



Smoking cessation intervention activities and outcomes before, during and after the national Healthcare Reform in Denmark

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Abstract

Background Many countries and regions undergo structural changes that intent to improve the effectiveness and quality of care. Until 2007, the municipalities, counties, hospitals and pharmacies shared the smoking cessation activities almost equally in Denmark. Among others, the Danish Healthcare Reform 2007 intended to add responsibility for smoking cessation intervention at county level to the municipality level. New regions should run the hospital services; exclusively.

Aim To evaluate the influence of the Danish Healthcare Reform 2007 on national smoking cessation interventions.

Methods From 2006 to 2010 35,087 smokers were registered in the Danish Smoking Cessation Database. The large majority underwent the 6-weeks gold standard programme for smoking cessation; a manual based patient education, motivational counseling and nicotine replacement therapy. The data collection included the setting and compliance, self-reported quitting and overall satisfaction.

Results The total number of interventions reduced from 7,320 in 2006 to 6,119 in 2010 (16.4%). The municipalities doubled their smoking cessation interventions from 2007, when the counties closed down. The pharmacies stayed relatively stable, but the hospitals significantly reduced to almost no intervention. Accordingly, patients and pregnant women contributed to 85.5% (1,027 persons) of the overall reduction. A replacement from employees as a target group to general citizens took place. The follow-up rate increased after the implementation of the Healthcare Reform, but completing the programme, quit rates and satisfaction were relatively stable throughout the study period.

Conclusion One sixth of the smoking cessation interventions were lost after the Danish Healthcare Reform 2007, especially those reaching hospital patients and pregnant women. A major shift from employees to general citizens took place in the other settings.

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Introduction

World-wide, the increasing burden from chronic illness and the recent economical challenges have forced many countries and regions to undergo structural changes that intent to improve the effectiveness and quality of care of their health services. Health promotion, disease prevention and rehabilitation activities have proven to be cost-effective and necessary parts of prevention and control of chronic illness development as well as of reduction of complications and other harm experienced by the patients already suffering from these diseases (1).

Tobacco control is a natural step in this work. Worldwide tobacco is estimated to kill nearly 6 million people each year (2) and in Denmark alone 14,000 people

die from a tobacco related disease every year; which amounts to 24% of all deaths (3). This makes smoking one of the largest preventable problems to health. Many countries have already introduced much more restrictive laws and strategies on tobacco including Denmark (4).

As part of the structural changes in the Danish Health Services in 2007, the municipalities took over the general responsibility of providing health prevention services aimed at citizens (5). Furthermore, 271 municipalities were merged into 98, and 14 counties closed down and 5 new regions were established, which would still be responsible for the public hospital services constituting about 95% of all hospital services in Denmark. Prior to the Danish Healthcare Reform in 2007



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the municipalities, counties, hospitals and pharmacies shared the smoking cessation activities almost equally, according to the data from the Danish Smoking Cessation Database. It was established in 2001 for systematic documentation and evaluation of smoking cessation interventions taking place in any setting. Until now, more than 70,000 smokers have been registered from over 400 different smoking cessation services. It monitors 80-90% of all face-to-face smoking cessation activities in Denmark and is supported by the Danish National Board of Health and the Ministry of Health (6).

The purpose of this study is to evaluate the influence of the Danish Healthcare Reform in numbers and outcomes of smoking cessation intervention in Denmark.

Material and Method

In the period between January 1st, 2006, and December 31st, 2010, data from 35,087 smokers was reported to the Danish Smoking Cessation Database. The large majority of the participants undergoing a smoking cessation intervention programme followed a 6-weeks gold standard programme that involves 5 meetings, nicotine replacement therapy, qualified counselling and a manual based patient education programme (7-9). Only 1.2-3.1% of smokers followed short programmes including brief interventions with 1-2 meetings. All information was collected according to pre-designed questionnaires and manuals.

Outcome measurements

The main outcome was the number of participants in the smoking cessation intervention programmes in the different settings over time. Other outcomes were the national indicators: percentage of participants completing the programme (=completers), percentage of completers quitting at the end of the programme, percentage of completers followed up after 6 months and those staying smoke-free until follow-up after 6 months, as well the percentage of completers satisfied with the programme (Table 1).

In addition, we assessed whether the indicators changed significantly in 2007-2010 compared to 2006, the year before implementation of the Healthcare Reform.

Data collection

Characteristics of the smokers, such as age, sex, educational level (≥ 3 years of education after finishing school or < 3 years), employment (employed or not employed; the last including persons retired and under education), Fagerström score for nicotine dependency on a scale from 0-10 points (low 0-4 points or high 5-10 points)

and tobacco consumption were self-reported on the first day of the programme (10).

Table 1 The five national indicators of the smoking cessation database

Completing the smoking cessation programme

Proportion of participants that have completed the smoking cessation programme. A participant has completed a programme when he/she has participated in a minimum of 75% of the programme.

Quit rate at the end of the programme

Proportion of participants, who are ex-smokers at the end of the smoking cessation programme.

Only participants who completed the programme are included.

Follow-up rate

Proportion of participants with follow-up on time after 6 months.

Only participants who completed the programme and agree to be contacted are included.

Quit rate after 6 months

Proportion of participants that remain ex-smokers at 6 months follow-up.

Only participants who completed the programme, agree to be contacted, and responded to the follow-up are included.

Satisfaction with the programme

Proportion of participants that are satisfied with the smoking cessation programme. A participant who answered 4-5 (on a scale from 1-5) is considered satisfied with the programme.

Only participants who completed the programme, agree to be contacted, and responded to the follow-up are included.

The instructor registered programme characteristics. This included information about the setting (municipality, hospital, general practitioner, dentist, pharmacy, etceteras), group size or one-to-one format, duration and participants (patients, pregnant women, participants in work-place programmes, general population), as well as user payment and distribution of free nicotine replacement products. After finalising the programme, the instructor reported on completion and quit rates among participants.

Six months after the quit date follow-up was performed within ± 30 days. Thereby, the participants that registered at the end of December 2010 were followed up until medio September 2011; at least four attempts in all were made by phone calls during both daytime and in the evening. Information was gathered on self-reported continued non-smoking and user satisfaction with the programme. The overall follow-up rate was 84% in the study period. Only 842 (2.4%) of the participants had on forehand refused to be contacted for follow-up and some of the clinics had also on forehand decided not to follow-up on their participants at all. In total 5,634 participants were not followed up (3,112 from the public clinics, 1,726 from the pharmacies, and 790 from the private units).



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Ethics

Data was included continuously in the web-based database from the local clinics. The method and the database are approved by the Danish Data Protection Agency (2000-54-0013) according to Danish policy on research and development. The smokers gave informed consent permitting registration of personal data.

Statistics

Data is presented as total number of observations or percentages. Changes in number of participants in different settings were evaluated using data from 2006 and 2010 (chi-square: $p < 0.05$ was considered significant). In evaluating quit rates and user satisfaction, a distinction was made between completers and non-completers. According to the national guidelines, the results on quit rates and user satisfaction with the programme only includes participants that responded to a follow-up on time after six months.

Multiple logistic regression analysis was used to analyse whether the national indicators changed in 2007-2010 compared to 2006, after controlling for the participant and programme characteristics presented in Table 2. The results are presented as Odds Ratios with 95% confidence interval. It was considered significant if the confidence interval did not include the value 1.

The results are presented according to the STROBE criteria (11) and the analyses were performed using SPSS 19®.

Results

From January 1st, 2006, to December 31st, 2010, 35,087 smokers had undergone a smoking cessation intervention programme and been registered in the Danish Smoking Cessation Database (Table 2). The changes over time are shown in Figure 1. All over, comparing 2006 to 2010, the number of participants fell from 7,320 to 6,119, corresponding to 16.4%. A minor increase of 379 participants was seen in 2007, but already the following year the level was lower than in the beginning of the study period.

After the Healthcare Reform, the hospitals significantly reduced both their smoking cessation intervention programmes from 1,757 (24%) in 2006 to 361 (6%) in 2010 ($p < 0.0001$) and their advice to smokers to quit from 2,314 (32%) in 2006 to 1,717 (28%) in 2010 ($p = 0.007$). In contrast, the pharmacies increased their activities with 27% from 1,567 in 2006 to 2,147 in 2009, but then reduced to 1,526 in 2010, which corresponds to the start level in 2006 (Figure 1 and Table 2).

The profile of the participants changed over time. The reduction of participants was seen in almost all categories, but was most pronounced among the participants under 55 years of age, women, the employed, those with long educations, low nicotine dependency, however, also the heavy smokers. In contrast, an increased number of elderly participants without a job underwent a smoking cessation intervention programme from 2006-2010 (Table 2).

Concerning target groups of the interventions the reduction in employees receiving workplace programmes was almost similar to the increase in number of citizens. The number of patients and pregnant women undergoing a smoking cessation intervention programme was reduced with 1,027 corresponding to 85.5% of the overall reduction of 1,201 participants from 2006 to 2010.

There was a reduction in the use of free nicotine replacement therapy during the period. In contrast, the type and duration of the smoking cessation programmes did not change over time (Table 2).

The outcomes regarding the national indicators stayed relatively high and stable over time (Figure 1). Completers succeeded better on all outcomes than non-completers, except on follow-up rate.

After adjusting for participant and programme characteristics, the follow-up rate was significantly higher in 2007, 2008 and 2010 compared to 2006. Only minor changes were seen in regard to the other indicators (Table 3).

Discussion

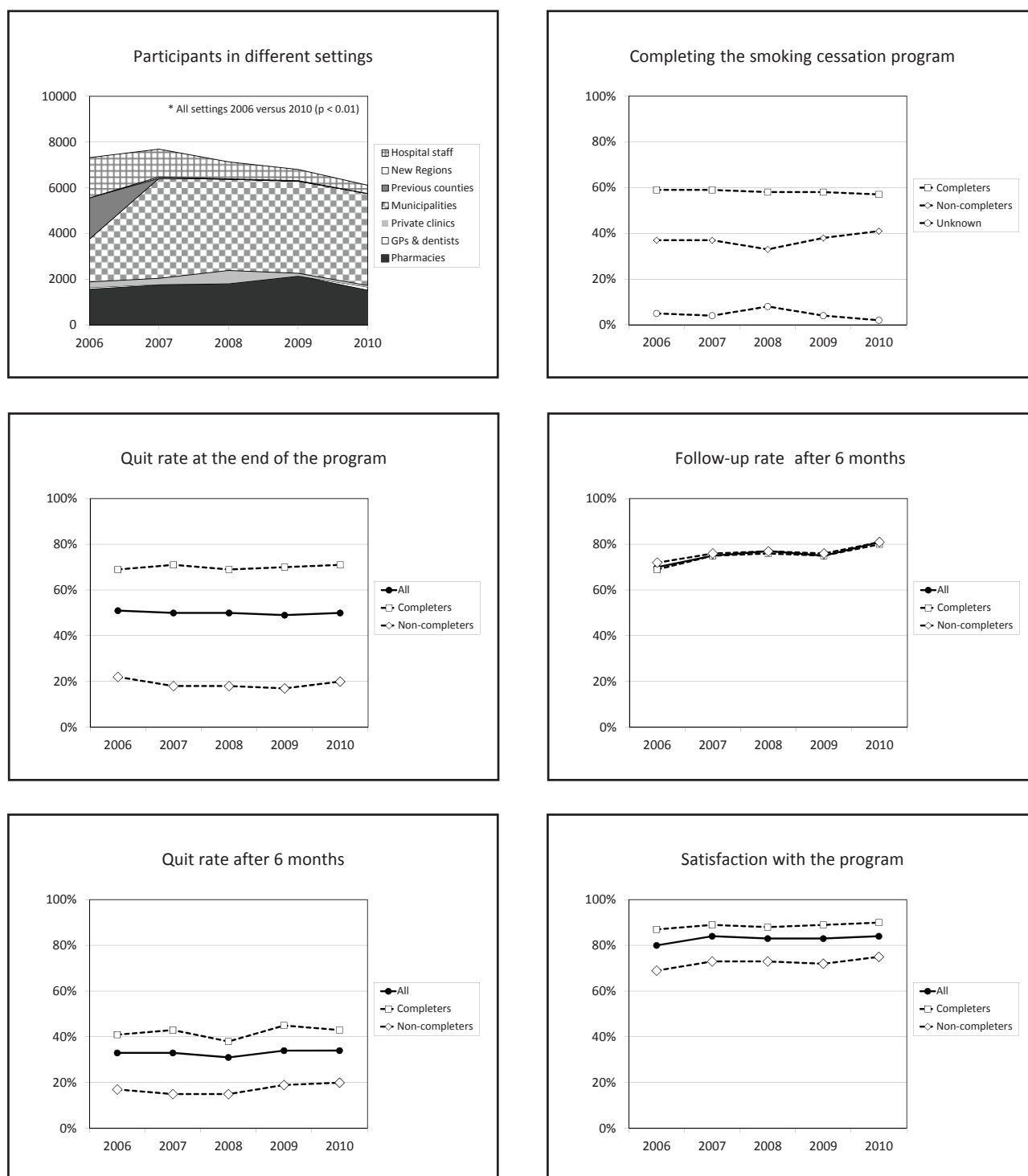
We found a decline of one sixth in the number of smokers undergoing a smoking cessation intervention programme, when evaluating the period before and after the Danish Healthcare Reform 2007. Especially the hospital patients and the pregnant women together with their relatives seem to have been lost in this process. In addition, a major shift from employees to general citizens took place in the other settings.

Before the Healthcare Reform, the main settings for smoking cessation intervention were the municipalities, the counties, the hospitals and the pharmacies, which participated with an almost similar number of smokers undergoing cessation intervention. The Healthcare Reform did not include establishment of specific structures, financial support or other positive initiatives that could support or strengthen the smoking cessation intervention activities in the different settings. It appears that



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Figure 1 Number of participants in different settings, participants completing the programme, follow-up rates, quit-rates and satisfaction rate for participants in smoking cessation intervention programmes in the period 2006-2010





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Table 2 Characteristics of the data registered in the Smoking Cessation Database from 2006-2010 (Activity and Effect) (Part 1 of 3)

| ACTIVITY | | | | | | | | | | | | |
|---|----------|-------|------|-------|------|-------|------|-------|------|-------|------|---------|
| | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2006-10 |
| | | n | % | n | % | n | % | n | % | n | % | |
| Participants registered | | 7,320 | | 7,699 | | 7,136 | | 6,813 | | 6,119 | | -1,201 |
| Participants agreed to be contacted | Yes | 7,140 | 97.5 | 7,520 | 97.7 | 6,966 | 97.6 | 6,668 | 97.8 | 5,951 | 97.3 | -1,189 |
| | No | 180 | 2.5 | 179 | 2.3 | 170 | 2.4 | 145 | 2.1 | 168 | 2.7 | -12 |
| Completing the programme | Yes | 4,286 | 58.6 | 4,571 | 59.4 | 4,143 | 58.1 | 3,984 | 58.5 | 3,480 | 56.9 | -806 |
| | No | 2,676 | 36.6 | 2,864 | 37.2 | 2,389 | 33.5 | 2,561 | 37.6 | 2,517 | 41.1 | -159 |
| | Un-known | 358 | 4.9 | 264 | 3.9 | 604 | 8.5 | 268 | 3.9 | 122 | 2.0 | -236 |
| Follow-up at end of programme | Yes | 5,588 | 76.3 | 5,841 | 75.9 | 5,125 | 71.8 | 5,222 | 76.6 | 4,651 | 76.0 | -937 |
| | No | 1,732 | 23.7 | 1,858 | 24.1 | 2,011 | 28.2 | 1,591 | 23.4 | 1,468 | 24.0 | -264 |
| Follow-up after the programme* | | | | | | | | | | | | |
| Any follow-up | Yes | 6,331 | 88.7 | 6,214 | 82.6 | 5,367 | 77.0 | 5,477 | 82.1 | 5,222 | 87.7 | -1,109 |
| | No | 809 | 11.3 | 1,306 | 17.4 | 1,599 | 23.0 | 1,191 | 17.9 | 729 | 12.3 | -80 |
| Response to any follow-up | Yes | 5,140 | 72.0 | 4,861 | 64.6 | 4,152 | 59.6 | 4,258 | 63.9 | 3,965 | 66.6 | -1,175 |
| Follow-up on time (6 months +/- 30 days) | Yes | 5,118 | 71.7 | 5,703 | 75.8 | 5,109 | 73.3 | 5,058 | 75.9 | 4,923 | 82.7 | -195 |
| | No | 2,022 | 28.3 | 1,817 | 24.2 | 1,857 | 3.7 | 1,610 | 24.1 | 1,028 | 17.3 | -994 |
| Response to follow-up on time : | All | 3,927 | 55.0 | 4,350 | 57.8 | 3,894 | 55.9 | 3,839 | 57.6 | 3,666 | 61.6 | -261 |
| Completers | Yes | 2,359 | 33.0 | 2,759 | 36.3 | 2,547 | 36.8 | 2,421 | 36.3 | 2,195 | 36.9 | -164 |
| | No | 1,414 | 19.8 | 1,524 | 20.1 | 1,274 | 18.3 | 1,343 | 20.1 | 1,409 | 23.7 | -5 |
| | Un-known | 154 | 2.2 | 67 | 0.9 | 73 | 1.0 | 75 | 1.1 | 62 | 1.0 | -92 |
| EFFECT | | | | | | | | | | | | |
| Smokefree at the end of programme | | 3,546 | 48.4 | 3,826 | 49.7 | 3,308 | 46.4 | 3,346 | 49.1 | 2,991 | 48.9 | -555 |
| Completers | Yes | 2,942 | | 3,231 | | 2,846 | | 2,794 | | 2,480 | | -462 |
| | No | 576 | | 518 | | 437 | | 433 | | 497 | | -79 |
| | Un-known | 28 | | 77 | | 25 | | 119 | | 14 | | -14 |
| Smokefree at follow-up 6 months** | | 1,276 | 32.7 | 1,425 | 32.9 | 1,184 | 30.6 | 1,295 | 34.0 | 1,229 | 33.9 | -47 |
| Completers | Yes | 966 | | 1,169 | | 972 | | 1,016 | | 935 | | -31 |
| | No | 239 | | 228 | | 192 | | 256 | | 273 | | 34 |
| | Un-known | 71 | | 28 | | 20 | | 23 | | 21 | | -50 |
| Point prevalence | | 1,490 | 37.9 | 1,698 | 39.0 | 1,409 | 36.2 | 1,619 | 42.2 | 1,464 | 39.9 | -26 |
| Satisfaction*** | | 2,996 | 80.3 | 3,487 | 83.5 | 3,083 | 82.8 | 3,076 | 83.0 | 2,940 | 84.2 | -56 |
| Completers | Yes | 1,998 | | 2,386 | | 2,153 | | 2,106 | | 1,884 | | -114 |
| | No | 904 | | 1,048 | | 875 | | 919 | | 1,010 | | 106 |
| | Un-known | 94 | | 53 | | 55 | | 51 | | 46 | | -48 |

* % of participants that agreed to be contacted at 6 months follow-up, ** % of all valid follow-up with a response, *** Satisfied or very satisfied (% all valid follow-up with a response)



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Table 2 Characteristics of the data registered in the Smoking Cessation Database from 2006-2010 (Participant characteristics) (Part 2 of 3)

| PARTICIPANT CHARACTERISTICS | | | | | | | | | | | | |
|--------------------------------|--|-------|------|-------|------|-------|------|-------|------|-------|------|---------|
| | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2006-10 |
| | | n | % | n | % | n | % | n | % | n | % | |
| Participants registered | | 7,320 | | 7,699 | | 7,136 | | 6,813 | | 6,119 | | -1,201 |
| Age | <35 | 1,396 | 19.1 | 1,345 | 17.5 | 1,268 | 17.8 | 1,261 | 18.5 | 1,162 | 19.0 | -234 |
| | 35-54 | 3,845 | 52.5 | 3,717 | 48.3 | 3,188 | 44.7 | 2,940 | 43.2 | 2,710 | 44.3 | -1,135 |
| | 55+ | 2,078 | 28.4 | 2,637 | 34.3 | 2,679 | 36.6 | 2,612 | 38.3 | 2,246 | 36.7 | 168 |
| | Unknown | 1 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 |
| Gender | Female | 4,538 | 62.0 | 4,765 | 61.9 | 4,334 | 60.7 | 4,087 | 60.0 | 3,632 | 59.4 | -906 |
| | Male | 2,782 | 38.0 | 2,934 | 38.1 | 2,802 | 39.3 | 2,726 | 40.0 | 2,487 | 40.6 | -295 |
| Employed | No (including retired and students) | 1,865 | 25.5 | 2,454 | 31.9 | 2,663 | 37.3 | 2,952 | 43.3 | 2,703 | 44.2 | 838 |
| | Yes | 5,289 | 72.3 | 5,073 | 65.9 | 4,295 | 60.2 | 3,652 | 53.6 | 3,237 | 52.9 | -2,052 |
| | Unknown | 166 | 2.3 | 172 | 2.2 | 178 | 2.5 | 209 | 3.1 | 179 | 2.9 | 13 |
| Education | Less than 3 years education after school | 3,560 | 48.6 | 3,693 | 48.0 | 3,511 | 49.2 | 3,449 | 50.6 | 3,108 | 50.8 | -452 |
| | 3 years and more | 3,548 | 48.5 | 3,781 | 49.1 | 3,358 | 47.1 | 3,032 | 44.5 | 2,719 | 44.4 | -829 |
| | Unknown | 212 | 2.9 | 225 | 2.9 | 267 | 3.7 | 332 | 4.9 | 292 | 4.8 | 80 |
| Fagerström dependency | Low (0-4 points) | 2,814 | 37.1 | 2,855 | 37.1 | 2,685 | 37.6 | 2,436 | 35.8 | 2,182 | 35.7 | -632 |
| | High (5-10 points) | 4,468 | 61.0 | 4,813 | 62.5 | 4,400 | 61.7 | 4,329 | 63.5 | 3,899 | 63.7 | -569 |
| | Unknown | 38 | 0.5 | 31 | 0.4 | 51 | 0.7 | 48 | 0.7 | 38 | 0.6 | 0 |
| Tobacco consumption | < 15 grams | 1,656 | 22.6 | 1,736 | 22.5 | 1,732 | 24.3 | 1,669 | 24.5 | 1,476 | 24.1 | -180 |
| | ≥ 15 grams | 5,664 | 77.4 | 5,963 | 77.5 | 5,404 | 75.7 | 5,144 | 75.5 | 4,643 | 75.9 | -1,021 |
| Setting | Pharmacy | 1,567 | 21.4 | 1,751 | 22.7 | 1,809 | 25.4 | 2,147 | 31.5 | 1,526 | 24.9 | -41 |
| | Hospital clinic incl midwife | 1,757 | 24.0 | 1,216 | 15.8 | 743 | 10.4 | 492 | 7.2 | 361 | 5.9 | -1,396 |
| | General practitioner and dentist | 77 | 1.1 | 31 | 0.4 | 11 | 0.2 | 2 | 0.0 | 132 | 2.2 | 55 |
| | Private clinic | 245 | 3.3 | 265 | 3.4 | 569 | 8.0 | 118 | 1.7 | 74 | 1.2 | -171 |
| | Municipality | 1,870 | 25.5 | 4,373 | 56.8 | 3,991 | 55.9 | 4,025 | 59.1 | 4,018 | 65.7 | 2,148 |
| | Region/County | 1,804 | 24.6 | 58 | 0.8 | 12 | 0.2 | 23 | 0.3 | 0 | 0.0 | -1,804 |
| | Other | 0 | 0.0 | 5 | 0.1 | 1 | 0.0 | 6 | 0.1 | 8 | 0.1 | 8 |
| | | | | | | | | | | | | |
| Advice to quit**** | General practitioner | 2,636 | 36.0 | 3,087 | 40.1 | 2,911 | 40.8 | 2,810 | 41.2 | 2,473 | 40.4 | -163 |
| | Hospital staff | 2,314 | 31.6 | 2,346 | 30.5 | 2,136 | 29.9 | 1,947 | 28.6 | 1,717 | 28.1 | -597 |
| | Dentist | 982 | 13.4 | 1,064 | 13.8 | 992 | 13.9 | 917 | 13.5 | 831 | 13.6 | -151 |
| | Pharmacy | 209 | 2.9 | 229 | 3.0 | 292 | 4.1 | 317 | 4.7 | 204 | 3.3 | -5 |
| | Own initiative | 2,949 | 40.3 | 3,011 | 39.1 | 2,660 | 37.3 | 2,598 | 38.1 | 2,350 | 38.4 | -599 |

**** Participants were allowed to tick more than one box



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Table 2 Characteristics of the data registered in the Smoking Cessation Database from 2006-2010 (Programme characteristics) (Part 3 of 3)

| PROGRAMME CHARACTERISTICS | | | | | | | | | | | | |
|--|-----------------------------|-------|------|-------|------|-------|------|-------|------|-------|------|-----------|
| | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | 2006-2010 |
| | | n | % | n | % | n | % | n | % | n | % | |
| Participants giving consent to registration of data in the database | | 7,320 | | 7,699 | | 7,136 | | 6,813 | | 6,119 | | -1,201 |
| Target group | Patients (+ family) | 1,029 | 13.9 | 683 | 8.9 | 488 | 6.8 | 350 | 5.1 | 284 | 4.6 | -745 |
| | Employees | 3,285 | 44.9 | 2,635 | 34.2 | 1,196 | 16.8 | 914 | 13.4 | 867 | 14.2 | -2,418 |
| | All citizens | 2,119 | 28.9 | 3,340 | 43.4 | 4,157 | 58.3 | 4,800 | 70.5 | 4,357 | 71.2 | 2,238 |
| | Mixed groups | 309 | 4.2 | 514 | 6.7 | 815 | 11.4 | 349 | 5.1 | 135 | 2.2 | -174 |
| | Pregnant women (+ partners) | 351 | 4.8 | 304 | 3.9 | 181 | 2.5 | 100 | 1.5 | 69 | 1.1 | -282 |
| | Other | 227 | 3.1 | 223 | 2.9 | 299 | 4.2 | 300 | 4.4 | 407 | 6.7 | 180 |
| Type of programme | Individual | 985 | 13.5 | 904 | 11.7 | 882 | 12.4 | 942 | 13.8 | 888 | 14.5 | -97 |
| | Group | 6,158 | 84.1 | 6,750 | 87.7 | 6,223 | 87.2 | 5,799 | 85.1 | 5,145 | 84.1 | -1,013 |
| | Other | 177 | 2.4 | 45 | 0.6 | 31 | 0.4 | 72 | 1.1 | 86 | 1.4 | -91 |
| Duration of programme | 1-2 times | 224 | 3.1 | 108 | 1.4 | 224 | 3.1 | 101 | 1.5 | 73 | 1.2 | -151 |
| | 3-4 times | 179 | 2.4 | 240 | 3.1 | 555 | 7.8 | 190 | 2.8 | 142 | 2.3 | -37 |
| | 5-6 times | 6,771 | 92.5 | 7,122 | 92.5 | 6,167 | 86.4 | 6,325 | 92.8 | 5,593 | 91.4 | -1,178 |
| | 7 or more | 146 | 2.0 | 229 | 3.0 | 188 | 2.6 | 184 | 2.7 | 303 | 5.0 | 157 |
| | Unknown | 0 | 0.0 | 0 | 0.0 | 2 | 0.0 | 13 | 0.2 | 8 | 0.1 | 8 |
| Free NRT | No | 2,582 | 35.3 | 3,933 | 51.1 | 4,667 | 65.4 | 4,607 | 67.6 | 4,091 | 66.9 | 1,509 |
| | Yes - few samples | 3,741 | 51.1 | 2,941 | 38.2 | 1,895 | 26.6 | 1,673 | 24.6 | 1,602 | 26.2 | -2,139 |
| | Yes - for weeks | 703 | 9.6 | 571 | 7.4 | 403 | 5.6 | 320 | 4.7 | 227 | 3.7 | -476 |
| | Yes - other | 294 | 4.0 | 254 | 3.3 | 171 | 2.4 | 213 | 3.1 | 199 | 3.3 | -95 |
| User payment | Yes | 880 | 12.0 | 1,061 | 13.8 | 1,133 | 15.9 | 177 | 2.6 | 75 | 1.2 | -805 |
| | No | 6,440 | 88.0 | 6,638 | 86.2 | 5,963 | 83.6 | 6,636 | 97.4 | 6,036 | 98.6 | -404 |
| | Unknown | 0 | 0.0 | 0 | 0.0 | 40 | 0.6 | 0 | 0 | 8 | 0 | 8 |

the municipalities successfully managed to take over the intervention from the counties by doubling their capacity. In addition, the pharmacies have the same level of activities as before the Healthcare Reform, however, with some changes during the study period. It is important to clarify that municipalities and most pharmacies in Denmark have a close and contracted collaboration on providing smoking cessation interventions, and that minor differences over time between these two groups can be due to changes in partnerships.

During the whole study period, the Danish National Board of Health ran media campaigns on smoking cessation. The campaigns especially intensified in 2007 in relation to the introduction of a national smoking ban. From 2009, an extra budget was decided for massive campaigns based on the Australian model with new ini-

tiatives and videos every week including social media (12). You would expect an additional effect on participation in smoking cessation intervention programmes from the campaigns. However, this was not supported by the results of the present study. Neither was it reflected in the quit rates.

The follow-up rate seemed to improve in the years following the Healthcare Reform. This is probably due to an extra effort of involving the national Quit Line in conducting the follow-up after 6 months.

Other countries have experienced changes in uptake and delivery of smoking cessation services. One example is a study from 1996-2002, that showed a fall despite implementation of new policy initiatives in Great Britain (13).



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Table 3 Changes in the national indicators; OR and 95% Confidence Interval for the final multivariable model (adjusted for participants and programme characteristics)

| | OR (95% CI) | p-value |
|---|-------------------------|-------------------|
| Completing the smoking cessation programme | | |
| 2006 | 1 | |
| 2007 | 1.04 (0.96-1.12) | 0.335 |
| 2008 | 1.12 (1.03-1.21) | 0.008* |
| 2009 | 1.07 (0.98-1.16) | 0.133 |
| 2010 | 0.97 (0.89-1.06) | 0.502 |
| Quit rate at the end of the programme | | |
| 2006 | 1 | |
| 2007 | 1.10 (0.98-1.23) | 0.097 |
| 2008 | 1.03 (0.92-1.16) | 0.627 |
| 2009 | 1.09 (0.96-1.23) | 0.178 |
| 2010 | 1.12 (0.99-1.28) | 0.740 |
| Follow-up rate after 6 months | | |
| 2006 | 1 | |
| 2007 | 1.38 (1.18-1.62) | <0.001* |
| 2008 | 2.02 (1.67-2.25) | <0.001* |
| 2009 | 1.11 (0.92-1.33) | 0.274 |
| 2010 | 1.28 (1.05-1.56) | 0.019* |
| Quit rate after 6 months | | |
| 2006 | 1 | |
| 2007 | 1.04 (0.92-1.17) | 0.554 |
| 2008 | 0.85 (0.75-0.97) | 0.013* |
| 2009 | 1.02 (0.89-1.17) | 0.765 |
| 2010 | 1.04 (0.90-1.89) | 0.609 |
| Satisfaction with the programme | | |
| 2006 | 1 | |
| 2007 | 1.16 (0.98-1.38) | 0.087 |
| 2008 | 1.01 (0.85-1.21) | 0.911 |
| 2009 | 1.16 (0.96-1.40) | 0.132 |
| 2010 | 1.22 (1.00-1.48) | 0.052 |

* Significance at 0.05

England introduced its public smoking ban in the summer of 2007, which led to an immediate increase in quit attempts and more activity in their stop smoking services as a direct result of the law (14). The same tendency has been seen in Scotland and Wales (15). Nevertheless, activity in smoking cessation services in Denmark has kept falling since the introduction of the public smoking ban. An important difference between England and Denmark is, however, the Healthcare Reform taking place in Denmark during the smoking ban implementation. It should be evaluated in the future if and how other undetected factors may have overruled an expected smoking ban effect.

The reduction in hospital patients, pregnant women and their partners undergoing a smoking cessation intervention was not intended by the Healthcare Reform, which clearly says that the municipalities are not responsible for patient-related health promotion during hospital stay (16). Furthermore, it specifies that patient-related health promotion should be done in collaboration with the regions. In addition, the Danish health strategy 'Health throughout Life' recommends that prevention of tobacco related diseases should be highly prioritised in municipalities and regions – including establishment of more smoking cessation intervention services for the general citizens as well as for patients (17).

The benefits of smoking cessation intervention among patients are tremendous on both short and long term. A recent example is the intensive peri-operative smoking cessation intervention programme that significantly reduces the complication rate and is followed by a relatively high quit rate on longer term (18). Unfortunately, the surgical group of smokers has not yet been shown to benefit from general practitioner activities (19). Overlooking the possibility for smoking cessation intervention among pregnant women and their partners is against the general recommendations because of the increased complications of pregnancy and a variety of problematic foetal outcomes (20). It is therefore recommended to re-establish smoking cessation interventions in the hospital settings including midwives, or otherwise actively compensate for the reduction of smoking cessation intervention programmes in hospital settings.

In total, the smoking cessation intervention programmes stayed relatively stable in the municipalities and regions/counties. However, the major shift in target groups from employees to general citizens is interesting and has not been described before. Part of the explanation may be that the municipalities have given higher priority to unemployed and elderly in special projects or offered smoking cessation intervention programmes mainly in the working hours, thereby closing the door to other groups.

The Healthcare Reform seems to have influenced the development of activity in Denmark in a negative direction. To ensure that there are strategies of smoking prevention that include all groups of smokers, it is crucial that the regions and municipalities cooperate and coordinate areas of responsibility.

Compared to other countries that document national smoking cessation intervention, Denmark has a relatively low uptake of smokers in smoking cessation clinics. In



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2006, an estimated 28% of the population were smokers (21) and in 2010 about 21% (22), which means that more than 1 million Danes are still smokers. Less than 1% of the smokers participate in the smoking cessation services. In Scotland, activity in national smoking cessation clinics is still increasing every year and covered 6.5% of the smoking population in 2009 (15). International guidelines recommend that 5% of smokers from the population should participate in the smoking cessation intervention programmes every year (23).

Since the 1950's, the number of smokers has reduced in Denmark as in most other European countries. The reduction has been 1/2-1% per year. This has not increased in relation to the smoking ban (24). Over the study period, the fall in number of smokers was much smaller than the reduction of 16% in smoking cessation activities in the same period.

This study has several strengths and limitations. It is a strength that the database is nation-wide and used in all settings, where smoking cessation intervention programmes take place. The data quality was high with few missing data throughout the study period.

Besides, we have presented results and informed about missing numbers according to the STROBE criteria (11).

It is, however, possible that the different smoking cessation services register information about the target groups, such as pregnant women, in different ways in relation to the setting. Comparison with data from other clinical databases and the national hospital register would secure the quality of registration of for instance pregnancy.

In addition, it is a limitation that the information is self-reported, including the quit rates, which may therefore seem higher than they are in reality. Though, this would be similar in the whole study period and would thereby not influence the changes originating from the Healthcare Reform differently. The specific Danish Healthcare Reform, organisation of health services, culture and other conditions may reduce the generalisation of the results to other countries.

Since it is not mandatory, but only recommended, to report to the Smoking Cessation Database, it does not cover all data on smoking cessation interventions provided in Denmark, but only 4 municipalities out of 98 do not report smoking cessation intervention programmes.

In conclusion, this study shows that the Danish Healthcare Reform was followed by an unexpected high reduction of smoking cessation intervention programs.

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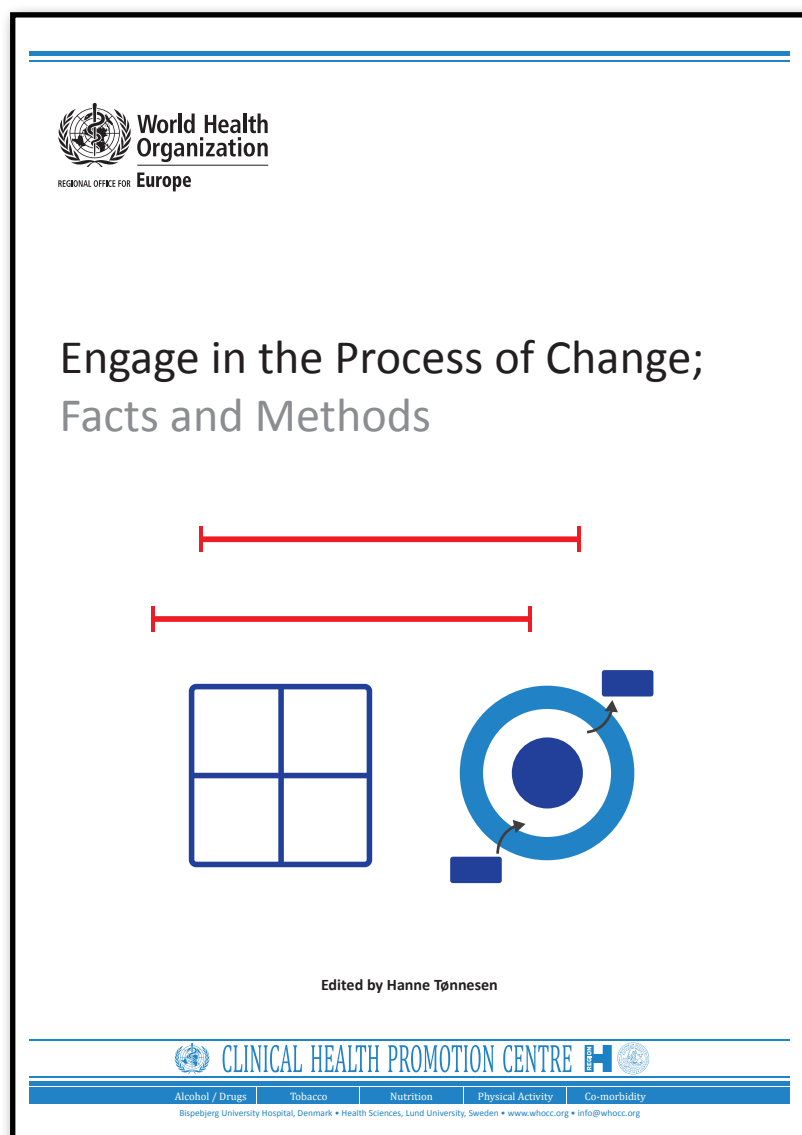
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