

The Effect of Interventions Targeting Tobacco Consumption: a Review of Literature Reviews

Michel Grignon (Center for Health Economics and Policy Analysis, McMaster University ; Irdes),
Jennifer Reddock (McMaster University)

This synthesis of systematic literature reviews provides an update of current knowledge on the effectiveness of public policies or interventions targeting tobacco consumption. The effect of interventions warning secondary school pupils about the harmful effects and addictive nature of smoking, price increases due to cigarette tax increases and the various therapies designed to help smokers stop smoking will be examined more particularly.

Among the sixty four literature reviews identified, the majority deal with smoking cessation. Related interventions are more effective when carried out by health professionals who set a 'quit date' for smoking cessation and prescribe nicotine replacement products. Support for quitting smoking via interventions delivered by mobile phone or the Internet are also effective. Furthermore, all forms of support for cessation of tobacco use appear to be cost effective. Price increases set above average income increases reduce overall tobacco consumption but fail to completely dissuade smoking initiation. By contrast, community youth intervention initiatives appear to be more effective in reducing the percentage of regular smokers.

Tobacco consumption is a major public health issue in France and throughout the world: prolonged smoking is effectively responsible for deaths from lung cancer (26 378 in France in 2009) and also cancers of the mouth and larynx. It increases the risk of death from cardiovascular diseases or certain cancers of the digestive tract. Prolonged smoking furthermore includes the risk of disability (tracheotomy for example) and deteriorates the

health of survivors. Finally, what makes it a severe public health problem is that a large number of individuals continue to smoke regularly into middle age (past 40 years old) even if the harmful effects of so doing have been empirically established, the first studies dating back to the 1950's (Hill, 1954; Luther, 1964). The reason for this paradox comes from the fact that tobacco is highly addictive. Public interventions aimed at preventing prolonged smoking, either by

dissuading teenagers from starting the habit, or by helping smokers quit the habit, are thus completely justified.

This synthesis of systematic literature reviews concerns the effect of public policies or interventions aimed at reducing tobacco consumption. It provides an update of current knowledge on the effectiveness of interventions among secondary school pupils, and the effectiveness of tobacco

price increases or therapies to help smokers stop smoking.

How can a systematic literature review answer this question?

As smoking behaviour theories diverge, leading to contradictory predictions on the effects of public health interventions, this literature review is empirical. Today, the standard approach favoured by economists is rational addiction theory (Becker and Murphy, 1988) predicting that the decision to start smoking is not determined by the price of cigarettes at the time of the decision, but by anticipated future prices as perceived by the individual. A strong personal conviction that cigarette taxes will increase will more likely deter smoking initiation, but if the individual believes that price increases will finally progress more slowly than inflation (or income) they will not be dissuasive. According to this same theory, no form of intervention will help a smoker cease smoking as the only factor of importance is the rational choice between the pleasure and the cost of smoking.

However, certain variants of this model have led to different conclusions. Orphanides and Zervos (1995) for example, proposed a rational tobacco consumption model in which the smoker is never able to accurately predict the degree of addiction to which he will be subject and can thus become trap-

ped. Other than anticipated future price increases, smokers' perception of their level of addiction will also determine their decision to start or to continue smoking. In this variant of the rational addiction theory, therapeutic assistance will help smokers trapped in addiction to cease smoking. Another variant, leading to the same conclusions regarding the effectiveness of interventions aimed at smoking-cessation, posits that smokers only acquire information on the effect of tobacco on their personal health progressively (Suranovic *et al.*, 1999).

Outside the economics discipline, tobacco consumption is almost always described as non-rational and, to some extent, suffered by the individual. The 'biological' model postulates that the elements causing addiction are part of the product itself and affect the smoker in the same way as a germ or virus. The sociological model postulates that smokers lose their free will under the influence of advertising and peer pressure. According to these two perspectives, a counter-propaganda campaign targeting teenagers can be effective in the same way as smoking bans and price shocks. According to these theories of smokers as victims, prevention is always better than a cure and the emphasis is placed on preventing smoking initiation rather than smoking cessation.

The problem here is the lack of a real empirical test to prove one or other of these theories: in other words to determine whether individuals are perfectly rational, rational but needing to expe-



This document is a synthesis of the review of literature reviews conducted by the authors for IRDES within the framework of the 2012 Court of Auditors report.

To read the Court of Auditors report: <http://www.ccomptes.fr/Publications/Publications/Les-politiques-de-lutte-contre-le-tabagisme>

rience smoking in order to gain information on their degree of dependence or vulnerability regarding smoking-related diseases, or totally irrational (see Grignon and Pierrard (2004) and Grignon (2012), for a more in-depth discussion).

The scientific community thus must rely on two available tools: theoretical model predictions that can be tested using data on behaviours observed in real-life situations¹, or natural experiments²; in other words public health interventions that can, under certain conditions, be treated as laboratory experiments and thus provide results comparable to empirical tests. The literature review presented here essentially concerns natural experiments (price shocks, random trials on smoking cessation or preventive interventions) providing results from "empirical experiments" (Hacking, 1988, created this concept, by similarity to empirical testing).

If the empirical experimentation approach is the only one available at the

SOURCES

The main sources used were the Health Systems Evidence^a database and the specialised EconLit^b database..

Health Systems Evidence is a continuously updated repository published by McMaster University. It inventories syntheses of research evidence on governance, financial and service delivery in health systems. In time, Health Systems Evidence will also include a continuously updated repository of economic evaluations in these same domains, descriptions of health systems and health system reforms.

EconLit is a multilingual bibliographical database published by the American Economic Association, analysing and indexing international literature in the economic and social sciences field. Econlit currently contains over a million references: journal articles (600 titles scanned), monographs, doctoral theses, research documents and full-text book reviews.

^a <http://www.healthsystemsevidence.org>

^b <http://www.ebscohost.com/academic/econlit>

¹ It is extremely difficult to build definitive tests based on observational data, notably because such data does not provide a clear-cut answer regarding the causal nature of the relationship observed between factors and behaviours (Grignon and Pierrard, 2004).

² We refer to natural experiments here as even in the case of random trials, we compare the intervention being tested to the best available practice outside the treatment for ethical reasons. A veritable controlled experiment would compare the intervention to a uniform treatment (more often, no treatment at all). In English, the natural experiment leads to a measure of *effectiveness* result whereas the controlled experiment measures *efficacy*. Unfortunately, the French language has only one term 'efficacité' to express both concepts.

moment, it nevertheless only provides imperfect responses to the question of intervention or policy effectiveness evaluation. Any type of intervention is dependent on the context (economic, social, and political) in which it is implemented and the response obtained is not so much ‘intervention X works’ but rather ‘intervention X worked in this particular context’ (Cartwright, 2007).

The systematic review of the results of a range of empirical experiments dampens the context effect mentioned above. This is achieved using two different methods: the first consists in aggregating the results of all experiments as a whole to obtain an average experiment. It will be referred to as a meta-analysis³³ when it is carried out quantitatively by considering that, as the number of experiments increase, the average result for all the experiments will converge towards a result independent of context and reveal the theoretic causal relationship. The other way of using a systematic review to eliminate the effects of context in each intervention is to study how the measured effect in an experiment covaries with the context in which the experiment was conducted. This type of analysis, known as meta-regression (a meta-analysis by regression) consists in controlling the observed effect by the elements of context. This allows for a faster convergence towards the ‘real’ result and an understanding of some of the factors facilitating or impeding the effect sought after by an intervention being achieved. This method has an advantage compared to a simple meta-analysis that concludes by a yes or a no: does the intervention have the desired effect or not?

Last, the review of literature reviews presented here will identify the most promising interventions through the meta-analyses, meta-regressions or narrative reviews.

Of the 64 literature reviews identified, few deal with experiments conducted in France

A total of 64 literature reviews including the words ‘smoking’, ‘tobacco’ or ‘cigarette’ in their title or abstract were identified in the Health System Evidence (HSE) database [Sources and Methods insert]. Six economic analyses (cost effectiveness, cost utility, or avoided cost) were added, also taken from the HSE database. Finally, specific economic literature dealing with the effects of taxes and prices on smoking initiation and cessation behaviours was analysed separately using an earlier meta-analysis and adding a traditional review (non-systematic) of the relatively modest body of literature subsequently published.

Few studies identified in the systematic literature reviews deal with smoking-cessation policies or interventions implemented in France. If all the literature reviews do not explicitly provide the distribution of country of origin for the studies being reviewed, the majority that do provide this information allow us to conclude that the results of French studies are rarely taken into account. Why? Firstly because fewer studies are conducted in France as public policy evaluation

is less frequent than in the United States or the United Kingdom. Secondly, certain studies conducted in France, having been published in French, have little chance of being included in systematic literature reviews. It is impossible to determine the role of this reviewer selection bias based on language. Given the current state of knowledge, the review of literature reviews presented here will provide few ‘turnkey’ anti-tobacco policies directly applicable in France, but as previously evoked, it will allow us to eliminate the least promising interventions from the review of international studies and to suggest an more focused review of interventions carried out in France or in similar contexts.

The majority of meta-analyses deal with smoking-cessation

A meta-analysis examines the effect of interventions aimed at preventing tobacco initiation (‘starting to smoke on a regular basis’) among teenagers. It is a review of ‘community’ interventions (Carson *et al.*, 2011), in other words actions conducted outside the school framework, based on 25 studies conducted in four countries (none in France), and it reveals a statistically significant

METHOD

The review of literature reviews aimed at answering the question: ‘What effect has the intervention compared to the status quo?’ for several types of intervention was elaborated by using the Health Systems Evidence (HSE) database. A review of economic evaluations concerning interventions relating to tobacco consumption was added. Economic evaluations are based on specific studies and add an evaluation of unit costs per outcome (Cost-effectiveness Analysis) or health unit (Quality Adjusted Life Years or QALY, referred to as Cost-Utility Analysis), or even unit of well-being (Cost-Benefit Analysis). These specific studies are interesting as they give an indication of the ‘price to pay’ to obtain results in the fight against tobacco consumption. Only evaluations conducted in countries comparable to France were retained.

The corpus, based on a keyword search, comprises 64 reviews and six economic analyses. From the reviews selected, the following elements were retained:

1. Estimated effect of the intervention (for each type of intervention reviewed).
2. Estimation of variance.
3. Calculation of the intervention’s absolute effect (for the most interesting) in relation to the most frequent reference state (or base).
4. Methodological aspects of the review: criteria and research foundations, excluded studies, bias, sensitivity analysis.
5. Methodological comments when relevant.

³³ Built with the Greek word for ‘behind’, ‘meta-analysis’ literally means ‘which comes behind the analysis’ and could be translated as ‘analysis of singular analyses’ (Glass, 2000).

but weak effect on self-reported smoking behaviour in answer to the question 'Are you a regular smoker?': the average intervention reduces the percentage of smokers in the week or month preceding the survey by between 3% and 17%. Some studies finding a stronger effect were not included due to methodological biases.

The vast majority of meta-analyses deal with smoking cessation. Twenty two were identified of which four concerned the effectiveness of smoking cessation consultations in general and in accordance with the consultant's professional identity (doctor, nurse, psychologist, etc.), and eighteen concerned the more specific question of the methods employed (nicotine replacement therapies (NRT), motivational interviews, telephone consultations, behavioural therapy).

The effectiveness of smoking-cessation interventions depends on the types of professionals carrying them out and the use of nicotine replacement products

Concerning the effectiveness of interventions according to the professional identity of the consultant, four reviews compare the effectiveness of consultations against no consultations rather than direct comparisons between different types of consultation. All reached the conclusion that consultations are highly effective. One review (Hutton *et al.*, 2011) shows that any type of consultation, whatever the professional, increases the probability of smoking cessation⁴ at six months, by over 75%. If the professional is a doctor (Boyle *et al.*, 2011), the probability increases by between 66% and 84% and by 30% if it is a nurse (Zaki *et al.*, 2008).

Another review (Garrison *et al.*, 2003) comparing studies examining the effectiveness of consultations with dif-

ferent professionals adds the dimension 'combined with nicotine replacement products'. Studies examining the effectiveness of consultations without nicotine replacement products find no significant difference between professionals: the effect is the same at around +80 %, whether the consultant is a doctor, nurse or psychologist. In contrast, considerable differences in effectiveness are found when professionals combine consultations with nicotine replacement therapy: consultations with psychologists or professional counsellors are 300 % more effective when combined with NRT compared with no intervention at all. On the other hand, consultations with doctors or nurses have the same level of effectiveness even combined with NRT and can decrease from between 10% and 50% compared with no intervention at all. According to this literature review, the most promising means of obtaining a positive effect on smoking cessation is to combine consultations with a psychologist or 'counsellor' with NRT. These results are difficult to extrapolate to France where psychologists are unable to prescribe NRT and 'counsellors' have no equivalent in the French health system.

'Motivational' interviews are effective showing an increase in the rate of complete smoking cessation of between 30% and 80% compared with no intervention at all (Lai *et al.*, 2010). A meta-analysis of group therapies shows a 100% success rate compared to self-help but the time-line over which the success rate was monitored was not specified.

The effectiveness of interventions using tools such as the Internet or mobile phones is also underlined ...

Other studies compare the effectiveness of interventions according to the tools used (Rice, Stead, 2008; Hajek *et al.*, 2005; Whittaker *et al.*, 2009). Those using the Internet or mobile phones are all effective or very effective even over the long-term (over a year). Smoking cessation success rates, measured against the lack of intervention, range between +20% and +118%. The study conducted by Whittaker *et al.* (2009) finds that at twelve months, the percentage of individuals that stopped smoking increased

by almost 50%. A meta-analysis (Krebs *et al.*, 2010) of 88 computer-assisted counselling interventions on smoking cessation, diet, physical exercise and mammograms show a high effectiveness for these interventions both statistically and clinically but nevertheless indicate a progressive decrease in their effectiveness through time after the end of the intervention. Interventions that can be adapted through time have longer lasting effects than those that are fixed once and for all. Finally, computer-assisted interventions simultaneously targeting several (up to three) behaviour patterns have a similar impact as those targeting one type of behaviour only.

..... as are the ones fixing the smoking cessation date

Ultimately, the most effective form of intervention appears to consist in training health professionals in smoking cessation techniques (Villanti *et al.*, 2010). Based on three studies, professionals able to set the date of smoking cessation increase the probability of success by 1,400%. A review of these studies suggests that the success rate comes from the ability to schedule the date of cessation rather than the training. Comprehensive interventions combining several tools (questioning, counselling, evaluating, NRT support and setting the date of smoking cessation) increase the success rate by 219% compared to no intervention at all (Spring *et al.*, 2009). In terms of effectiveness, a breakdown of the tools employed in the consultation process places setting the date of smoking cessation with the patient and the prescription of nicotine replacement products in the lead. Finally, self-help (Tzelepis *et al.*, 2011), financial incentives or those incorporating self-esteem (Stead and Lancaster, 2005) and telephone counselling (Shahab, McEwen, 2009; Stead *et al.*, 2006) have a modest and often temporary effect (at six months, but not a year).

A meta-analysis of nine studies (the most recent dating back to 2003) examining the effects of financial assistance in the purchase of nicotine replacement products (Kaper *et al.*, 2005) records an average ratio of between 1.17 and 1.88. It reveals that the partial reimbursement of NRT costs results in 40% of

⁴ In the following paragraphs and unless otherwise specified, 'smoking cessation' is to be understood as 'smoking cessation at six months'.

the effects of total reimbursement. The cost of smoking cessation ranges from between 592 and 1,817 euros.

Finally, training professionals or targeting certain key elements of a consultation such as setting a smoking cessation date with the patient, asking health professionals to conduct motivational interviews or psychologists and counsellors to prescribe NRT with total reimbursement appear to be the most promising approaches. Consultations by mobile phone or the Internet *also* appear to be effective.

Economic meta-analyses on the demand elasticity of cigarettes to price, income and advertising

Two meta-analyses were identified using the specialised database EconLit (Sources insert) of which the analysis conducted by Gallet and List, published in 2003. It analysed 86 studies conducted by economists on the demand elasticity of cigarettes or tobacco to price, income and advertising published before 2002. The second study confirms the results obtained by Gallet and List according to which advertising has virtually no impact on tobacco consumption.

The literature review published by Gallet and List produces 523 price elasticities, 375 income elasticities and 137 elasticities to spending on advertising. The variable on which price, income or advertising has an impact is always the quantity of cigarettes smoked by a given population (most often per capita) with an average of -0.48 for price, and +0.42 for income.

The meta-regression shows that the impact of price on the quantity of cigarettes smoked is greater on the long-term than the short-term when measured on individual data and among the teenage population. The price elasticity of demand appears to remain robust whatever the methodological refinements employed by the economists. Thus, a 1% increase in the final price (equivalent to a 1.25% tax increase

in France if the producers include the total tax increase in their prices) reduces cigarette consumption by at least 0.5%, and perhaps more among teenagers. However, it is not indicated whether this result refers to a decrease in smokers' daily consumption rates or whether it means that 0.5% of the smoking population have definitively stopped smoking, potentially representing 40,000 lives saved. Moreover, tax increases must be sufficiently high to compensate for increases in individual income.

A narrative literature review (Bader *et al.*, 2011), carried out more recently, compares the impact of price on several 'high risk' populations such as teenagers (under 18 years old), young adults (18-24 years old), the socially disadvantaged and dual diagnosis patients (smokers with mental health problems or smokers with additional addictions), heavy smokers (high consumption rate over a long period) and aboriginal populations. Studies based on aggregate data show a significant effect of taxes on teenagers and young adults but studies based on individual data are more numerous not to detect an impact of price on smoking initiation or cessation among young persons. The socially disadvantaged population appears more sensitive to price than the others but not the Aborigines or individuals suffering from mental health problems or other types of addiction.

The impact of price on smoking initiation in the younger population is strong according to some studies and null according to others

These studies are based on individual data measuring the impact of cigarette taxes or prices on what economists refer to as 'smoking participation', or being a regular smoker.

As it concerns the sensitivity of smoking initiation to the prices in force at the time of the decision, a first generation of studies (summarised in Chaloupka, 2000) observed that teenagers or young adults were more sensitive to price than adults or the population average. Teenagers or young adults' incomes being lower, they are more sensitive to

price increases. Moreover for teenage beginner smokers who are not yet hooked, or hesitant non-smokers, price variations have a greater impact than on regular smokers. In certain studies, however, this overall result concerning teenagers covers two different effects: a quasi-null effect on the under 16 age group and a very strong impact at over 16 years old (Glied, 2002). The interpretation of this result was that the younger teenagers do not buy their cigarettes with their own budgets. They use their pocket money, which parents may increase, or else they are given the cigarettes they smoke. Another interpretation was that the under 16s are unable to take into account the long-term effects of price.

From the years 2000 on, De Cicca and other authors (De Cicca *et al.*, 2002 ; De Cicca *et al.*, 2005) questioned results concluding that price had a significant impact on teenage smoking. According to them, the correlations measured in older studies simply resulted from the omission of a third variable, the jurisdiction's attitude towards smoking (the State in the United States, the Canadian Province or the Nation in Europe) leading to tax increases. If public opinion strongly reproves smoking in general, and smoking among teenagers in particular, it will be easier for the lawmakers to increase cigarette taxes and more difficult for teenagers to smoke. A correlation between tax increases and the reduction in tobacco consumption among teenagers could be due to the differential increase in this reprobation between jurisdictions. Taking up previous measures (in the United States) and adding controls for this anti-smoking attitude, De Cicca *et al.* (2006) found that the price of cigarettes had no impact on teenage smoking.

The effect of price on the decision to stop smoking definitively is significant, especially for women

The few studies relating retrospective individual data (relating the question 'If you previously smoked, at what age did you stop smoking?' to the price of cigarettes in that year and in previous years) to the effect of price on the decision to stop smoking, however, reveals signifi-

cant effects. Forster and Jones (2001), using British data, evaluate a price elasticity of +1.46 for women and +0.60 for men on stopping smoking definitively corroborating the results obtained by Tauras and Chaloupka (1999) using North American data (+1.19 for women and +1.12 for men). According to both these studies, increasing the price of cigarettes by 1% increases the percentage of definitive cessations by over 1%. Douglas (1998), using 1980s North American data, Lopez-Nicolas (2002) using 1990s Spanish data and Grignon (2009) using French data (years 2000), find a -1 or over elasticity between price and smoking duration (-1.0 in the United States, -1.14 in Spain, and -1.33 among women in France), the only exception being the result for French men non-significantly different from 0. This means that a 1% price increase reduces average smoking duration by over 1%.

Narrative literature reviews confirm the effects of measures such as prohibiting smoking in the home or at work on passive smoking among children

The narrative literature reviews mentioned here only examine topics not covered by meta-analyses. One such study (Petticrew and Roberts, 2006) measures the effect of taking biological measures on smoking. It shows that measuring lung function using a flow spirometer has a significant effect on smoking cessation as opposed (on average) to measuring the outflow of carbon monoxide. Another study (Kabir *et al.*, 2010), based on 19 studies shows that policies prohibiting smoking in the home and/or at work based on biological measurements, and applied to all the population in a given zone, has a significant impact on passive smoking among children. A Cochrane review (Jackson *et al.*, 2005, AMSTAR 7/10) quantitatively assesses smoking cessation interventions carried out by sports clubs (rather than health professionals, and included here as no quantitative review mentions this type of intervention); the authors were unable to identify studies with a sufficient level of proof and the review is unable to reach a conclusion one way or the other.

The economic evaluation of interventions to prevent smoking initiation or promote smoking cessation

Economic evaluations compare the cost of an intervention to its outcome thereby providing additional information but even more context-dependent: context determines not only whether an intervention is effective but also whether its unit cost per outcome is acceptable. Evaluations differ in how they measure the result: cost-effectiveness analyses (CEA) measure the effect of an intervention by its direct outcome (for example, the number of individuals who stop smoking). A typical CEA shows an increase in cost due to the intervention but some interventions actually reduce overall costs (costs saved are higher than the cost of the intervention) and their CEA degenerates into a Cost-Minimization Analysis (CMA): by how much does the intervention cut costs? Cost-utility analyses (CUA) measure the effect of an intervention by means of a health measurement permitting the comparison between different health interventions. The most frequently used measurement is Quality Adjusted Life Years (QALY). Finally, cost-benefit analyses (CBA) measure outcome in monetary value which makes it possible to compare the intervention with any type of intervention with a benefit that can be measured in monetary terms. A CBA in the health domain is thus always based on a monetary value of the quantity and quality of human life.

We identified two CEA, two CUA and two CMA in the HSE database concerning anti-smoking interventions, but no CBA.

One of the cost-effectiveness studies (Hollingworth *et al.*, 2012) shows that an intervention in school to prevent smoking initiation through peer pressure costs 1,936 euros per avoided smoker (measured two years after the intervention among 12-13 year olds). The second study (Salize *et al.*, 2009) concludes that an intervention aimed at promoting smoking cessation through the reimbursement of nicotine replacement products (bupropion) costs 92

euros per cessation (at 12 months) and one combing nicotine replacement products and a doctor's advice, 83 euros per cessation.

One of the cost-utility studies (Vemer *et al.*, 2010) measures the long-term cost for society of nicotine replacement products using Quality Adjusted Life Years (QALY). The cost of the intervention is thus the cost of the nicotine replacement product to which is added the cost differential for the health system related to the fact that ex-smokers will live longer than if they had continued to smoke and thus consume more healthcare. In total, the cost by QALY ranges from between 4,500 and 7,500 euros and never above 16,000 euros, which remains relatively low (cost effective). The second study (Boyd and Briggs, 2009) measures the cost by QALY of two interventions by simulating long-term smoking cessation based on the result of four weeks observation: the nicotine replacement product costs 5,496 euros per QALY and the group therapy 6,745 euros.

Finally, one of the CMAs (Hejblum *et al.*, 2009) measured the savings made by a French hospital that assisted patients admitted for a hip or knee replacement to stop smoking before the operation at 117 euros per patient. How the fact of stopping smoking reduce complications related to these operations is not made clear in the study. The second study (Holtgrave *et al.*, 2009) measures the savings for American society of a prevention campaign targeting teenagers (social marketing) estimated at 1.9 billion dollars.

* * *

The systematic literature reviews analysed here allow us to reach the following conclusions: professional help (doctor, nurse, counsellor or psychologist) is always effective. A smoker desiring to stop and receiving help has 80% more chance of succeeding than a smoker that tries to stop on a self-help basis. However, providing these professionals with appropriate tools to help them support smokers wanting to quit is even more effective. Notably, a doctor prescribing a fixed date for smoking cessation has more impact than a doctor

who doesn't: the probability of success increases by around 300% compared to self-help techniques. The most effective combinations are trained health professionals with the appropriate tools to assist smoking cessation such as psychologists or counsellors authorised to prescribe nicotine replacement products. However, doctors who prescribe NRT have no greater impact than those who do not. Behavioural therapies (group therapies) have the same impact as individual help provided by a professional. Interventions on hospitalised patients are no more effective than general counselling interventions by a professional in the ambulatory sector. Telephone assistance (mobile phone) or Internet are potentially effective, perhaps slightly more so than help from an untrained professional, but less than help from

a trained professional who prescribes NRT. Here again, the type of help (frequency of calls, dynamic and personalised help programme) determines the level of effectiveness.

All types of support for cessation of tobacco use seem to be highly cost effective: nicotine replacement reimbursements cost between 80 and 1,793 euros per smoking cessation. Interventions in schools aimed at dissuading smoking initiation through peer pressure costs 1,874 euros per avoided smoker. In general, nicotine replacements cost around 5,000 euros per year of life saved and never more than 16,000 euros. Finally, group therapy costs 6,745 euros per year of life saved.

Price increases have a significant effect on overall tobacco consumption on the condition that they are higher than average income increases, but do not appear to significantly dissuade smoking initiation. However, even if they are effective in persuading smokers to stop smoking, no existing study indicates whether they are effective in convincing heavy smokers who have been smoking a long time and are most at risk.

Community interventions aimed at dissuading teenagers from starting to smoke are effective and reduce the percentage of regular smokers by 3% to 17% on average. ♦

FURTHER INFORMATION

- Bader P., Boisclair D., Ferrence R. (2011). "Effects of tobacco taxation and pricing on smoking behavior in high risk populations: A knowledge synthesis". *International journal of environmental research and public health*. 8(11):4118-4139.
- Becker Gary S., Murphy K. M. (1988). "A theory of rational addiction". *Journal of Political Economy* 96: 675-700.
- Boyd K.A., Briggs A.H. (2009). "Cost-effectiveness of pharmacy and group behavioural support smoking cessation services in Glasgow". *Addiction*.104(2):317-325.
- Boyle R., Solberg L., Fiore M. (2011). "Use of electronic health records to support smoking cessation". *Cochrane database of systematic reviews* (Online). (12):CD008743.
- Carson K.V., Brinn M.P., Labiszewski N.A., Esterman A.J., Chang A.B., Smith B.J. (2011). "Community interventions for preventing smoking in young people". *Cochrane database of systematic reviews* (Online). (7):CD001291.
- Cartwright N. (2007). *Hunting Causes and Using Them*. Cambridge U Press.
- Chaloupka F. (2000). "Economics of smoking", in Culyer, A.J. and J.P. Newhouse (eds.). *Handbook of Health Economics*, volume 1, North Holland Elsevier.
- De Cicca P., Kenkel D., Mathios A. (2002). "Putting Out the Fires : Will Higher Taxes Reduce the Onset of Youth Smoking?". *Journal of Political Economy*, 110(1) : 144-169.
- De Cicca P., Kenkel D., Mathios A. (2005). "The fires are not out yet : Higher taxes and young adult smoking", in *Substance Use : Individual Behaviour, Social Interactions, Markets and Politics, Advances in Health Economics and Health Services Research* Volume 16, M. Grossman and B. Lindgren, Eds.
- De Cicca P., Kenkel D., Mathios A., Shin Y., Lim J. (2006). "Youth smoking, cigarette prices, and anti-smoking sentiment". NBER Working Paper 12458.
- Douglas S. (1998). "The duration of the smoking habit". *Economic Inquiry* 36 : 49-64.
- Forster M., Jones A. (2001). "The role of tobacco taxes in starting and quitting smoking : duration analysis of British data". *Journal of the Royal Statistical Society (Series A)* 164(3) : 1-31.
- Gallet C. A., List J. A. (2003). "Cigarette demand: a meta-analysis of elasticities". *Health Economics* 12 : 821-835
- Garrison M.M., Christakis D.A., Ebel B.E., Wiehe S.E., Rivara F.P. (2003). "Smoking cessation interventions for adolescents: A systematic review". *Am J Prev Med*.
- Glass G. V. (2000). "Meta-analysis at 25". www.gvglass.info/papers/meta25.html
- Glied, S. (2002). "Youth tobacco control: reconciling theory and empirical evidence". *Journal of Health Economics* 21 : 117-135.
- Grignon M. Pierrard B. (2004). « Approches économiques du tabagisme ». *Médecine Sciences* 20(8).
- Grignon M. (2009). "An empirical investigation of heterogeneity in time preferences and smoking behaviors". *The Journal of Socio-Economics* 38 : 739-51.
- Grignon M. (2012). « Approches économiques de l'addiction tabagique », présentation au Groupe d'Échanges sur le Tabagisme, Paris, Mars.
- Hacking I. (1988). "Telepathy : Origins of Randomization in Experimental Design" *Isis* 79(3) *A Special Issue on Artifact and Experiment* 427-451.
- Hajek P., Stead L.F., West R., Jarvis M. (2005). "Relapse prevention interventions for smoking cessation". *Cochrane database of systematic reviews* (Online). (1):CD003999.
- Hejblum G., Atsou K., Dautzenberg B., Chouaid C. (2009). "Cost-benefit analysis of a simulated institution-based preoperative smoking cessation intervention in patients undergoing total hip and knee arthroplasties in France". *Chest*. 135(2):477-483.
- Hill A.B. (1954). *The mortality of doctors in relation to their smoking habits. A preliminary report*. 228(i): 1451-55 et 60 :

CONTINUED

- Hollingworth W., Cohen D., Hawkins J., Hughes R.A., Moore L.A.R., Holliday J.C., et al. (2012). "Reducing smoking in adolescents: Cost-effectiveness results from the cluster randomized assist (a stop smoking in schools trial)". *Nicotine and Tobacco Research*. 14(2): 161-168.
- Holtgrave D.R., Wunderink K.A., Vallone D.M., Heaton C.G. (2009). "Cost-utility analysis of the national truth campaign to prevent youth smoking". *American Journal of Preventive Medicine*. 36(5): 385-388.
- Hutton H.E., Wilson L.M., Apelberg B.J., et al. (2011). "A systematic review of randomized controlled trials: Web-based interventions for smoking cessation among adolescents, college students, and adults". *Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco*. 13(4):227-238.
- Jackson N.W., Howes F.S., Gupta S., Doyle J.L., Waters E. 2005. "Policy interventions implemented through sporting organisations for promoting healthy behaviour change". *Cochrane Database of Systematic Reviews*. (2) Art. No.: CD004809. DOI: 10.1002/14651858.CD004809.pub3.
- Kabir Z., Alpert H.R., Goodman P.G., Haw S., Behm I., Connolly G.N. et al. (2010). "Effect of smoke-free home and workplace policies on second-hand smoke exposure levels in children: An evidence summary". *Pediatric Health*. 4(4):391-403.
- Kaper J., Wagena E.J., Severens J.L., Van-Schayck C.P. 2005. "Healthcare financing systems for increasing the use of tobacco dependence treatment". *Cochrane Database of Systematic Reviews*. (1). Art. No.: CD004305. DOI: 10.1002/14651858.CD004305.pub3.
- Krebs P., Prochaska J.O., Rossi J.S. (2010). "A meta-analysis of computer-tailored interventions for health behavior change". *Preventive Medicine*. 51(3-4):214-221.
- Lai D.T., Cahill K., Qin Y., Tang J. (2010). "Motivational interviewing for smoking cessation". *Cochrane database of systematic reviews (Online)*. (1):CD006936.
- Lavis J., Davies H., Oxman A., Denis J.L., Golden-Biddle K., Ferlie E. (2009). "Toward systematic reviews that inform health care management and policy-making". *Journal of Health Services Research & Policy*, Vol 10 Suppl 1 : 35-48.
- López-Nicolás A. (2002). "How important are tobacco prices in the propensity to start and quit smoking? An analysis of smoking histories from the Spanish Health Survey". *Health Economics* 11 : 521-535.
- Luther L.T. (1964). Smoking and Health. *The US Surgeon General's report*.
- Myung S., McDonnell D.D., Kazinets G., Seo H.G., Moskowitz J.M. (2009). "Effects of web and computer-based smoking cessation programs: Meta-analysis of randomized controlled trials". *Arch Intern Med*. 169(10):929.
- Orphanides A., Zervos D. (1995). "Rational addiction with learning and regret". *Journal of Political Economy* 103(4) : 739-758.
- Petticrew M. and Roberts H., (2006). *Systematic reviews in the social sciences: a practical guide*. Oxford : Blackwell Publishing.
- Rice V.H., Stead L.F. (2008). "Nursing interventions for smoking cessation". *Cochrane database of systematic reviews (Online)*. (1):CD001188.
- Shahab L., McEwen A. (2009). "Online support for smoking cessation: A systematic review of the literature". *Addiction*. 104(11):1792-1792.
- Salize H.J., Merkel S., Reinhard I., Twardella D., Mann K., Brenner H. (2009). "Cost-effective primary care-based strategies to improve smoking cessation: More value for money". *Archives of Internal Medicine*. 169(3):230-235.
- Spring B., Howe D., Berendsen M., et al. (2009). "Behavioral intervention to promote smoking cessation and prevent weight gain: A systematic review and meta-analysis". *Addiction*. 104(9):1472.
- Stead L.F., Lancaster T. 2005. "Group behaviour therapy programmes for smoking cessation". *Cochrane database of systematic reviews (Online)*. (2):CD001007.
- Stead L.F., Perera R., Lancaster T. (2006). "Telephone counselling for smoking cessation". *Cochrane database of systematic reviews (Online)*. (3):CD002850.
- Suranovic S.M., Goldfarb R. S., Leonard T. C. (1999). "An economic theory of cigarette addiction". *Journal of Health Economics* 18(1) : 1-30.
- Tauras J., Chaloupka F.J. (1999). «Determinants of Smoking Cessation : An Analysis of Young Adult men and Women». NBER Working Paper 7262.
- Tzelepis F., Paul C.L., Walsh R.A., McElduff P., Knight J. (2011). "Proactive telephone counseling for smoking cessation: Metaanalyses by recruitment channel and methodological quality". *J Natl Cancer Inst*;103(12):922.
- Vemer P., Rutten-van-Molken M.P., Kaper J., Hoogenveen R.T., van Schayck C.P., Feenstra T.L. (2010). "If you try to stop smoking, should we pay for it? The cost utility of reimbursing smoking cessation support in the Netherlands". *Addiction*. 105(6):1088-1097.
- Villanti A.C., McKay H.S., Abrams D.B., Holtgrave D.R., Bowie J.V. (2010). "Smoking-cessation interventions for US young adults: A systematic review". *Am J Prev Med*. 39(6):564-574.
- White H., Waddington H. (2012). "Why do we care about evidence synthesis? An introduction to the special issue on systematic reviews". *Journal of Development Effectiveness*, 4 :3, 351-358.
- Whittaker R., Borland R., Bullen C., Lin R.B., McRobbie H., Rodgers A. (2009). "Mobile phone-based interventions for smoking cessation". *Cochrane database of systematic reviews (Online)*. (4):CD006611.
- Zaki A., Abrishami A., Wong J., Chung F.F. (2008). "Interventions in the preoperative clinic for long term smoking cessation: A quantitative systematic review". *Canadian journal of anaesthesia = Journal canadien d'anesthésie*. 55(1):11-21.