

Health Care Service for the Upper Class? Equity in Utilization of an Internet-based *Chlamydia trachomatis* Infection Testing Service, Sweden: a Cross-Sectional Study

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Abstract The utilization rate between social groups of a free Internet based *Chlamydia trachomatis* (*C. trachomatis*) testing service in Sweden is unknown. This study examined variations in use of this service according to the participants' age, gender, educational levels and their parents' educational levels. In 2004, Sweden introduced the first free Internet-based *C. trachomatis* testing service for both men and women of all ages. During three consecutive years (2005-2007), the questionnaire that accompanied the ordered test contained questions regarding participants' level of education and other socio-demographic information. A total of 6025 participants completed the questionnaires and provided urine samples. The response rate was 77% (2256/2923) for men and 93% (3769/4055) for women. In both gender, about 46% tests were accessed by those with high education (≥ 14 years) as compared to only 2% by those with low education (≤ 9 years) ($p < 0.001$). With one exception, a similar trend was seen when parental educational levels were used where 35% to 40% of the tests were taken by participants whose parents had a high level of education and 18% to 26% of the tests were taken by participants whose parents had a low level of education. No significant trend was seen in terms of proportion of men accessing the service according to their mothers' education. This study demonstrates an existence of inequality in utilization of an Internet-based *C. trachomatis* infection testing service as more men and women with a high level of education utilized this service than men and women with a low level of education. Future studies should aim to find a reason for this discrepancy which will help researchers and policy makers to find ways to promote the equal utilization of Internet-based health service between different socio-economic groups.

Keywords: *C. trachomatis*, health care service, utilization, equality, Sweden

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1. Introduction

In 2004, Sweden was the first country in the world to introduce free Internet-based *Chlamydia trachomatis* (*C. trachomatis*) testing service for both men and women of all ages [1,2]. First introduced in the county of Västerbotten, the testing is now available for over half the Swedish population. This testing service is not part of a screening strategy but serves as a complement to regular clinical testing, where participants make their own risk assessment before ordering a Chlamydia testing kit. A systematic review on equity in use of curative health services in universal health care systems indicated a wide variation between people of high and low socio-economic groups [3]. To date, few studies have explored whether there are social differences in the use of this free Internet-

based home testing for *C. trachomatis* infection [4,5,6]. All studies have based educational level on the participants' educational level but since Internet-based Chlamydia testing services mostly attract young sexually active persons where many have not yet finished their studies.

Currently, Sweden along with the other Nordic countries top the European list of Internet use [7], and 90% of Swedish citizens 16-34 year old use the Internet daily [8]. We know that the access to Internet at home is steadily increasing in Sweden and that there is no difference in frequency of Internet use at home between high and low socio-economic groups in Sweden [8]. However, equal access to Internet between social groups does not necessarily mean equitable use of Internet for chlamydia testing. How people use the Internet in Sweden differs depending on educational background [8,9]. People with a high level of education use the Internet to find

information or solutions to practical problems, and people with a lower level of education use the Internet more for entertainment and social contacts [8,9].

As online STI testing is an easy and accessible service that will most likely expand in the future, it is important to determine whether this service is used at the same rate by people with lower education levels, a group that is at higher risk for *C. trachomatis* infection [5,6]. This study examines variations in use of a Swedish online testing service according to the participants' and their parents' educational levels, age, and gender.

2. Methods

Swedish Internet users ordering a *C. trachomatis* home test from the largest publicly funded online testing service (www.klamydia.se) in Sweden answered a questionnaire. The Internet testing method is described in detail elsewhere [2]. Briefly, citizens in the county of Västerbotten enter their personal civic number and postal address on the website to make an order. The county of Västerbotten is a sparsely populated region in the northern Sweden with 260 000 inhabitants (3% of the total Swedish population) and comprises 13% of Sweden's total area. There are three large cities in Västerbotten where 83% of the population lives. Once an order has been made, it is stored in a database and then a test package is mailed that contains instructions, a personal coded urine specimen container, a laboratory requisition slip, and a paper questionnaire. Women also receive a vaginal swab for self-collection, which they insert into their urine sample. The test sample, the laboratory requisition slip, and the questionnaire are sent by mail in a preaddressed envelope to the laboratory and test results are retrieved from the Internet site using personal codes. Infected individuals seek treatment independently by printing out a physician referral sheet and the physician confirms that treatment had begun via letter. The questionnaires were sent out for three consecutive years (2005-2007). The participants were informed that answering the questionnaires was voluntary and that their decision would not alter the testing procedure.

The questionnaire that accompanied the ordered *C. trachomatis* test contained questions regarding the

participants' and their parents' educational levels (in number of years) along with other socio-demographic information. The educational levels were then classified into the following three categories: low education (≤ 9 years), medium education (10-13 years), and high education (≥ 14 years). In Sweden, school starts at the age seven and a minimum of nine years of schooling is mandatory by law. The participants were also grouped into the following four age categories: 15-18 years, 19-24 years, 25-30 years, and 31+ years.

2.1. Statistical Methods

Differences in the proportion of men and women who accessed the Internet for testing *C. trachomatis* according to their own and their parents' educational levels were examined using the Chi-square tests. All p-values were two-tailed and values <0.05 were considered significant. The distributions of the participants by their age, gender, and educational levels as well as their parental educational levels are presented in graphic format. The results are presented for participants older than 18 years when participant's own education was used; otherwise, results are presented for all samples when parental education was used. All the analyses were carried out separately for men and women. Statistical analyses were performed using SPSS, Windows version 18.0 (SPSS Inc., Chicago, IL, USA), and graphics were produced using Microsoft Office Excel 2007.

2.2. Ethics

The Regional medical ethics committee in Umeå, Sweden approved the study.

3. Results

A total of 9360 tests were accessed through this Internet service between 2005 and 2007. Of these, 6978 (74.5%) urine samples were returned for analysis. Of these, 6025 participants completed questionnaire. The total questionnaire response rate was 86% (6025/6978); for men the response rate was 77% (2256/2923), for women, 93% (3769/4055).

Table 1. Numbers and percentages (%) of tests accessed by men and women from a Swedish online STI testing service (www.klamydia.se) according to their own and parental educational level

	Total no of test N = 5927	Men, N = 2201			Women, N = 3726		
		No of test (%)	CT+ No (%)	P Value	No of test (%)	CT+ No (%)	P value
Subjects' own education (only aged above 18 years included)							
High	2451	931 (46)	52 (5.6)	0.001	1520 (45)	63 (4.1)	0.002
Medium	2830	1054 (52)	101 (9.6)		1776 (53)	124 (7.0)	
Low	102	41 (2)	6 (14.6)		61 (2)	5 (8.2)	
All	5383	2026	159 (7.8)		3357	192 (5.7)	
Mothers' education (all age groups, all sample)							
High	2457	901 (44)	67 (7.4)	0.838	1556 (45)	75 (4.8)	0.010
Medium	2026	710 (34)	57 (8.0)		1316 (38)	71 (5.4)	
Low	1065	448 (22)	32 (7.1)		617 (18)	50 (8.1)	
All	5548	2059	156 (7.6)		3489	196 (5.6)	
Fathers' education (all age groups, all sample)							
High	1989	787 (39)	53 (6.7)	0.578	1202 (35)	48 (4.0)	0.002
Medium	2041	712 (35)	58 (8.1)		1329 (39)	75 (5.6)	
Low	1405	529 (26)	40 (7.6)		876 (26)	67 (7.6)	
All	5435	2028	151 (7.4)		3407	190 (5.6)	

Table 1 presents numbers and percentages of tests accessed by men and women from a Swedish online free

STI testing service (www.klamydia.se) according to their own and their parents' educational level. For both men

and women, about 46% of the tests were accessed by those with a high level of education but only 2% by those with a low level of education ($p < 0.001$). A similar trend was seen when parental educational levels were used separately for the mother and the father: 35% to 40% of the tests were taken by men and women whose parents had a high level of education and 18% to 26% by men and women whose parents had a low level of education. However, no significant trend was seen in terms of proportion of men accessing the service according to their mothers' education.

Figure 1 shows the proportion of tests accessed by men and women of different age groups according to their own level of education. For both men and women, the significantly lowest proportion of tests was taken by the lowest educational groups in all age categories ($< 3.1\%$). Proportion of tests accessed by men and women of different age groups according to their mothers' educational levels and their fathers' educational levels are shown in Figure 2 and Figure 3, respectively. No consistent trend among age groups is seen.

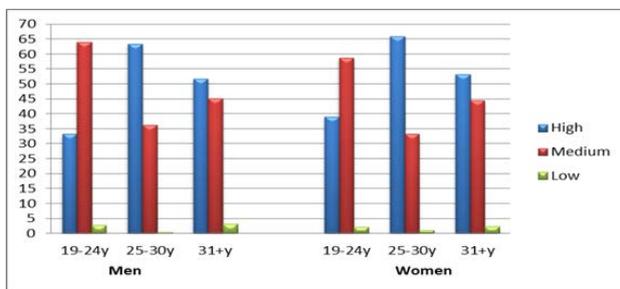


Figure 1. Proportion of tests accessed by men and women of different age groups according to their own educational levels

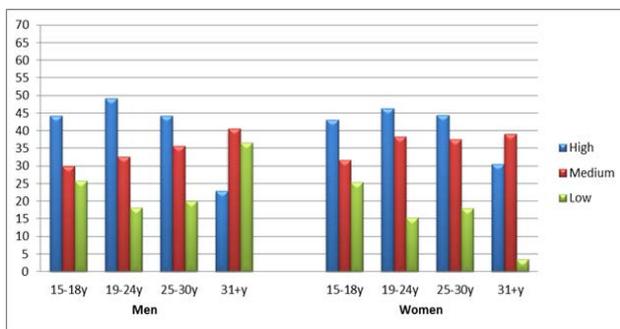


Figure 2. Proportion of tests accessed by men and women of different age groups according to their mothers' educational levels

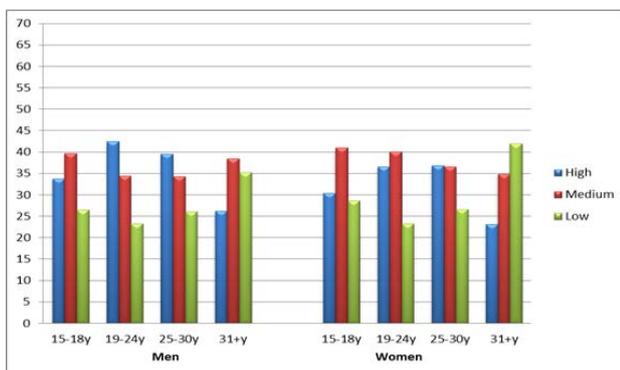


Figure 3. Proportion of tests accessed by men and women of different age groups according to their fathers' educational levels

4. Discussion

The present study findings revealed that the use of the Internet-based free test for *C. trachomatis* and the risk of being infected vary markedly by level of education. More men and women with a high level of education than men and women with lower levels of education used this Internet-based health care service. A similar trend was seen when parental educational levels were considered, where men and women with highly educated parents were more likely to use the Internet the testing service than men and women with lower educated parents.

During the late 1990s in Sweden, there was a large difference in Internet access between socio-economic groups and even between men and women [10]. Today, there is no reported class or gender difference in Internet access, and today nine out of ten Swedish Internet users have a personal computer [8]. In an evaluation of non-participants in a Dutch Internet-based *C. trachomatis* screening, only 2.5% stated the reason for not participating was having no or limited Internet access [11]. Internet use in Sweden increases yearly in all age groups, where the highest increase in the daily Internet use is in the age group over 35 years [8,12]. On the other hand, among ages 16 to 35 years, the daily Internet use has only increased by 6% between 2008 and 2012 [13]. It seems likely that future Internet use among 16-35 year olds, who are also the most frequent users of the Internet-based *C. trachomatis* testing service, will remain fairly stable.

Similar to our study findings, an Internet-based screening in the Netherlands showed that the participation rate was lower among the high-risk clusters (based on demographic, ethnicity, and level of income) in both Rotterdam and Amsterdam [5]. Internet-based *C. trachomatis* testing services being preferred by higher educated individuals may further be supported by a study of female users of an internet-based screening of rectal STI's where 63% of the participants had at least a college education [4]. Another study on men who have sex with men however reported that more men with lower educational background were willing to order an anonymous home HIV test via the Internet than higher educated men [14]. A possible reason for the recruitment of more participants with a lower educational background in this study [14] could be that the recruitment was done by banner advertisements on social network websites, which are a common Internet arena for people with lower educational backgrounds [8,9] and also an arena where potential sexual partners can meet. Banner advertisement on social network websites was not implemented in our study.

In Sweden, health care is financed by taxes, so individual health care visits and medications are heavily subsidized. According the Swedish law of communicable diseases, testing and treatment for *C. trachomatis* is free. This means that using this Internet-based testing service, the physician visit, and treatment are free. Although using this Internet-based testing service is free and there is no class or gender difference in the Internet access in Sweden, this study shows people with higher educational levels use this service more than people with lower educational levels. The reason for this difference is not known and needs to be further explored. Since this Internet-based *C. trachomatis* testing service has been proven to be sensitive

to commercials [2], it could be of value to design future advertisements to also include social network websites to optimize the recruitment of all educational groups in Sweden.

4.1. Study limitations

Although this was a large study with a significant amount of testing data on both men and women, including their socio-demographic background information, there are number of limitations that need to be mentioned. The answer frequency of 86% could have been higher if the online STI test users were re-sent questionnaires or reminded by telephone. The characteristic of the non-responders could also have been evaluated with a follow-up questionnaire. To minimize the risk of invading the users' privacy, only one questionnaire was sent without any further actions. We believe that if a user experiences a privacy invasion, he/she might be less interested in future STI testing. Almost one-fourth (25%) of all the orders were never returned with a urine analysis (2382/9360). This is a limitation of the service itself but also a study limitation as we do not know the characteristics of the non-testers. Since most of our users were in the age group 19-30 years and most users were from a university city (Umeå, Sweden) (data not shown), one could speculate that their own education was not yet completed. This study, however, was concerned about the current education status of the participants and their parents.

4.2. Conclusions

This study demonstrates that men and women with a high level of education use the free Internet-based *C. trachomatis* infection testing service at a higher rate, compared with men and women with lower levels of education. Future studies should aim to determine why people with lower educational levels do not use this free service at the same rate as people with higher educational levels. The findings from such studies could be used to help establish practices and policies that promote equal utilization of Internet-based health service among different socio-economic groups.

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