per IQ point; compensatory education needed for children with IQ less than 70; WTP to avoid cases of children with IQ less than 70 can be by the cost $ 420 000 per child of part time special education (discounted to the present at 5 %)	$ 4 317 per IQ point	1997*

	Exposure to lead in the US	Grosse et al. (2002)	CI- indirect costs	USA	population of U.S. children	With discounted lifetime earnings of $ 723 300 for each 2-year-old in 2 000 dollars, the estimated economic benefit for each year's cohort of 3.8 million 2-year-old children ranges from $ 110 billion to $ 319 billion	economic benefit for each year's cohort of 3.8 million 2-year-olds - from $ 140.11 billion to $ 406 billion	2000
	Lead poisoning	Korfmacher (2003)	CI- direct and indirect costs	USA	New York citizens	Total annual benefit - Potential reduction in special education costs $ 9 706 454; Health care – Potential savings due to avoided direct treatment costs - $ 3 136 519; Potential for increased lifetime earnings = Total annual earnings gain - Average avoided IQ loss ($) - $ 776 256 773	reduction in special education costs - $ 12 910 344; Potential savings due to avoided direct treatment costs - $ 4 171 816; Potential for increased lifetime earnings (Average avoided IQ loss) - $ 1 032 482 284	1999
	Exposure to methyl mercury (impacts on the developing brain)	Trasande et al. (2005)	CI- direct and indirect costs	USA	babies born in USA with cord blood mercury levels > 5.8 µg/L	Loss of intelligence causes diminished economic productivity - $ 8.7 billion annually (range, $ 2.2–43.8 billion; all costs are in $ 2000). Of this total, $ 1.3 billion (range, $ 0.1–6.5 billion) each year is attributable to mercury emissions from American power plants.	loss of intelligence causes diminished economic productivity - $ 11.08 billion	2000

							annually	
	Early-life exposure to ETS and develop-mental delays	Miller et al. (2006)	CI- direct costs	USA	cohort of minority women and children in New York City (odds ratio of developmental delay = 2.36; 95% confidence interval 1.22–4.58)	The estimated cost of these services per year due to ETS exposure is > $ 50 million per year for New York City Medicaid births and $ 99 million per year for all New York City births.	Cost of services per year due to ETS exposure - > $ 52 million per year (New York City Medicaid births); $ 103 million per year (all New York City births)	2006

Note: CI- Cost of illness, CEMH- Centre for the Economics of Mental Health

Appendix 3: Review of WTP estimates for developmental end-point

Health outcome	Study (In-text reference)	Type of good (prevention, treatment, …)	Description of good					
			Medical treatment costs included (Y/ N/ n.a.)	Loss of productivity included (Y/ N/ n.a.)	Mortality	Treatment	Others	Outlook
Decline in child cognitive ability	von Stackelberg and Hammitt (2009)	clean up of contaminated freshwater system	NO	NO			IQ reduction / deficit in reading comprehension	decrease from 20 in 100 chance of 6 point reduction in IQ / 7 month deficit in reading comprehension to 5 or 10 in 100 chance
Neonatal mortality rates	Joyce et al. (1989)	improve of neonatal survival prospects associated with a 10 % reduction in sulfur dioxide concentration	YES	NO	neonatal mortality	neonatal intensive use, prenatal care use		
Neurodevelopment disorders	Agee and Crocker (1996)	reduction in child body lead burden	NO				body lead burden of the child	

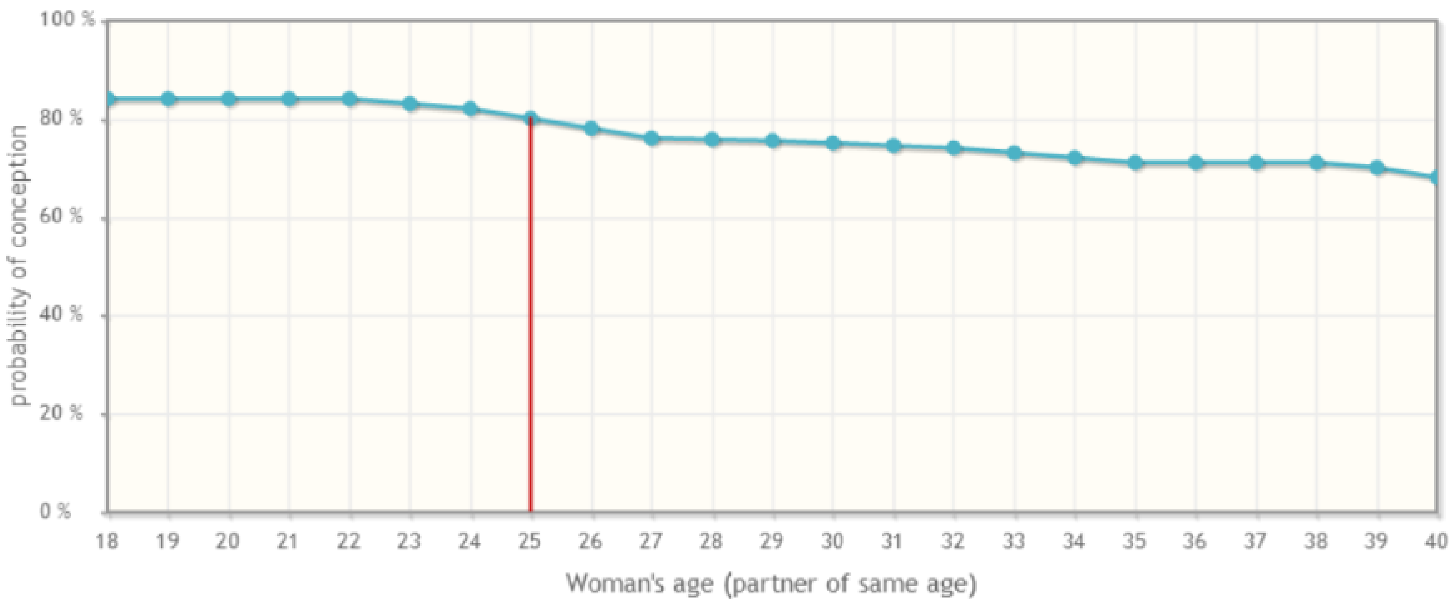
Health outcome	Study (In-text reference)	Estimates									
		Categories	WTP / WTA	WTP for attribute	Mean	Mean in USD 2010 - PPP exchange rate	Mean in USD 2010 - Market exchange rate	Std.	Std. in USD 2010 - Market exchange rate	Marginal WTP	Marginal WTP in USD 2010 - Market exchange rate
Decline in child cognitive ability	von Stackelberg and Hammitt (2009)	One-time increase in the State income tax	WTP	IQ point	$ 466	$ 473.64	$ 473.64				
Neonatal mortality rates	Joyce et al. (1989)	white families - prenatal care is used to measure cost of raising the probability of infant survival	WTP	Improved neonatal survival prospects				$ 54 000 000 (collectively women's WTP - social marginal WTP)	$ 150 655 305 (collectively women's WTP - social marginal WTP)	$ 1 (social marginal WTP of a white woman)	$ 2.8 (social marginal WTP of a white woman)

		black families - prenatal care is used to measure cost of raising the probability of infant survival	WTP							$ 4 (social marginal WTP of a black woman)	$ 11.16 (social marginal WTP of a black woman)
		white families - neonatal intensive care is used to measure cost of raising the probability of infant survival	WTP					$ 1 090 000 000 (collective marginal WTP)	$ 3 041 005 227 (collective marginal WTP)	$ 16 (social marginal WTP of a white woman)	$ 44.64 (social marginal WTP of a white woman)
		black families - neonatal intensive care is used to measure the cost of raising the probability of infant survival	WTP							$ 110 (social marginal WTP of a black woman)	$ 306.89 (social marginal WTP of a black woman)
Neurodevelopment disorders	Agee and Crocker (1996)	overall mean	WTP	1 Percent Reduction in Child Lead Burden (1980 dollars)	$ 16.11	$ 36.40	$ 36.40			$ 1.07	$ 2.99

		parents who chose chelation therapy	WTP	1 Percent Reduction in Child Lead Burden (1980 dollars)	$ 104.39	$ 235.88	$ 235.88			$ 3.62	$ 10.10
		parents who did not choose chelation therapy	WTP	1 Percent Reduction in Child Lead Burden (1980 dollars)	$ 11.18	$ 25.26	$ 25.26			$ 0.79	$ 2.20
		1984 U.S. metropolitan households with a child	WTP	1 Percent Reduction in Child Lead Burden (1980 dollars)	$ 242 00 0 000- $ 2 300 0 00 000	546 833 362. 78 - 5 197 176 588. 39	546 833 362. 78 - 5 197 176 588. 39			$ 17 000 000- $ 80 000 000	$ 47 428 522- $ 223 193 044

Appendix 4: Questionnaire: figure illustrating the probabilities of conception

Probability of conceiving at age 25



The chart is interpreted as follows:

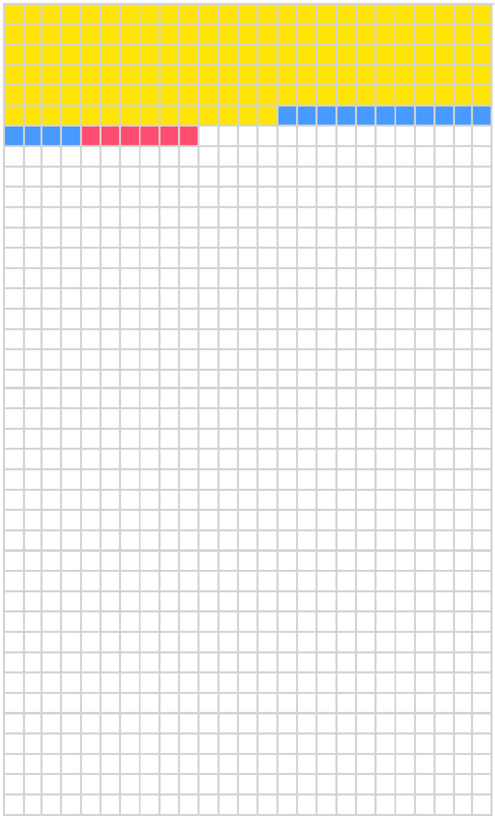
Imagine we are looking at a 25-year-old couple that is trying to conceive. The figure shows that the probability of conceiving for a **25** year old is **80 %** if the couple tries to conceive for at least a 12 month period. The probability is a bit higher for those younger than 25.

continue

Source: Medical study conducted in Europe (Dunson D.B., Baird D.D., Colombo B. (2004): Increased infertility with age in men and women. OBSTETRICS AND GYNECOLOGY, Volume: 103, Issue: 1, 51-56)

1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Appendix 5: Questionnaire: figure illustrating the probabilities of birth defects



– Minor birth defects

– Birth defects affecting internal organs

– Birth defects affecting external body parts

– Children without birth defects