



## Internet usage of women attempting pregnancy and pregnant women in the Netherlands



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### ABSTRACT

**Objectives:** Research focused on Internet behavior by women attempting pregnancy and pregnant women is scarce. Some research has been done in other countries, however it cannot be assumed those results also apply to Dutch women.

**Study design:** A descriptive cross-sectional study was performed using an Internet-questionnaire among women attempting pregnancy and pregnant women.

**Main outcome measures:** The aim of this study was to identify the Internet behavior of women attempting pregnancy and pregnant women in the Netherlands.

**Results:** In total, 365 women completed the questionnaire. Of these, 95.6% used the Internet as an information source before or during their pregnancy. Most searched topics were fetal development, lifestyle and pregnancy as well as birth complications. Over 90% of the women thought the information found was reliable and based pregnancy related decisions on this information. However, only 50.1% of the women discussed the information found with their caregiver. Of the respondents, 76.2% thought a reliable website is needed provided by the caregivers.

**Conclusions:** A vast majority of Dutch women attempting pregnancy and Dutch pregnant women use the Internet to search for information and to make decisions about their pregnancy, however they were not satisfied with the information available online. A reliable, informative, interactive and up-to-date website is deemed necessary.

### Introduction

In the Netherlands the Internet is used increasingly to find information about health problems [1]. Seventy-five percent of Dutch citizens searched the Internet in 2010 for health-related information, compared to 49% and 42% respectively in 2003 and 2000 [1]. Patients use information from the Internet when they interact with healthcare professionals and when making decisions regarding their health [2,3]. Pregnant women also use the Internet to exchange thoughts and information with each other [4,5]. Spink et al. reported pregnancy in the top five healthcare questions searched for on the Internet [6]. Research on pregnant women's information seeking behavior on the Internet has been done in Sweden, the United States, Italy, Turkey, Spain, Portugal and China [3,4,7–13]. Most of these studies are, however, more than 10 years old.

More than 75% of childbearing women use the Internet as an important source for information about their pregnancy in the United

States, Sweden and China [4,7,8]. Of these women, a little less than 20% rated the Internet as the most important source of information [7]. All studies reported that pregnant women searched for information on the Internet at least once a month, though frequency varies widely between studies [4,10–12]. The most common topics searched for included fetal development, nutrition, medication, pregnancy complications and antenatal care [3,4,10,11,14–16]. Pregnant women used information from the Internet to help them make decisions and to raise their self-confidence about making decisions [15,17–19]. However, in the study by Ferraz et al., the doctor is still the major influencer in pregnant women's decision-making [13]. In general, pregnant women considered health information from the Internet as reliable and useful, it is alarming that several studies show that information on the Internet is not always reliable and may be confusing [4,9,15,17,20,21]. Also, reliability of websites is mainly based on visual design [22]. The percentage of home births in the Netherlands is relatively high and the structure of the Dutch healthcare system consists of primary and

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secondary (and tertiary) care [23–25]. In the Netherlands, obstetric care has a unique echelon system. Women can choose to give birth at home or in the hospital. Healthy women with a low risk profile enter the primary care system and their births are attended by community midwives at home, in birth centers or at the hospital without the involvement or supervision of doctors. In case of complications or suspected pathology, women are referred to an obstetrician-gynecologist in a hospital. Guidance and monitoring of high risk women is performed in general hospitals (secondary care) and academic referral centers (tertiary care). These women will primarily be attended by clinical midwives or residents in obstetrics and gynecology, under direct or indirect supervision of an obstetrician-gynecologist [23–26].

Research on Internet searching behavior by Dutch pregnant women is scarce and because of the unique Dutch maternity care system, results cannot be generalized from studies in other countries. Increasing our knowledge about Internet usage of pregnant Dutch women could lead to better customized care by maternity care providers.

This is why the aim of this study is to identify how much time women attempting pregnancy and pregnant women in the Netherlands search the Internet for information, what information they seek, how much they value this information and if they discuss the information with their caregiver.

## Methods

This descriptive cross-sectional study was conducted between April 15th and May 7th of 2016. A questionnaire was distributed using social media focusing on midwife practices and network contacts to reach women in the Netherlands. The Internet is accessible equally throughout the Netherlands.

Participants were eligible for inclusion when they were living in the Netherlands, 18 years or older and were able to read and understand Dutch. Furthermore, women had to be attempting pregnancy, had to be pregnant or had to be two months postpartum or less. An explanation of the aim of this study was given at the beginning of the questionnaire, the answers were completely anonymous, and participants could stop at any time. This study was not reviewed by a health research ethics board, since the respondents were not subjected to actions and were not imposed to a code of conduct, and therefore this study does not fall into the scope of the 'Wet medisch-wetenschappelijk onderzoek met mensen' (WMO; Medical Research Involving Human Subjects Act).

Participants were invited to fill out an online questionnaire. The questionnaire was accessible through SurveyMonkey® for a period of three weeks. Participants were recruited through Facebook, Twitter and also 200 midwife practices in the Netherlands were approached to distribute the questionnaire.

The Dutch questionnaire was constructed by the main author based on the reviewed literature [4,8,10,27]. The first draft was reviewed by members of the CAPTURE-group. The questionnaire consisted of 38 questions: 23 multiple choice questions, 13 multiple choice questions with an additional comment box and two open-ended questions (Appendix 1).

Data were collected and transferred to SPSS for Windows®, version 22. Descriptive statistics were used to explore the sample characteristics. Differences were tested with  $\chi^2$ -test with Fisher exact correction where necessary. Significance level was determined with an alpha of 0.05. The responses to the open-ended questions were analyzed with content analysis.

Answers of participants, before they discontinued the questionnaire, were included in calculations. Missing values consisted of questions not answered by participants due to questions being irrelevant as to their pregnancy status and Internet usage or due to participants not finishing the questionnaire. Missing values were excluded from calculations.

**Table 1**  
Demographic characteristics.

	Nulliparous	Multiparous	N&M	P-value
Ethnicity	n = 186	n = 199	n = 385	
– Dutch	176 (94.6)	184 (92.5)	360 (93.5)	0.39
– Other	10 (5.4)	15 (7.5)	25 (6.5)	
Living area	n = 183	n = 199	n = 382	
– Noord-Holland	53 (29.0)	44 (22.1)	97 (25.4)	0.28
– Zuid-Holland	40 (21.9)	45 (22.6)	85 (22.3)	
– Friesland	4 (2.2)	2 (1.0)	6 (1.6)	
– Groningen	5 (2.7)	9 (4.5)	14 (3.7)	
– Flevoland	2 (1.1)	1 (0.5)	3 (0.7)	
– Utrecht	20 (10.9)	35 (17.6)	55 (14.4)	
– Drenthe	9 (4.9)	4 (2.0)	13 (3.4)	
– Gelderland	27 (14.8)	29 (14.6)	56 (14.7)	
– Overijssel	9 (4.9)	10 (5.0)	19 (5.0)	
– Noord-Brabant	9 (4.9)	17 (8.5)	26 (6.8)	
– Limburg	2 (1.1)	0 (0.0)	2 (0.5)	
– Zeeland	3 (1.6)	3 (1.5)	6 (0.16)	
Age	n = 185	n = 198	n = 383	
– 18–24 years <sup>a</sup>	26 (14.1)	8 (4.0)	34 (8.9)	< 0.01
– 25–30 years	102 (55.1)	78 (39.4)	180 (47.0)	
– 31–35 years	46 (24.9)	89 (44.9)	135 (35.2)	
– 36 years or older	11 (5.9)	23 (11.6)	34 (8.9)	
Relationship status	n = 186	n = 199	n = 385	
– In a relationship <sup>b</sup>	182 (97.8)	195 (98.0)	377 (97.9)	1.00
– Single	4 (2.2)	4 (2.0)	8 (2.1)	
Educational Status	n = 184	n = 198	n = 382	
– High school <sup>a</sup>	10 (5.4)	20 (10.1)	30 (7.9)	< 0.01
– Secondary vocational educ	62 (33.7)	74 (37.3)	136 (35.6)	
– Higher professional education	55(29.9)	83 (42.0)	138 (36.1)	
– University education	57 (31.0)	21 (10.6)	78 (20.4)	
Employment status	n = 183	n = 198	n = 381	
– Working	165 (90.2)	168 (84.8)	333 (87.4)	0.12
– Not working	18 (9.8)	30 (15.2)	48 (12.6)	
Caregiver	n = 161	n = 199	n = 360	
– Primary care <sup>a,*</sup>	124 (77.0)	135 (67.8)	259 (71.9)	0.02
– Secondary care	24 (14.9)	53 (26.6)	77 (21.4)	
– Tertiary care	11 (6.8)	11 (5.5)	22 (6.1)	
– No caregiver	2 (1.2)	0 (0.0)	2 (0.6)	
Pregnancy complications	n = 161	n = 199	n = 360	
– Yes <sup>a</sup>	104 (64.6)	102 (51.3)	206 (57.2)	0.01
– No	57 (35.4)	97 (48.7)	154 (42.8)	

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

N&M = nulliparous and multiparous.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

\* Fisher's exact test.

## Results

### Demographic characteristics

In total, 408 women began the questionnaire of which two were excluded; one because she lived in France and the other because she was more than one year postpartum. Three hundred and sixty-five women completed the entire questionnaire.

The demographic characteristics are shown in Table 1. In this cohort, nulliparous women were younger than multiparous women ( $P < 0.01$ ), multiparous women had a significantly lower educational level ( $P < 0.01$ ). Most women received maternity care in primary care with an independent midwife (Table 1).

Demographics were not comparable with the Dutch population. Participating women were not well distributed over the Netherlands, especially the high percentage of pregnant women in the densely populated areas (Noord-Holland, Zuid-Holland and Utrecht) is noticeable [28]. The educational level was high in comparison to the Dutch

**Table 2**  
Internet use.

	Nulliparous	Multiparous	N&M	P-value
Internet use	n = 185	n = 199	n = 384	
– Yes	180 (97.3)	187 (94.0)	367 (95.6)	0.11
– No	5 (2.7)	12 (6.0)	17 (4.4)	
Reasons <u>no</u> Internet use <sup>+</sup>	n = 8	n = 14	n = 22	
– No need <sup>+</sup>	1 (20.0)	7 (58.3)	8 (36.4)	0.29
– Fear <sup>+</sup>	1 (20.0)	1 (8.3)	2 (9.1)	0.52
– Unreliable <sup>+</sup>	1 (20.0)	0 (0.0)	1 (4.5)	0.29
– Enough information from other sources <sup>+</sup>	3 (60.0)	2 (16.7)	5 (22.7)	0.12
– Own knowledge <sup>+</sup>	1 (20.0)	2 (16.7)	3 (13.6)	1.00
– Other <sup>+</sup>	1 (20.0)	2 (16.7)	3 (13.6)	1.00
Reasons Internet use <sup>+</sup>	n = 547	n = 507	n = 1054	
– Easy and quick	137 (77.4)	131 (73.2)	268 (75.3)	0.36
– Experiences of other woman	95 (53.7)	83 (43.9)	178 (50.0)	0.17
– Additional information	80 (45.2)	65 (36.3)	145 (40.7)	0.09
– Cannot wait for appointment with caregiver	64 (36.2)	59 (33.0)	123 (34.6)	0.53
– Well-advised decision making	49 (27.7)	56 (31.2)	105 (29.5)	0.46
– For information in the time nobody knows I'm pregnant	50 (28.2)	46 (25.6)	96 (27.0)	0.59
– Preparation for appointment with caregiver	34 (19.2)	28 (15.6)	62 (17.4)	0.38
– Questions I dare not ask	18 (10.2)	15 (8.4)	33 (9.3)	0.56
– Information not given by caregiver	19 (10.7)	12 (6.7)	31 (8.7)	0.18
– Trivial information <sup>a,+</sup>	0 (0.0)	10 (5.6)	10 (2.8)	< 0.01
Time searching Internet/week <sup>+</sup>	n = 177	n = 179	n = 356	
– < 1 h <sup>a</sup>	48 (27.1)	82 (45.8)	130 (36.5)	< 0.01
– 1–2 h	61 (34.5)	56 (31.3)	117 (32.9)	
– 2–3 h	28 (15.8)	23 (12.8)	51 (14.3)	
– 3–4 h	20 (11.3)	10 (5.6)	30 (8.4)	
– 4–5 h	8 (4.5)	1 (0.6)	9 (2.5)	
– 5–6 h	8 (2.3)	3 (1.7)	11 (3.1)	
– > 6 h	4 (2.3)	4 (2.2)	8 (2.2)	
Time till information found on Internet	n = 176	n = 178	n = 354	
– < 10 min	132 (75.0)	136 (76.4)	268 (75.7)	0.90
– 10–30 min	39 (22.2)	39 (21.9)	78 (22.0)	
– 31–60 min	3 (1.7)	2 (1.1)	5 (1.4)	
– > 1 h	2 (1.1)	1 (0.6)	3 (0.9)	
Feeling after searching the Internet <sup>+</sup>	n = 241	n = 246	n = 487	
– Satisfied	55 (31.3)	62 (34.8)	117 (33.1)	0.47
– Reassured	65 (36.9)	61 (34.3)	126 (35.6)	0.60
– Neutral	87 (49.4)	96 (53.9)	183 (51.7)	0.40
– Frightened	21 (11.9)	14 (7.9%)	35 (9.9)	0.20
– Confused	11 (6.3)	9 (5.1)	20 (5.6)	0.63
– Dissatisfied <sup>+</sup>	1 (0.6)	2 (1.1)	3 (0.9)	0.57
– Worried <sup>+</sup>	1 (0.6)	2 (1.1)	3 (0.9)	0.57
Trimester most Internet searching	n = 84			
– Preconception	4 (4.8)			
– First trimester	29 (34.5)			
– Second trimester	12 (14.3)			
– Third trimester	39 (46.4)			

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

N&M = nulliparous and multiparous.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

<sup>+</sup> Fisher's exact test.

<sup>+</sup> Multiple answers possible.

population [29]. Also, 98.0% of the women in our study were in a relationship, while in 2009 only 92.0% of the women who conceived had a partner [30]. Furthermore, the percentage of employed women in our study was 87.4%, where the net employment rate for Dutch women is 72.0% [31]. Nulliparous women had more self-reported pregnancy complications than multiparous women, which does correspond with literature [32].

### Internet use

Almost all women (n = 367, 95.6%) used the Internet as a source of information, which did not differ significantly between nulliparous and multiparous women (p = 0.11; Table 2). Most women reported using the Internet less than two hours weekly, but nulliparous spent significantly more time on the Internet than multiparous women (p < 0.01; Table 2).

Women searched the Internet more often in the first (34.5%) and third trimester (46.4%) of their pregnancy and used it mainly because it is easy accessible, quick and they can gain additional information. A majority of the women found the information searched for in less than ten minutes (75.7%; Table 2). Main topics women searched for were fetal development, pregnancy as well as birth complications and lifestyle (Table 3).

### Reliability

Most women thought information from the Internet was reliable or were neutral towards the reliability. The key method to assess reliability was by looking for the same information on other websites and by checking if the website was linked to a hospital or midwife practice. Nulliparous checked more often for reliable sources on websites than multiparous women (P = 0.04; Table 4).

### Interaction with caregiver

Half of the women (50.1%) discussed the information found on the

**Table 3**  
Topics searched for on the Internet.

	Nulliparous n = 177	Multiparous n = 178	P-value
Fetal development	156 (88.6)	156 (87.6)	0.77
Complications	109 (61.6)	109 (61.2)	0.95
Lifestyle <sup>a</sup>	119 (67.2)	84 (47.2)	< 0.01
Postpartum period	62 (35.0)	51 (28.7)	0.20
Pain relief	52 (29.4)	45 (25.3)	0.39
Supplies	45 (25.4)	50 (28.1)	0.57
Birth	36 (20.3)	38 (21.3)	0.82
Breathing through contractions	35(19.8)	25 (14)	0.15
Delivery <sup>a,+</sup>	2 (1.1)	12 (6.7)	0.01
Pregnancy ailments <sup>+</sup>	9 (5.1)	4 (2.2)	0.17
Conceiving <sup>+</sup>	9 (5.1)	3 (1.7)	0.09
Pregnancy in general <sup>+</sup>	5 (2.8)	3 (1.7)	0.50
Experiences of other women <sup>+</sup>	3 (1.7)	4 (2.2)	1.00
Practical issues <sup>a,+</sup>	5 (2.8)	0 (0)	0.03
Psyche <sup>+</sup>	2 (1.1)	2 (1.1)	1.00
Medication <sup>+</sup>	1 (0.6)	2 (1.1)	1.00
Alternative ways <sup>+</sup>	0 (0)	3 (1.7)	0.25
Twins	1 (0.6)	1 (0.6)	1.00
Counseling <sup>+</sup>	1 (0.6)	1 (0.6)	1.00
Intoxication <sup>+</sup>	0 (0)	1 (0.6)	1.00

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

<sup>+</sup> Fisher's exact test.

**Table 4**  
Reliability assessment.

	Nulliparous	Multiparous	P-value
Assessed reliability information on Internet	n = 177	n = 179	
– Very reliable	4 (2.3)	8 (4.7)	0.30
– Reliable	91 (51.4)	79 (44.1)	
– Neutral	79 (44.6)	90 (50.2)	
– Unreliable	3 (1.7)	1 (0.6)	
– Very unreliable	0 (0.0)	1 (0.6)	
How women assess the reliability of information on Internet <sup>+</sup>	n = 411	n = 391	
– Same information on various sites	117 (66.1)	123 (68.7)	0.60
– Hospital/midwife protocol	109 (61.6)	106 (59.2)	0.65
– Site originating government/science	63 (35.6)	53 (29.2)	0.23
– Reliable sources mentioned <sup>a</sup>	53 (29.9)	37 (20.7)	0.04
– Other women on fora sound reliable	34 (19.2)	29 (16.2)	0.46
– Looks reliable	24 (13.6)	30 (16.8)	0.40
– Recently posted on the website	9 (5.1)	8 (4.7)	0.79
– Heard it from caregiver	1 (0.6)	2 (1.1)	1.00*
– Intuition	1 (0.6)	2 (1.1)	1.00*
– Own knowledge	0 (0.0)	1 (0.6)	1.00*

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

\* Fisher's exact test.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

<sup>+</sup> Multiple answers possible.

**Table 5**  
Interaction with caregiver.

	Nulliparous	Multiparous	N&M	P-value
Discuss information with caregiver	92 (54.1)	86 (46.5)	178 (50.1)	0.38
Reasons not to discuss information with caregiver <sup>+</sup>	n = 82	n = 92	n = 174	
– No need <sup>a</sup>	47 (60.2)	67 (77.0)	114 (69.1)	0.02
– Not enough time <sup>a</sup>	5 (6.4)	2 (2.3)	7 (4.2)	0.26
– Caregiver did not ask <sup>a,+</sup>	10 (12.8)	3 (3.4)	13 (7.9)	0.04
– Trivial information	18 (23.1)	20 (23.0)	38 (23.0)	0.99
– I did not dare <sup>+</sup>	2 (2.6)	0 (0.0)	2 (1.2)	0.22
Reaction of caregiver on information shared from the Internet	n = 88	n = 84	n = 172	
– Discussed everything	79 (89.8)	82 (97.6)	161 (93.6)	0.19
– Listened to it, but ignored it	3 (3.4)	2 (2.4)	5 (2.9)	
– Ignored it totally	3 (3.4)	0 (0.0)	3 (1.7)	
– Discussed only the relevant information	3 (3.4)	0 (0.0)	3 (1.7)	
More contact moments caregiver	n = 155	n = 170	n = 325	
– Totally agree	8 (5.2)	7 (3.9)	15 (4.6)	0.13
– Agree	18 (11.6)	26 (14.5)	44 (13.5)	
– Neutral	34 (21.9)	20 (16.2)	54 (16.6)	
– Disagree	76 (49.0)	78 (43.6)	154 (47.4)	
– Totally disagree	19 (12.3)	39 (21.8)	58 (17.9)	
Longer contact moments caregiver	n = 155	n = 179	n = 334	
– Totally agree	4 (2.6)	2 (1.1)	6 (1.8)	0.50
– Agree	16 (10.3)	15 (8.4)	31 (9.3)	
– Neutral	28 (18.1)	26 (14.5)	54 (16.2)	
– Disagree	82 (52.9)	97 (54.2)	179 (53.6)	
– Totally disagree	25 (16.1)	39 (21.8)	64 (19.2)	

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

N&M = nulliparous and multiparous.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

\* Fisher's exact test.

**Table 6**  
Decision making.

	Nulliparous	Multiparous	N&M	P-value
Decision making based on <sup>+</sup>	n = 381	n = 367	n = 748	
– The Internet	85 (49.7)	78 (44.3)	163 (47.0) <sup>†2</sup>	0.33
– A caregiver	162 (91.0)	171 (91.4)	333 (91.2)	0.97
– Family/friends/acquaintances <sup>a</sup>	107 (60.1)	89 (47.6)	196 (53.7)	0.02
– My intuition	12 (6.7)	14 (7.5)	26 (7.1)	0.78
– Own knowledge	8 (4.5)	9 (4.8)	17 (4.7)	0.89
– Partner <sup>+</sup>	5 (2.8)	4 (2.1)	9 (2.5)	0.75
– Books <sup>+</sup>	1 (0.6)	2 (1.1)	3 (0.8)	1.00
– Research <sup>+</sup>	1 (0.6)	0 (0.0)	1 (0.3)	0.49
Value Internet in making decisions	n = 82	n = 75	n = 157	
– 0%	1 (1.2)	2 (2.7)	3 (1.9)	0.46
– 1–25%	36 (43.9)	39 (52.0)	75 (47.8)	
– 26–50%	35 (42.7)	26 (34.7)	61 (38.9)	
– 51–75%	9 (11.0)	5 (6.7)	14 (8.9)	
– 76–100%	1 (1.2)	3 (4.0)	4 (2.5)	

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

N&M = nulliparous and multiparous.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

\* Fisher's exact test.

<sup>+</sup> Multiple answers possible.

Internet with their caregiver (Table 5). Women would not reduce their time spent on the Internet if they had more or longer contact hours with their caregiver. Main reason for not discussing the information with their caregiver was no need and they rated the information as trivial. Multiparous felt less need to discuss information with their caregiver than nulliparous women ( $P = 0.02$ ; Table 5).

### Decision making

Almost half of the respondents took the information found on the Internet into account when making decisions regarding their pregnancy, but most women relied on information provided by a caregiver (91.2%) and by family, friends or acquaintances (53.7%; Table 6).

### Need for a reliable site

Over three quarters of the participants (76.2%) felt the need for a reliable website, nulliparous more than multiparous women ( $n = 145$ , 81.5% vs  $n = 133$ , 71.1%;  $P = 0.02$ ). In total, 187 women (70.6%) would like a chat function on such a website, 191 women (72.2%) would like to be able to watch short movies with information and 157 women (59.2%) would like to be able to talk with one another on a forum.

In this cohort, women would like information on fetal development, delivery, lifestyle, pregnancy, pregnancy ailments, pregnancy as well as birth complications and the postpartum period (Table 7).

### Discussion

This study demonstrates that most Dutch women who are attempting pregnancy or are pregnant, use the Internet as a source to acquire information regarding their pregnancy, regardless of parity. This is in contradiction with studies from Bakhireva et al., Kavlak et al. and Narasimhulu et al. in which nulliparous women were more likely to use the Internet [10,14,15].

The minority of women who did not use the Internet, mentioned that they did not feel the need and received enough information from other sources as main reasons. There are no data from other studies to compare.

**Table 7**  
Information that should be on a reliable website.

	Nulliparous	Multiparous	P-value
Fetal development	36 (25.2)	34 (25.8)	0.91
Delivery	30 (21.0)	27 (20.5)	0.92
Lifestyle	35 (24.5)	22 (16.7)	0.11
Pregnancy	29 (20.3)	22 (16.7)	0.44
Pregnancy ailments	23 (16.1)	25 (18.9)	0.53
Complications	18 (12.6)	22 (16.7)	0.34
Postpartum period	16 (11.2)	19 (14.4)	0.43
Information about conceiving	12 (8.4)	7 (5.3)	0.31
Changes in their body <sup>a,*</sup>	13 (9.2)	2 (1.5)	0.01
Experiences	5 (3.5)	7 (5.3)	0.46
Reference reliable sources	7 (4.9)	5 (3.8)	0.65
Practical issues <sup>a</sup>	7 (4.9)	3 (2.3)	0.25
Psyche	5 (3.5)	5 (3.8)	0.90
Prenatal research <sup>a</sup>	6 (4.2)	3 (2.3)	0.37
Risks/Medicine/Intoxication <sup>a</sup>	4 (2.8)	4 (3.0)	0.91
Guidance <sup>a</sup>	3 (2.1)	4 (3.0)	0.62
Red flags <sup>a</sup>	2 (1.4)	5 (3.8)	0.21
Alternative birth ways <sup>a</sup>	1 (0.7)	5 (3.8)	0.08
Resources <sup>a</sup>	5 (3.5)	1 (0.8)	0.12
Twins <sup>a</sup>	0 (0.0)	1 (0.8)	0.30

All variables are shown in n (%). All differences were analysed using  $\chi^2$ , except if stated otherwise below.

Multiple answers possible.

<sup>a</sup> Significant difference between nulliparous women and multiparous women.

\* Fisher's exact test.

Dutch women used the Internet regarding their pregnancy mainly to gain additional information and because it is quick and easy accessible. Gaining additional information was also one of the main reasons mentioned by Lagan et al. and Bjelke et al. and in a study by De Santis et al. where the majority of women reported using the Internet because of its speed and ease of access [12,20,27].

Most women in our study searched the Internet for less than two hours weekly, with nulliparous searching longer than multiparous women. This is not surprising, since nulliparous women probably have a higher need for information due to the novelty of pregnancy, furthermore, they may have more time to search the Internet due to the fact they do not have children. In other studies, time spent on the Internet is widespread, but in general, women searched at least once a month [4,8,11]. Women in our study generally browse the Internet in the first and third trimester, this is partly corresponding with studies from different countries, in which women mainly sought at the beginning of their pregnancy [4,8,9,27]. Larsson et al. gave as possible explanation a stronger need for information during early stages of pregnancy when women have recently entered a new life situation [4]. This may be applicable to searching at the end of pregnancy as well.

Main topics Dutch women search for on the Internet are fetal development, pregnancy as well as birth complications and lifestyle advice. These subjects were also the main subjects women searched for in other studies [4,8,10,12,15,20]. Most women feel neutral or satisfied after browsing the Internet, a small number feel confused or frightened. Bjelke et al. and De Santis et al. described that a majority of pregnant women feel worried after reading information on the Internet [12,27].

In accordance with existing literature, Dutch women think information on the Internet is reliable and they assess reliability by checking different sites for corresponding information and a trustworthy source [4,8–10]. We cannot check if the information the women found was indeed reliable and since it is known from existing literature that people tend to judge reliability of a website on its visual design, it is important to find out whether the information found is indeed reliable [22]. However, almost half of the women base their decisions regarding pregnancy on information found on the Internet and such, it is important for caregivers to realize women may make decisions based on unreliable information. This is in contrast to what Ferraz et al. found in

their Portuguese study, where pregnant women regarded face-to-face contact with their caregivers as the most influential factor for decision-making [13].

Only half of the participants discussed the information found on the Internet with their caregiver. This is in accordance with Huberty et al. and Narasimhulu et al. [15,19]. In accordance with Lagan et al, most caregivers listened to and discussed the information found on the Internet when pregnant women share their findings [20].

More than three-quarters of the respondents felt a need for a reliable website regarding pregnancy, containing all important information. Women in our study not only suggest caregivers should recommend a reliable site, but request caregivers to provide one. eHealth may increase patient satisfaction, patient engagement and fewer clinic visits [33].

The main strength of this study is that this is the first study in the Netherlands on this subject. Also, most studies about this subject are over 10 years old and a lot has changed in the past years concerning the way people use Internet so this study adds recent information. This might explain the difference in this study and older studies in terms of the amount of women using the Internet for information. Furthermore, we asked women about their need for a reliable website concerning pregnancy and what kind of information they would look for on such a website. These insights can help when building such a specific website. It is also important to take into account the visual design of such a website [22].

Our study had some limitations. The questionnaire was distributed through Facebook, Twitter and 200 midwife practices with the possible result the study population was not representative of the Dutch population. We tried to overcome this by asking the midwife practices, spread throughout Netherlands, to distribute our questionnaire. We did not have any influence on the distribution of the questionnaire. After data-analysis, we had to conclude that our study population is not representative of the Dutch population; the distribution was not comparable with the general Dutch population, the education level was higher, the employment rate was higher and more respondents were in a relationship [28–31]. This cannot be explained by the Internet accessibility in the Netherlands, since the accessibility is the same throughout the country. Another possible selection bias caused by the online distribution of the questionnaire was that women who do not use the Internet or use the Internet less in general were underrepresented. This could contribute to the high percentage of women using the Internet compared to other studies [8–10]. Furthermore, our questionnaire was only validated through face validity and not pilot tested in the population. We also did not ask if respondents thought specific information was not reliable, only if they thought any information found on the Internet was (un)reliable.

In conclusion, in this study, over 95% of all women who are attempting pregnancy or are pregnant use the Internet to find pregnancy related information. They can find this information relatively quick and they use this information when making decisions, although only 50% discusses the information found with their caregiver. This is important for the caregiver to realize. Despite the vast amount of information regarding pregnancy on the Internet, most women have the need for a reliable website where they can find all the information about pregnancy from a trustworthy source. Since health interventions and lifestyle behavior changes before conception also improve maternal and child health outcomes, it deems us important to provide such a website.

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## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.srhc.2019.04.005>.

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