

Points of sale of tobacco products

Synthesis of scientific and practice-based knowledge on the impact of reducing the number of points of sale and restrictions on tobacco product displays



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NEDERLANDSE SAMENVATTING

DEEL I INLEIDING

Diverse maatregelen voor tabaksontmoediging zijn gericht op het verminderen van de beschikbaarheid, toegankelijkheid en/of zichtbaarheid van tabaksproducten op verkooppunten. In reactie op een debat in de Tweede Kamer in oktober 2013 stemde de Staatssecretaris van Volksgezondheid, Welzijn en Sport ermee in de kennisbasis over de impact van twee van deze maatregelen te evalueren, namelijk een vermindering van het aantal verkooppunten (met speciale aandacht voor tabaksautomaten) en een inperking van de zichtbaarheid van tabaksproducten op verkooppunten. Deze gegevens zijn bedoeld ter ondersteuning van een evenwichtige discussie over de diverse beleidsopties.

Dit rapport beschrijft gegevens van een systematische review van resultaten van wetenschappelijk onderzoek samen met gegevens uit 'grijze' literatuur en informatie van deskundigen in een aantal Europese landen om een beeld te krijgen van de impact van de twee maatregelen.

DEEL II VERKOOPPUNTEN VAN TABAKSPRODUCTEN

Aantallen, soorten en beleid

In Nederland zijn er diverse bronnen voor het kopen van tabaksproducten. Daarvan zijn supermarkten veruit de meest gebruikte, zowel onder volwassenen als onder jongeren, op enige afstand gevolgd door tabaksspeciaalzaken en pompstations. Tabaksautomaten en internet lijken geen belangrijke bron te zijn voor het verkrijgen van tabaksproducten (tabellen 2.1 en 2.2).

Wat betreft de meest gebruikelijke plaatsen waar tabak wordt gekocht, bestaan tussen de EU-lidstaten opmerkelijke verschillen. In sommige landen, zoals Frankrijk, Italië en Hongarije (vanaf 1 juli), is de verkoop van tabak hoofdzakelijk beperkt tot tabaksspeciaalzaken.

Evenals in veel andere landen bestaat er in Nederland geen officieel register voor verkopers van tabak. Schattingen variëren van 30.000 tot 60.000 tabaksverkooppunten. Voor zover hierover gegevens beschikbaar zijn, suggereert een ruwe 'vergelijking' dat het aantal inwoners of rokers dat wordt bediend door één verkooppunt enorm verschilt tussen landen (tabel 2.4). Zelfs als deze gegevens vergelijkbaar en betrouwbaar zouden zijn, is het niet mogelijk conclusies te trekken over de effecten van verkooppunten op de prevalentie van roken, omdat er tal van factoren zijn die deze cijfers beïnvloeden. Bovendien kan binnen een land op lokaal niveau het aantal (of de dichtheid van) tabaksverkooppunten enorm variëren als functie van sociaaleconomische status, onafhankelijk van de bevolkingsdichtheid.

Beleid

In het WHO-kaderverdrag inzake Tabaksontmoediging wordt een vermindering van de dichtheid van tabaksverkooppunten niet actief aanbevolen als maatregel om tabaksgebruik te ontmoedigen, met uitzondering van een verbod op tabaksautomaten. Toch roept een aantal gezondheidsautoriteiten en niet-gouvernementele organisaties op het aantal en de locaties van tabaksverkooppunten te reguleren en te beperken, net als in het geval van alcohol. Hun voorstellen zijn gericht op het verminderen van de beschikbaarheid van tabak en dragen daarmee bij aan de denormalisatie van roken, aangezien gezondheidsboodschappen over de schadelijke gevolgen van roken niet stroken met de brede beschikbaarheid van tabaksproducten. Het verlenen van vergunningen aan verkopers kan een instrument zijn om de dichtheid van tabaksverkooppunten te verlagen, hoewel deze maatregel zelden expliciet voor dit doel wordt toegepast. Hongarije is een uitzondering. Sinds 1 juli 2013 mogen in dit land uitsluitend tabakswinkels in staatseigendom tabak verkopen, hetgeen resulteerde in een sterke daling van het aantal tabaksverkooppunten van ongeveer 40.000 naar 6.500.

Het aantal tabaksverkooppunten kan ook dalen in het kielzog van andere maatregelen voor tabaksontmoediging, zoals het verhogen van de wettelijke minimumleeftijd voor de verkoop van tabaksproducten, het verbieden of beperken van roken in openbare ruimten en de horeca, of accijnsverhogingen. Daarnaast kunnen winkeliers er vrijwillig voor kiezen te stoppen met de verkoop van tabak. Voorbeelden hiervan zijn te vinden bij Amerikaanse drogisterijen en supermarkten. Redenen om te stoppen met de verkoop van tabak kunnen verband houden met gezondheids- of ethische overwegingen, of met zakelijke overwegingen zoals dalende tabaksverkoop of een negatieve invloed op het imago van de winkel. Er is ook geopperd om winkeliers te belonen als zij stoppen met de verkoop van tabaksproducten. Tot slot is gesuggereerd de quota voor legale import en verkoop van tabaksproducten geleidelijk te reduceren, net als visquota of CO₂-quota op andere gebieden, of om een rokersvergunning in te voeren in plaats van een vergunning voor verkopers van tabaksproducten.

Vergunningen

De implementatie van een vergunningenstelsel wint steeds meer voorstanders als een potentieel effectief instrument om een vermindering van het aantal verkooppunten van tabak te realiseren. Tot nu toe is vergunningverlening echter zelden expliciet ingezet als een middel om het aantal retailers (geleidelijk) te beperken (bijv. door 'natuurlijk' verloop, niet vernieuwen van vergunningen, invoering van een maximum aantal vergunningen). Reden hiervoor kan zijn dat overheidsinterventies op de tabaksmarkt eenvoudiger te rechtvaardigen lijken te zijn als ze zich richten op de bescherming van kinderen en het ontmoedigen van roken onder jongeren. Dit lijken ook de meest geciteerde redenen te zijn voor het implementeren van een vergunningenstelsel (bijv. om handhaving van de minimumleeftijd voor het kopen van tabak te intensiveren), naast het bevorderen van naleving van belastingwetten.

Een vergunningensysteem voor retailers voor tabaksverkoop is ingevoerd in vijf Australische staten, Singapore, Canada en 39 staten van de Verenigde Staten. In Europa is het vergunnen van tabakswinkeliers ingevoerd in Finland en Hongarije, en voorgesteld (maar niet geïmplementeerd) in

Noorwegen. In Frankrijk is al jaren een specifiek vergunningensysteem operationeel, maar vergunningeisen hebben geen betrekking op aspecten van de volksgezondheid. In Engeland, Wales en Noord-Ierland hebben winkeliers geen vergunning nodig om tabak te verkopen, maar als zij herhaaldelijk de wet overtreden door tabak te verkopen aan iemand jonger dan 18 jaar, kunnen ze hun recht om tabak te verkopen voor maximaal een jaar verliezen. Dit is een vorm van 'negatieve vergunning'. Diverse landen hebben gekozen voor een registratiesysteem (bijv. Schotland en Ierland), waarvan wordt aangenomen dat het minder kostbaar is en minder administratieve lasten met zich meebrengt dan een vergunningensysteem. Bij een registratiesysteem zijn de tarieven meestal minimaal (en vormen daarmee mogelijk geen afschrikmiddel om te stoppen met de verkoop) en vindt er geen beoordeling van retailers plaats. In Ierland staat een verandering van een registratiesysteem naar een vergunningensysteem op de politieke agenda om effectiever te kunnen reguleren wie tabak mag verkopen en waar deze producten mogen worden verkocht.

Er zijn aanwijzingen dat een verhoging van het vergunningentarief (zoals is gebeurd in Zuid-Australië), of invoering van vergunningen waar ze nog niet bestaan (zoals in Finland), waarschijnlijk een effectieve methode is voor het terugdringen van het aantal verkooppunten (zelfs wanneer dit niet het doel was). Dit effect wordt echter alleen verwacht daar waar de consumentenvraag naar sigaretten laag is, zoals in de horeca. Het valt nog te bezien of een verdere verhoging van het tarief ook winkeliers met hoge volumes van tabaksverkoop zou ontmoedigen, of dat andere maatregelen nodig zijn.

Tabaksautomaten

In het WHO-kaderverdrag inzake Tabaksontmoediging wordt het verminderen van het aantal tabaksautomaten niet alleen gestimuleerd als een maatregel om de toegankelijkheid voor jongeren te verminderen (Artikel 16), maar ook omdat tabaksautomaten alleen al door hun aanwezigheid een vorm van reclame voor en promotie van tabakswaren zijn (Artikel 13). Tabaksautomaten zijn in 30 landen in de Europese regio van de WHO verboden. In negen van deze landen is dit verbod tussen 2007 en 2012 ingevoerd. In 13 lidstaten van de EU zijn tabaksautomaten verboden of waren ze nooit toegestaan (Bulgarije, Cyprus, Estland, Frankrijk, Griekenland, Hongarije, Kroatië, Letland, Litouwen, Polen, Roemenië, Slovenië en Verenigd Koninkrijk). In 2012 was de prevalentie van het kopen van tabaksproducten via automaten onder de algemene bevolking (≥ 18 jaar) in de afgelopen 12 maanden het hoogst in Oostenrijk (34%), Spanje (31%) en Malta (29%). Voor Nederland was dit 10% (1% vaak, 4% soms en 5% zelden).

Toch lijken automaten in de meeste landen geen belangrijk distributiekanaal voor tabaksproducten te zijn. Schaarse onderzoeksgegevens suggereren dat niet alleen een compleet verbod op tabaksautomaten, maar ook een gedeeltelijk verbod (bijv. vanwege leeftijdsgrenzen), een rookverbod in openbare ruimten en horeca en accijnsverhogingen de *verkoop* via dit distributiekanaal zouden kunnen verlagen. Of de prevalentie of incidentie van roken wordt beïnvloed door een verbod op tabaksautomaten is niet bekend, omdat er geen onderzoeken zijn gedaan die zich specifiek op deze vraag hebben gericht. Het is niet waarschijnlijk dat op de korte termijn een dergelijk effect op het rookgedrag wordt bewerkstelligd, omdat verkoop via automaten deels of volledig gecompenseerd zou kunnen worden door andere bronnen. Desondanks wordt gerapporteerd dat het verbieden van

tabaksautomaten in gelegenheden waar roken toch al verboden is, zoals in uitgaansgelegenheden, een aanvulling zou zijn op antirookwetgeving en sociale normen tegen roken zou ondersteunen. Bovendien zou een verbod op tabaksautomaten (een verhoging van) de wettelijke minimumleeftijd voor de verkoop van tabaksproducten kunnen versterken, omdat beide maatregelen erop gericht zijn tabaksproducten minder toegankelijk te maken voor jonge mensen.

Effecten van (beperking van) dichtheid en nabijheid van verkooppunten op rookgedrag

Tot nu toe is relatief weinig aandacht besteed aan de relatie tussen de wijdverspreide beschikbaarheid van tabakswaar in de detailhandel en het aanzetten tot roken. De afgelopen jaren zijn echter meerdere onderzoeken gepubliceerd over het verband tussen de dichtheid en nabijheid van tabaksverkooppunten en rookgedrag bij zowel jongeren als volwassenen. Een beperking op dit gebied is dat er geen studies zijn gepubliceerd die rechtstreeks de effecten van *veranderingen* (noch een stijging, noch een daling) in dichtheid en nabijheid van tabaksverkooppunten op rookgedrag onderzochten.

Mogelijke mechanismen

De beschikbare literatuur wijst op meerdere mechanismen via welke de dichtheid en nabijheid van het aantal punten waar tabak wordt verkocht invloed zouden kunnen hebben op rookgedrag. Meer verkooppunten en verkooppunten op kortere afstand kunnen tabak toegankelijker maken, met name voor jongeren, omdat zij over minder middelen beschikken om ver te reizen om tabak te kopen. Een hogere dichtheid en een grotere nabijheid van het aantal tabaksverkooppunten zou ook de blootstelling van jongeren aan reclame op deze verkooppunten kunnen verhogen, en bij rokers die proberen te stoppen zorgen voor *cues*, die de drang om te roken uitlokken. Bovendien zou een grotere beschikbaarheid van tabak leiden tot de perceptie dat roken sociaal geaccepteerd is. Tot slot kan een hogere dichtheid van verkooppunten de concurrentie tussen deze punten vergroten, wat vervolgens retailers ertoe zou kunnen aanzetten de prijs van sigaretten te verlagen (indien wettelijk toegestaan), of ertoe zou kunnen leiden dat verkopers de wetgeving met betrekking tot verkoop aan minderjarigen minder goed naleven.

Dichtheid en nabijheid van tabaksverkooppunten en rookgedrag onder jongeren

Dertien onderzoeken zijn geïdentificeerd naar de relatie tussen dichtheid en nabijheid van tabaksverkooppunten en roken en daaraan gerelateerd gedrag onder jongeren. Al deze onderzoeken zijn afkomstig uit Noord-Amerika, op één Australische studie na. Het meest consistente bewijs werd gevonden voor een verband tussen rookgedrag en de *dichtheid* van tabaksverkooppunten in de buurt van scholen. Bevindingen suggereren dat een hogere dichtheid van verkooppunten in de omgeving van scholen de kans vergroot dat jongeren vatbaar zijn voor roken, experimenteren met roken of al roker zijn. De bevindingen over deze uitkomsten konden echter niet altijd worden gerepliceerd in de verschillende onderzoeken. Daarnaast toonden meerdere onderzoeken aan dat de *dichtheid* van verkooppunten rondom de school een effect heeft op beginnen of experimenteren met roken, maar niet op jongeren die al roken. De relatie tussen de *nabijheid* van een verkooppunt ten opzichte van de school en rookgedrag onder jongeren is in slechts drie studies onderzocht en geen daarvan vond significante verbanden.

Het bewijs voor een relatie tussen dichtheid van tabaksverkooppunten rondom het huis of in de buurt en rookgedrag onder jongeren werd als beperkt en inconsistent beoordeeld, waarbij drie van de zes studies over dit onderwerp een verband vonden voor uiteenlopende uitkomsten met betrekking tot roken. De resultaten suggereerden dat dichtheid rondom het huis verband houdt met ooit in het leven gerookt hebben, tabaksgebruik in de voorgaande maand, en met een hogere frequentie van roken onder jongeren. Een aanvullend onderzoek (van drie onderzoeken over het onderwerp) vond een verband tussen de nabijheid van een verkooppunt tot het huis en het gebruik van tabak (prevalentie en aantal sigaretten per dag).

Dichtheid en nabijheid van tabaksverkooppunten en rookgedrag onder volwassenen

Het bewijs voor een verband tussen dichtheid en nabijheid van tabaksverkooppunten en rookgedrag onder volwassenen is beperkt, en onderzoeken zijn heterogeen met betrekking tot opzet en uitkomstmaten. Acht onderzoeken werden gevonden, uitgevoerd in de VS, Finland, Engeland en Nieuw-Zeeland. Vier (van de acht) studies onderzochten verbanden tussen dichtheid/nabijheid en uitkomsten gerelateerd aan *stoppen met roken*; drie daarvan suggereren dat nabijheid (en in mindere mate dichtheid) van tabaksverkopers inderdaad verband houdt met uitkomsten wat betreft stoppen met roken (bijv. terugval, abstinentie). Van de overige vier onderzoeken rapporteerden er drie positieve verbanden tussen dichtheid en verschillende indicatoren voor roken (prevalentie, aantal sigaretten per dag).

Bewijs uit de literatuur over alcohol

De literatuur over de effecten van dichtheid en nabijheid van alcoholverkooppunten is beter ontwikkeld dan de literatuur over tabak, met name wat betreft het gebruik van longitudinale of tijdreeksstudies. Uit een review door Campbell et al. (2009) kwam naar voren dat studies naar veranderingen in dichtheid van alcoholverkooppunten er consistent op wezen dat een tolerantere vergunningverlening het aantal verkooppunten in de loop der tijd deed toenemen, wat vervolgens weer leidde tot verhoogd alcoholgebruik. Daarnaast bleek uit studies naar veranderingen in

verkooppuntendichtheid (die niet specifiek het gevolg waren van beleidsmaatregelen) consequent dat een hogere dichtheid gerelateerd was aan hoger gebruik.

Conclusie

In het algemeen luidt de conclusie dat er op dit moment relatief beperkt bewijs is dat een vermindering van het aantal tabaksverkooppunten leidt tot een lagere prevalentie of incidentie van roken, en dat dit bewijs eerder indicatief is dan sluitend. Het bewijs tot nu toe is voornamelijk gebaseerd op cross-sectionele (eenmalige) onderzoeken (met name onder jongeren), naast een aantal prospectieve cohortstudies. Er zijn geen onderzoeken gevonden voor jongeren of volwassenen waarin *wijzigingen* in de nabijheid of dichtheid van tabaksverkooppunten zijn onderzocht. Daarom wordt voorgesteld om, parallel aan de literatuur over alcohol, meer onderzoeken te doen die veranderingen in dichtheid en nabijheid van verkooppunten koppelen aan rookgedrag, bijvoorbeeld door gebruik te maken van een studieopzet met onderbroken tijdreeksen.

Bevorderende en belemmerende factoren bij invoering van een beleid gericht op het inperken van tabaksverkooppunten

In Nederland loopt de publieke steun voor het verbieden van de verkoop van tabaksproducten sterk uiteen, afhankelijk van het type locatie en rookstatus (minder onder rokers). In 2014 was de steun onder de algemene bevolking van 18 jaar en ouder het hoogst voor een verbod op de verkoop van tabak op sportlocaties (71%) en in drogisterijen (63%), en het laagst voor een verbod in gemakswinkels (19%), pompstations (24%) en supermarkten (31%).

Vermindering van het aantal verkooppunten zou de investeringen (in tijd en geld) voor het verkrijgen van tabaksproducten kunnen verhogen, en kunnen leiden tot veranderingen in het koopgedrag (bijv. inkopen in grote hoeveelheden) in plaats van dat daarmee de drempel om te kopen (en roken) hoger wordt. Onderzoek naar dit potentiële ongewenste effect is zeer beperkt zodat het niet mogelijk is hierover conclusies te trekken.

DEEL III DISPLAY VAN TABAKSPRODUCTEN OP VERKOOPPUNTEN

Beleid

Met steeds verdere beperkingen op tabaksreclame zijn displays van tabakswaren op het verkooppunt een van de belangrijkste kanalen geworden voor de tabaksindustrie om hun producten onder de aandacht te brengen. Volgens pleitbezorgers voor de volksgezondheid zijn tabaksdisplays feitelijk een vorm van tabaksreclame die roken stimuleren en dus verboden zouden moeten worden. Tot op heden hebben twaalf landen (soms delen van het land of bepaalde rechtsgebieden) een verbod of een gedeeltelijke beperking ingevoerd voor de display van tabaksproducten, waarbij IJsland het eerste Europese land was (2001) en Ierland het eerste EU-land (2009). Daarna volgden Finland in 2012, Engeland, Wales en Noord-Ierland (grote winkels in 2012, kleine winkels in 2015), Schotland (grote winkels in 2013, kleine winkels in 2015) en Hongarije en Kroatië in 2013. Noorwegen voerde

in 2010 een verbod in. Van belang is dat er geen 'universeel' verbod op de zichtbaarheid van tabaksproducten geldt. Sommige landen hebben een totaalverbod ingevoerd zodat alle tabaksproducten uit het zicht van klanten opgeslagen dienen te worden, terwijl andere landen alleen hebben bepaald dat de tabaksdisplays niet zichtbaar mogen zijn van buitenaf of beperkingen hebben ingesteld aan de afmetingen ervan.

De belangrijkste argumenten voor landen om een displaybeperking of -verbod in te voeren zijn dat hierdoor naar verwachting het roken onder de bevolking zal afnemen omdat het aantal jongeren dat begint met roken zal dalen en volwassen rokers, die willen stoppen of zijn gestopt met tabaksgebruik, door de maatregel worden gesteund. In het algemeen geldt er grote publieke steun, met name onder niet-rokers, hoewel deze steun relatief laag is in Nederland (46% versus gemiddeld 58% in de EU). De mate waarin tabaksretailers in landen met een totaal (maar niet gedeeltelijk) verbod zich hieraan houden, is doorgaans vrijwel 100%.

In diverse landen (bijv. onlangs in Noorwegen en het Verenigd Koninkrijk) heeft de tabaksindustrie rechtszaken aangespannen in reactie op beleidsplannen voor het invoeren van beperkingen op de display van tabaksproducten. Tot nu toe zijn de meeste claims door de rechtbanken verworpen, zoals in Schotland, Noorwegen en Ierland, of door de tabaksfabrikanten weer ingetrokken (Engeland).

Effecten op rookgedrag van (het beperken van) de zichtbaarheid van tabaksproducten op verkooppunten

Mogelijke mechanismen

Blootstelling aan displays van tabakswaar op verkooppunten kan rookgedrag beïnvloeden omdat de displays fungeren als een vorm van reclame en roken met name voor jongeren aantrekkelijk maken. Bovendien kunnen ze visuele *cues* afgeven waardoor rokers en degenen die proberen te stoppen met roken gaan verlangen naar een sigaret. Tot slot kunnen tabaksdisplays roken sociaal geaccepteerd maken door de perceptie van roken te beïnvloeden (bijv. onderschatting van de gevolgen voor de gezondheid, overschatting van de prevalentie van roken).

Displays van tabaksproducten op verkooppunten: onderzoek naar aan roken gerelateerde indicatoren

In totaal hebben 19 unieke studies het verband onderzocht tussen de zichtbaarheid van tabaksproducten op verkooppunten en een of meer 'aan roken gerelateerde indicatoren'. Van deze 19 studies onderzochten er 10 het verband tussen de aanwezigheid van tabaksdisplays op verkooppunten en *rookgedrag*. De resultaten suggereren dat displays op verkooppunten de kans dat iemand begint met roken vergroten en het stoppen met roken bemoeilijken, zowel direct als door indicatoren van rookgedrag te beïnvloeden, zoals de drang om te roken, vatbaar zijn voor roken en koopgedrag.

Meer in het bijzonder is vastgesteld dat er een positief verband bestaat tussen blootstelling aan tabaksdisplays en rookgedrag (verhoogde kans op: *een roker zijn* (4 van de 5 onderzoeken), *meer sigaretten roken* (1 onderzoek), *drang om te roken* (1 onderzoek) en *vatbaar zijn voor roken* (3 van de 3 onderzoeken). Bovendien toonden twee onderzoeken op scholen (2 van de 2) aan dat een hogere blootstelling aan reclame op verkooppunten was gerelateerd aan een verhoogde kans dat jongeren *gaan roken*. Er is geen duidelijk bewijs dat een verbod op tabaksdisplays een effect heeft op de *prevalentie van roken*, maar dit wordt slechts beoordeeld in één onderzoek met een relatief korte follow-up (onder jongeren 1 maand na invoering van het verbod, onder volwassenen 1 jaar na invoering van het verbod). Negen andere onderzoeken toonden aan dat blootstelling aan tabaksdisplays op verkooppunten verband houdt met een hogere kans dat iemand een (*poging tot*) *aankoop van tabak* doet (4 van de 5 onderzoeken), en een verhoogde kans dat iemand *een spontane aankoop doet* (4 van de 4 onderzoeken). Vier onderzoeken onder volwassen rokers toonden aan dat blootstelling aan tabaksdisplays het moeilijker lijkt te maken om te stoppen met roken (3 van de 3 onderzoeken) en dat gevoeligheid voor tabaksdisplays de kans leek te verlagen om in de toekomst een succesvolle stoppoging te ondernemen (1 van de 1).

Hoewel de meeste onderzoeken een cross-sectionele opzet (eenmalige meting) toepasten, hebben meerdere prospectieve onderzoeken, waarbij respondenten over een langere periode worden gevolgd, ook aangetoond dat blootstelling aan tabaksdisplays toekomstig rookgedrag (of aan roken gerelateerd gedrag) voorspelt. Deze tijdsvolgorde is een noodzakelijke voorwaarde voor causaliteit. De uitkomsten van onderzoek naar de effecten van de zichtbaarheid van tabaksproducten op verkooppunten zijn consistent met onderzoeksbevindingen over effecten van tabaksmarketing in het algemeen en met de bredere marketingliteratuur.

Niettemin wordt de huidige peer-reviewed onderzoeksliteratuur gekenmerkt door diverse beperkingen, met name een tekort aan onderzoeken die zich rechtstreeks richten op de impact van beperkende maatregelen ten aanzien van tabaksdisplays op de prevalentie van roken in de bevolking. Er bestaan plannen voor dergelijk onderzoek in enkele landen, waaronder het Verenigd Koninkrijk en Noorwegen. De resultaten daarvan zouden de kennisbasis aanzienlijk kunnen versterken, maar er is nog meer onderzoek nodig. Landen die van plan zijn de zichtbaarheid van tabaksproducten op verkooppunten te reguleren, hebben een unieke mogelijkheid om de effecten gedegen te onderzoeken, waarbij het van belang is een reeks goed gedefinieerde metingen te verrichten, zowel voor als na de invoering van de maatregel.

Conclusies

Resultaten van de verschillende studies wijzen er op dat de zichtbaarheid van tabaksproducten op verkooppunten de kans op roken vergroot (beginnen en stoppen), hetgeen suggereert dat een beperking van, of verbod op de display van tabaksproducten waarschijnlijk zal bijdragen aan een vermindering van tabaksgebruik onder de bevolking. Er is echter geen informatie over de grootte van de effecten, die zich mogelijk pas na langere tijd zullen manifesteren. Deze conclusie is gebaseerd op de hoge consistentie van onderzoeksbevindingen, onder verschillende bevolkingsgroepen, met diverse onderzoeksopzetten en uitkomsten met betrekking tot roken.

Bevorderende en belemmerende factoren bij invoering van een beleid ter beperking van de zichtbaarheid van tabaksproducten op verkooppunten

Resultaten van meerdere onderzoeken geven aan dat, vergeleken met andere landen, in Nederland de steun voor een verbod op de display van tabaksproducten vrij laag is. Dit zou er op kunnen wijzen dat de Nederlandse bevolking niet voldoende op de hoogte is van het feit dat blootstelling aan deze displays roken kan stimuleren. In dit opzicht lijkt het nuttig om het algemene publiek te informeren over wat vanuit het perspectief van de volksgezondheid de reden is voor het invoeren van een verbod op zichtbaarheid van tabaksproducten op verkooppunten.

De economische gevolgen voor tabaksretailers lijken niet substantieel te zijn. De kosten voor aanpassing van winkels kunnen laag gehouden worden als het de retailer is toegestaan de display af te dekken en het niet verplicht is om de rookwaar onder de toonbank op te slaan. Het is echter niet bekend of afdekken net zo effectief is als opslag onder de toonbank omdat bij het (te lang) openen van de displays tabaksproducten zichtbaar kunnen zijn voor de klanten, hetgeen bij opslag onder de toonbank niet het geval is.

Tot slot blijkt uit ervaringen in andere landen dat het van belang is maatregelen volledig en specifiek te definiëren om te voorkomen dat de regelgeving omzeild kan worden.

EXECUTIVE SUMMARY

PART I INTRODUCTION

Several tobacco control measures are in place that aim to reduce the availability, accessibility and/or visibility of tobacco products at points of sale (POS). In response to a debate in the Dutch Parliament in October 2013, the Secretary of State for Health, Welfare and Sport agreed to review evidence on the impact of two of these measures, i.e., reducing the number of points of sale and restricting the display of tobacco products at points of sale. Special attention should be paid to tobacco vending machines. These data aim to support and facilitate a balanced discussion of different policy alternatives.

This report synthesises data from a systematic review of research findings and information from grey literature and experts in a number of European countries to obtain a picture of the impact of the two measures.

PART II POINTS OF SALE (POS) OF TOBACCO PRODUCTS

Numbers, types and policies

There are several sources from which tobacco products can be purchased in the Netherlands. All evidence shows that grocery stores are by far the most common sources from which tobacco can be purchased, both among adults and youth, followed at some distance by specialised tobacco shops and gas stations. Vending machines and the Internet do not seem to be major sources from which tobacco products can be obtained (tables 2.1 and 2.2).

Several differences exist among EU Member States with regard to the usual locations of tobacco purchase, with some countries limiting sales mainly to specialised tobacco shops (France, Italy, and Hungary as of 2013) (table 2.3).

As in many other countries, there is no official register of tobacco retailers in the Netherlands. Estimates range between 30,000 and 60,000 tobacco points of sale. To the extent that data are available, a crude 'comparison' suggests that the number of inhabitants or smokers served by one point of sale or tobacco outlet differs widely between countries (table 2.4). Even if the data were comparable and reliable, no conclusions can be drawn regarding the effects of points of sale on smoking prevalence, given the numerous other influences impacting on these figures. Moreover, the number or density of tobacco retail outlets may vary widely within a country on the local level as a function of socioeconomic status, independent of population density.

Policies

A reduction of tobacco outlet density is not actively promoted as a means of controlling tobacco use within the WHO Framework Convention on Tobacco Control, except for a ban on cigarette vending machines. Nonetheless, regulating and restricting the number and locations of tobacco retail outlets, similar to the regulation and restriction of alcohol sale, has been advocated by a range of health authorities and non-governmental organisations. Their proposals aim to reduce tobacco availability and contribute to the denormalisation of smoking, as health messages on the harms of smoking are incompatible with the wide ubiquity of tobacco products. Licensing of retailers may be one instrument to achieve reductions in tobacco outlet density, although it is rarely explicitly applied for this purpose. Hungary is an exception, where, as of 2013, only state-governed tobacco stores are allowed to sell tobacco, resulting in a major reduction from approximately 40,000 to 6,500 tobacco retail outlets.

Reductions in points of sale of tobacco may also occur in the slipstream of other tobacco control measures, such as increases in the legal age for tobacco sale, bans or restrictions on smoking in public or work places, or tax increases. Retailers may also voluntarily choose to cease selling tobacco (e.g., certain US pharmacies and grocery stores). Reasons to stop tobacco sales may be health/ethics-related or business-related, due to, for example, declining tobacco sales or a poor fit with the store's image. It has been suggested that retailers may also be rewarded for stopping the sale of tobacco products. Finally, it has been suggested that the quota for the legal import and sales of tobacco products could be gradually reduced, similar to fish quotas or CO₂ quotas in other domains, or that a smoker's license could be implemented rather than a retailers license.

Licensing

The implementation of licensing schemes or systems has been increasingly advocated as a potentially effective instrument to achieve reductions in points of sale for tobacco. However, so far, licensing has rarely been explicitly used as a tool to (gradually) limit retailer numbers (e.g., by attrition, not renewing new licenses, or setting a maximum limit on the number of licences). This may be because government interventions in the tobacco market seem to be more easily justified when it concerns the protection of children and deterring youth from smoking, which seems to be the most cited reason for implementing license schemes (i.e., to improve enforcement of the legal age at which an individual can be sold tobacco products), in addition to promoting compliance with tax laws.

Licensing of tobacco retailers is in place in five Australian states, Singapore, Canada and 39 states of the United States. Moreover, in Europe, the licensing of tobacco retailers has been implemented in Finland and Hungary and has been proposed (but not implemented) in Norway. In France, a specific licensing system has been operating for many years, but license requirements do not include health-related community purpose conditions. In England, Wales and Northern Ireland, retailers do not need a license to sell tobacco, but when they persistently break the law by selling tobacco to someone under 18 years of age, they may lose their right to sell tobacco for up to one year. This is a form of negative licensing. Several countries have opted for a registration scheme

(e.g., Scotland and Ireland), which is assumed to be less costly and create less administrative burden. With a registration scheme, fees are usually minimal (and may not be a deterrent for stopping sales), and there is no assessment of retailers. In Ireland, a change from a registration system to a licensing system is on the political agenda, which would allow a more effective means of regulating who is allowed to sell tobacco and where tobacco products are sold.

There are some indications that an increase in licensing fees (as occurred in South Australia) or the introduction of licenses where they do not yet exist (as occurred in Finland) may be an effective method of reducing the number of retail outlets (even if it was not intended), but only where consumer demand for cigarettes is low, such as in the hospitality sector. It remains to be seen whether a further increase in fees would also discourage retailers with high volumes of tobacco sales or whether other measures are necessary.

Vending machines

In the WHO Framework Convention on Tobacco Control, reducing the number of tobacco product vending machines is promoted not only as a measure to reduce easy access for youngsters (Article 16) but also because they constitute by their very presence a means of advertising and promotion (Article 13). Tobacco vending machines are banned in 30 countries in the WHO European region, with nine countries implementing a ban between 2007 and 2012. Within the EU, tobacco vending machines are currently banned, or have never been allowed, in 13 Member States (Bulgaria, Croatia, Cyprus, Estonia, France, Greece, Hungary, the United Kingdom, Latvia, Lithuania, Poland, Romania and Slovenia). In 2012, the prevalence of buying tobacco products through vending machines among the general population (≥ 18 years) in the past 12 months was highest in Austria (34%), Spain (31%) and Malta (29%); for the Netherlands, it was 10% (1% often, 4% from time to time and 5% rarely).

Nonetheless, in most countries, vending machines do not seem to constitute a major channel of distributing tobacco products. Limited research data suggest that a full or partial ban (e.g., age restrictions) on vending machines, a public smoking ban or tax increases may reduce *sales* through this distribution channel. Whether smoking prevalence or incidence is affected by a ban on vending machines is unknown, as no studies have convincingly addressed this question. Such an effect is, in the short term, not likely to be mediated by limiting access to tobacco products, as sales through this distribution channel may be partly or fully compensated by other sources. Nonetheless, it has been mentioned that banning tobacco vending machines in establishments where smoking is already prohibited, such as hospitality venues, would complement smoke-free laws and reinforce social norms against smoking. Moreover, a ban on tobacco vending machines could reinforce (an increase in) legal age limits for the sale of tobacco products, as both measures aim to reduce access to tobacco products by young people.

Effects of (restricting) POS density and proximity on smoking behaviour

To date, relatively little attention has been devoted to the possible promotion of smoking via the widespread retail availability of tobacco products. In recent years, however, several studies have been published on the association between tobacco outlet density and proximity on smoking behaviour in both the youth and adult populations. A limitation in this area is that no studies have been published that have directly evaluated the effects of *changes* (whether an increase or a reduction) in tobacco outlet density on smoking behaviour.

Possible mechanisms

The present literature suggests several mechanisms through which the density and proximity of tobacco points of sale may influence smoking behaviour. A higher density and closer proximity can make tobacco more accessible, especially for youth, as they have less means to travel far to obtain tobacco. A higher density and proximity of tobacco points of sale is also suggested to increase the exposure of youth to advertising at points of sale and to provide cues to smokers trying to quit. In addition, the availability of tobacco may increase the perceived acceptability of smoking (social norm). Finally, higher densities of POS in an area may increase competition between outlets, which in turn may make retailers lower the price of cigarettes or may reduce compliance of vendors with rules regarding sales to minors.

Density and proximity of tobacco points of sale and smoking behaviour among youth

Thirteen studies were identified that explored associations between the density and proximity of tobacco points of sale and smoking (related) behaviours among youth, of which all but one originated from North America (the single study was carried out in Australia). The most consistent evidence was found for a relationship between the *density* of tobacco points of sale around schools and smoking behaviour. The findings suggested that a higher density of POS in the area surrounding schools increases the risk that adolescents could become susceptible to smoking or become experimental or current smokers. However, the findings on these outcomes could not always be replicated in different studies. In addition, several studies showed an effect of outlet density around the school on initiation or experimentation, but not on established smoking, suggesting that density may impact smoking initiation or experimentation but not current smoking among youth. The relationship between the *proximity* of POS to the school and smoking behaviour among youth was investigated in just three studies; however, none of these found evidence for significant associations.

The evidence for a relationship between the density of tobacco points of sale around the home or in the neighbourhood and smoking behaviour among youth was found to be limited and inconsistent, with three of six studies on this subject finding a relationship with different types of smoking outcomes. Findings have suggested that density around the home was related to lifetime and past month cigarette use and a higher frequency of smoking among youth. One additional study (of three studies on the subject) found a relationship between the proximity of POS to the home and the use of tobacco.

Density and proximity of tobacco points of sale and smoking behaviour among adults

The evidence for a relationship between the density and proximity of tobacco points of sale and smoking behaviour among adults (eight studies) is limited, and studies are heterogeneous with regard to design and outcome measures. Eight studies were found, which were carried out in the USA, Finland, England, and New Zealand. Four (of the eight) studies investigated associations between density/proximity and outcomes related to *smoking cessation*, and three of them suggest that proximity (and, to a lesser extent, density) of tobacco retailers is indeed associated with outcomes related to smoking cessation (e.g., relapse, abstinence). Of the other four studies, three reported positive associations between density and different smoking indicators (prevalence, no. of cigarettes per day).

Evidence from the alcohol literature

The literature on the effects of density and proximity of alcohol points of sale is more developed compared to the tobacco literature, especially regarding the use of longitudinal or time series studies. A review of evidence by Campbell et al. (2009) found that studies of changes over time in outlet densities consistently indicated that permissive licensing increased the number of outlets, which in turn led to increased alcohol consumption. Additionally, studies of changes over time in outlet density, which was not particularly linked to policies, consistently found a higher density to be related to higher consumption.

Conclusion

Overall, it is concluded that at this point in time, evidence supporting a reduction of tobacco POS leading to a lower smoking prevalence or incidence is still relatively weak and rather indicative than conclusive. The evidence so far is mainly based on cross-sectional studies (especially among adolescents) in addition to a few prospective cohort studies. No studies were found for either youth or adults in which *changes* in proximity or density of tobacco points of sale are investigated. Therefore, it is suggested that, in line with the alcohol literature, more studies should be carried out that link changes in outlet density to smoking behaviour, for example, by using an interrupted time series design.

Facilitators for and barriers to implementing a policy restricting Points of Sale

In the Netherlands, public support for banning the sale of tobacco products differs widely depending on the type of location and smoking status (less among smokers). In 2014, support in the general population of 18 years and older was highest for a ban on the sale of tobacco at sports locations (71%) and in drug stores (63%) and lowest for a ban in convenience stores (19%), gas stations (24%) and grocery stores (31%).

Reductions in the number of outlets may increase the costs (in time and money) of obtaining tobacco products, and cause changes in purchasing behaviour (e.g., buying in bulk) rather than

increasing the threshold to buy (and smoke). Data on this issue are very limited, and conclusions cannot be drawn. A detailed economic analysis of the expected costs and benefits of a reduction of tobacco points of sale in the Netherlands will be made in the framework of another study.

PART III DISPLAY OF TOBACCO PRODUCTS AT POINTS OF SALE

Policies

With increasing restrictions on tobacco advertisement, tobacco displays at the point of sale have become one of the major channels for the tobacco industry to market their products. Health advocates have argued that tobacco displays are in fact a type of tobacco advertisement, promote smoking and should be banned. To date, twelve countries (sometimes part of the country, in certain jurisdictions) have implemented a ban or partial restrictions on the display of tobacco products, with Iceland being the first European country (2001) and Ireland the first EU country (2009), followed by Finland in 2012; England, Wales and Northern Ireland (large shops in 2012) and Scotland (large shops in 2013), with a ban in small shops foreseen in 2015; and Hungary and Croatia in 2013. Norway implemented a ban in 2010. Note, however, that there is no 'universal' tobacco display ban. Some countries have implemented a comprehensive ban where all tobacco products must be stored out of sight of customers, while other countries have only indicated that the display is not allowed to be visible from outside the store or have set limitations on the size of the tobacco display.

The main arguments for countries to implement a display ban are that these regulations are expected to reduce smoking in the population by decreasing the number of young people starting to smoke and supporting adult smokers who want to quit or have quit the use of tobacco. Public support is generally high, although relatively low in the Netherlands (46% versus EU average of 58%), and retailer compliance in countries with a comprehensive (but not partial) ban is generally close to 100%.

In several countries (e.g., recently in Norway and the United Kingdom), policy plans to implement restrictions on the display of tobacco products have been challenged by the tobacco industry; however, thus far, most claims have been rejected by the judicial courts (e.g., in Scotland, Norway, and Ireland) or were withdrawn by the tobacco firms (England).

Effects of (restricting) POS display of tobacco products on smoking-related behaviour

Possible mechanisms

Exposure to points of sale displays may influence smoking behaviour by functioning as a type of advertisement by making smoking attractive, especially for youth. Moreover, they may provide visual cues that may elicit feelings of cravings among smokers and those trying to quit. Finally, tobacco displays may normalise smoking by influencing smoking perceptions (e.g., underestimation of the health consequences of smoking, an overestimation of the prevalence of smoking).

Tobacco product displays at points of sale: research on smoking-related indicators

A total of nineteen unique studies have investigated the relationship between point of sale tobacco product displays (POS-D) and one or more 'smoking-related indicators'. Of these 19 studies, 10 examined the relationship between POS-D and *smoking behaviour*, and the results suggest that POS-D increases the likelihood of smoking initiation and complicates cessation of smoking, both directly and by influencing the precursors of smoking behaviour (urges to smoke, susceptibility to smoking, purchase behaviour).

More specifically, exposure to POS-D was found to be positively associated with smoking behaviour (increased the likelihood of *being a smoker* (4 out of 5 studies), *smoking more cigarettes* (1 out of 1 study), *urges to smoke* (1 out of 1 study), being *susceptible to smoking* (3 out of 3 studies)). Moreover, two school surveys (2 out of 2) showed that greater exposure to retail advertising was associated with an increased risk of *smoking initiation* among youth. There is no clear evidence for an impact of a POS-D ban on *smoking prevalence*, and this is addressed in only one study with a relatively short follow up (1 month post-ban among youth, 1 year post-ban among adults). A further 9 studies showed that exposure to POS-D was associated with a higher likelihood to make a *tobacco purchase (attempt)* (4 out of 5 studies) and an increased likelihood of *making an unplanned purchase* (4 out of 4 studies). Four studies among adult smokers showed that exposure to POS-D seems to make it more difficult to quit smoking (3 out of 3 studies) and that sensitivity to POS-D appeared to lower the likelihood of successful quit attempts in the future (1 out of 1 study).

While most studies employed a cross-sectional design, several prospective studies have also demonstrated that exposure to POS-D predicts future smoking (related) behaviours. This temporality is a necessary condition for causality. The research evidence on POS-D is consistent with research findings on tobacco marketing in general and the broader marketing literature.

Nonetheless, the current peer-reviewed research literature is characterised by several limitations, most importantly a lack of well-designed studies that directly address the impact of POS-D restrictions on smoking prevalence in the population. There are plans for such studies in some countries, including the UK and Norway. The results of these studies could considerably strengthen the research base, but further studies are needed. Countries that are planning to implement

regulations on POS-D have a unique opportunity to properly investigate the effects, but they need to secure a set of well-defined measurements both before and after the implementation.

Conclusions

When considering data from a wide variety of studies, the available evidence indicates that POS-D increases the likelihood of smoking (initiation and cessation) and suggests that it is likely that restrictions or a ban on tobacco product displays will contribute to a reduction of tobacco use in the population. However, there is no information on the magnitude of the effects, which might become manifest only over a longer period of time. This conclusion is based on the high consistency of study findings across a variety of populations, research designs, and smoking outcomes.

Facilitators and barriers to implementing a policy restricting POS-D

The results of several studies indicate that in the Netherlands, support for a ban on the display of tobacco products is fairly low compared to other countries. Perhaps these figures indicate that the Dutch population is not sufficiently aware of the fact that exposure to these displays may promote smoking. Informing the general public on the public health reason for implementing tobacco products at the points of sale might be useful in this regard.

The economic consequences for tobacco retailers do not appear to be substantial. Costs of store adaptations can be kept low when the retailer is allowed to cover the display instead of converting to under-the-counter storage. However, it is unknown whether covers are as effective as under-the-counter storage, as there is a risk that covers will be left open (too long), which would make the tobacco products visible to customers.

Finally, experiences in other countries have shown that controls must be comprehensive and tightly defined to prevent circumvention of the regulations.

PART I INTRODUCTION

Chapter 1 General introduction

1.1 Background

This report synthesises research findings, grey literature and data from other sources to obtain a picture of the impact of reducing the number of points of sale of tobacco products and restricting the display of tobacco products at the retail level.

Measures to curb smoking include a reduction of the availability, accessibility and visibility of tobacco products for the general population and subpopulations of youth and adult smokers. In the Netherlands, the increase in the legal age limit for sale of tobacco to those aged 16 to 18 years, implemented on January 1 2014, is one example of limiting youth access to tobacco products. Recently, the issue has also been raised as to whether the number of points of sale of tobacco should be reduced. In the Dutch Parliament, several political parties suggested that such a measure would be an effective means to reduce smoking prevalence and to prevent smoking among the youth in particular (TK nota 126135-105670-VGP, June 2013; TK 1 October 2013). Additionally, a smaller number of points of sale (now estimated at 30,000-60,000) would simplify control of the enforcement of the legal age limit for the sale of tobacco products, which has been shown to be insufficient, as a high proportion of underage youth (<16 years up to 1 January 2014) still succeed in buying tobacco products.

More specifically, a proposal for an amendment to the Dutch Tobacco Act was submitted to restrict the points of sale of tobacco products to specialised tobacco shops (TK 2012-2013, 33590, no 9). This should be realised by implementing a licensing system at the local level. Other political parties have pled for a gradual reduction of the number of points of sale or starting with a reduction in bars, clubs and other entertainment establishments (mainly vending machines), which is in line with the implementation of a total smoking ban in these locations as of July 2014.

At the same time, a motion was proposed to ban the display of tobacco products at points of sale. This measure is in line with Article 13 of the WHO Framework Convention on Tobacco Control, ratified by the Netherlands in 2005, to undertake a comprehensive ban on advertising, promotion and sponsorship. With an increasing number of countries limiting or banning conventional methods of advertising, the tobacco industry shifted its focus towards the promotion of tobacco products at points of sale (e.g., USDHHS, 2012). Given the attractive packaging of products and depiction of brand names, the mere display of these products can be considered a form of advertising and promotion in itself, especially when presented in the form of large 'power walls'. Based on evidence of the effects of tobacco advertising and promotion (e.g., Lovato et al., 2011), restricting or banning the display of tobacco products has been proposed to reduce tobacco consumption and initiation, in particular among youth.

Countries and other jurisdictions differ widely in the number and type of points of sale for tobacco, and this also applies to the implementation of policies regulating points of sale and the display of tobacco products. For example, as of July 2013, the retail sale of tobacco in Hungary has been restricted to government-supervised stores only, resulting in a reduction from approximately

40,000 to less than 6,500 points of sale. Regarding specific points of sale, an increasing number of countries have imposed bans on vending machines in the past decade, and in the United States, a ban on pharmacy sales has been implemented in several cities. In addition, voluntary decisions by retailers to abandon tobacco sales have been reported, including the largest US retail pharmacy chain as well as individual grocery stores (Brennan & Schroeder, 2014; McDaniel & Malone, 2014). Moreover, after Iceland implemented a ban on displaying tobacco products at points of sale, more countries followed (e.g., Finland, Ireland, Norway and the United Kingdom).

In response to a debate in the Dutch Parliament in October 2013, the Secretary of State for Health, Welfare and Sport agreed to review the evidence on the impact of two of these measures, i.e., reducing the number of points of sale (with special attention to vending machines) and restricting the display of tobacco products at points of sale. This research was commissioned to the Trimbos Institute, where the Netherlands Expertise centre for Tobacco control (NET) is located. In addition to reviewing the research evidence, experiences of implementing policies on these two measures in other countries should be taken into account. This information aims to support and facilitate a balanced discussion of different policy alternatives.

1.2 Objectives/research questions

This review study aimed to synthesise knowledge on the impact of two tobacco control measures:

- Reducing the number (type, density, proximity) of points of sale for tobacco products (Part II)
- Restricting or banning the display of tobacco products at points of sale (Part III)

More specifically, we aimed to address the following questions:

- What are the current and planned policies in other countries related to these measures?
- Is there a relationship between numbers of points of sale for tobacco products and (precursors of) smoking behaviour? What effects can be expected from a restriction in the number of points of sale of tobacco products (in general and specifically for vending machines)?
- What is known about the effects of (restricting) the display of tobacco products at points of sale for tobacco products?
- What is known about subgroup differences in impact (youth and adults, socioeconomic groups, daily/nondaily smokers)?
- What is known about potential barriers or facilitators to implementing these measures (public support, economic consequences, shift to other points of sale, cross-border purchasing)?

1.3 Methods

Data were collected in broadly three ways:

- By means of a systematic literature search of peer-reviewed journals
- By searching for additional information (grey literature), mainly through the internet
- By contacting and consulting tobacco control experts in a selected number of other countries who were asked to complete a questionnaire.

Systematic literature search

Before describing the strategy employed for the systematic literature review, some comments are in order. The core question underlying this project was whether reducing the number or density of tobacco retail outlets and restricting the display of tobacco products at these locations are expected to be effective strategies for reducing tobacco use. However, the available research evidence complicates straightforward answers on causality. This is not a gap in research quality but an issue inherent in investigating 'real world' interventions, where many measures are often implemented at the same time and where control over confounding factors that can affect smoking behaviour is limited. In establishing the effects of policy measures, it is usually not feasible to conduct randomised controlled trials in which a randomly selected part of the population under study is exposed to the variable or intervention and another otherwise comparable (control) group is not. Moreover, effects may manifest after a much longer time period than the time span usually included in studies.

Therefore, it was deemed important to look beyond strictly controlled research studies and direct smoking-related outcomes and to consider other research designs and indicators. More specifically, in evaluating the research data, the following questions were addressed:

- Are there effects on precursors of smoking (for example, 'smoking susceptibility', 'social norms', 'perceptions and beliefs', 'awareness') in addition to smoking behaviour and prevalence itself at the population level?
- What is the weight of evidence of a variety of research designs and outcomes? Do they point in the same direction?
- Is a causal association plausible, i.e., are there likely underlying (psychological and social) mechanisms that could cause such an effect?
- Is a parallel likely with other domains? For example, with regard to the number of points of sale for tobacco products, the literature on alcohol outlet density might be informative. Additionally, the broader literature on the effects of (restricting) tobacco marketing and advertising might inform conclusions about the effects of restricting outlet density and tobacco product displays.

These questions, to a large extent, concern criteria for drawing conclusions about causality proposed in the landmark paper by Hill in 1968 (Hill, 1968), which have been applied in slightly modified versions in the field of tobacco research (e.g., USDHHS, 2004). These include, among others: the *strength* of the association (the stronger in terms of significance and magnitude, the more likely associations are causal); the *consistency* of findings (similar results produced by different studies with different methods and populations at different locations and at different times); the *temporal* relationship (e.g., changes in policies or interventions precede changes in smoking); a *dose-response* relationship (e.g., the greater the exposure to tobacco product displays or the higher the density of outlets, the stronger the association with the outcomes); and finally, the coherence or biological/psychosocial *plausibility*, including 'analogy' with other domains (e.g., theoretical models, comparison with alcohol policies or marketing effects in general).

The strictness of the original criteria by Hill has been criticised. With the notion of health outcomes having multiple causes and being influenced by complex environmental and social change processes, Lucas & McMichael (2005) conclude that "...causality must be viewed as an aid to judgment, not as an arbiter of reality". In this vein, we will try to formulate conclusions.

We did not have to start from scratch. Especially in the domain of a display ban, excellent studies were performed and expert opinions were expressed several years ago in the preparatory phase of implementing policies restricting tobacco product displays in several countries (e.g., Norway and England). These reports guided our research (Lund et al., 2008, Lund et al., 2010; Chaloupka 2012; Hammond, 2010). In the field of limiting points of sale, the study results are more scarce, more heterogeneous, less systematically reviewed and seem to fulfil fewer criteria for causality.

Identification of studies for the systematic reviews

To identify studies for the systematic reviews on the two topics in this report, i.e., the relationship between density/proximity of tobacco POS and display bans at POS with smoking behaviour, a search strategy of the literature on this topic was designed.

We identified studies from three electronic databases: PubMed, PsychINFO and CINAHL. Searches were carried out for density/proximity and display bans together. Studies were included if they were published from 2003 onwards. Subsequently, references of the included publications were scanned for additional studies.

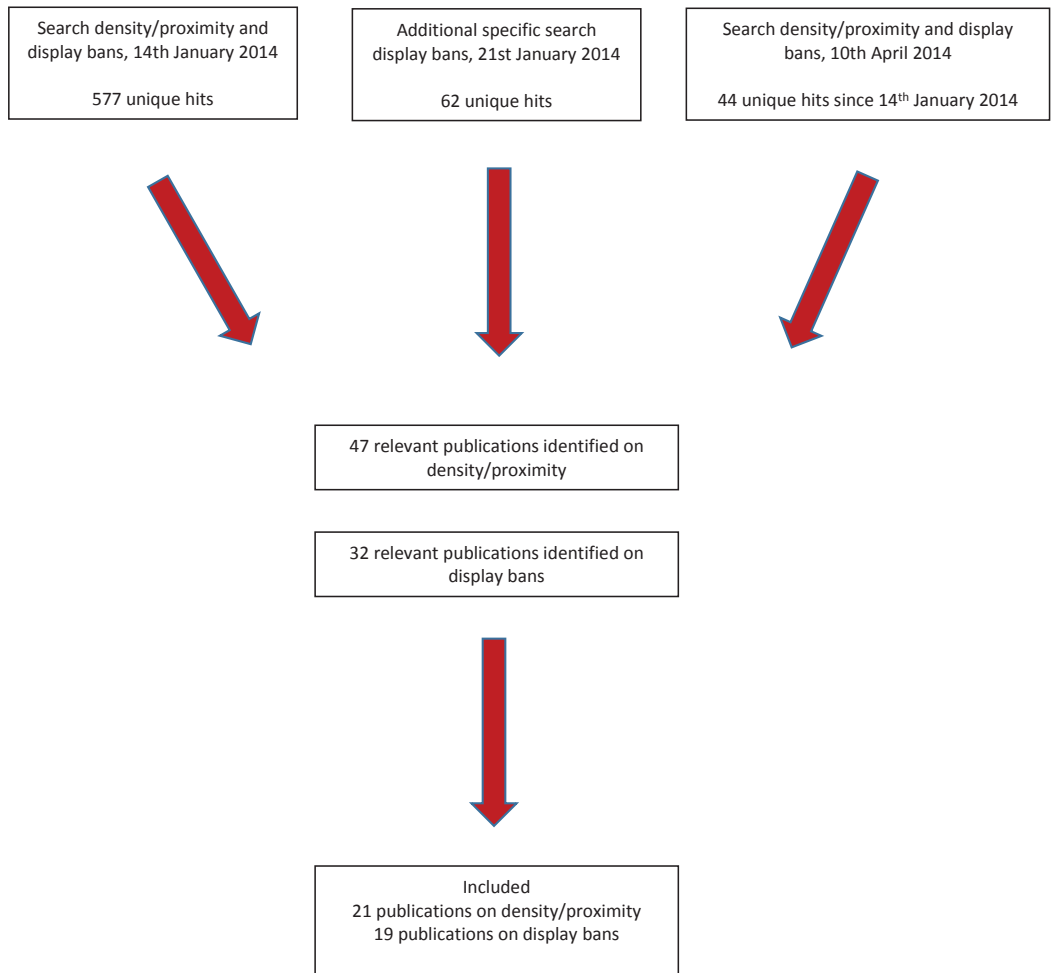
The search was carried out in three stages:

- The following search string was used for identifying studies on the relation between both density/proximity and display bans with smoking (related) outcomes: (outlet*[ti] OR retail*[ti] OR sale*[ti] OR access[ti]) AND (smoking[mh] OR tobacco use[mh] OR tobacco products[mh] OR tobacco[tiab] OR smok*[tiab] OR cigaret*[tiab] OR nicotine[tiab]). The search was carried out on the 14th of January 2014, and 577 unique hits were found.
- For the search on display bans at POS, an additional search was carried out: (TI tobacco OR AB tobacco OR TI smok* OR AB smok* OR TI cigaret* OR AB cigaret* OR TI nicotine OR AB nicotine) AND (TI display* OR AB display*) AND (TI ban* OR AB ban*). This search was carried out the 21st of January 2014, and 62 unique hits were found. However, only one additional study on display bans could be found that was not already included.
- On the tenth of April 2014, a final additional search in PubMed was carried out replicating the first search string to be able to include the most recent evidence. This resulted in an additional 2 studies on display bans being included. No new studies on density/proximity were found.

Based on the abstracts, we selected studies that addressed the relationship between tobacco product displays at point of sale and smoking (related) indicators (i.e., smoking behaviour, quit attempts and relapse, purchase behaviour of tobacco products and smoking-related attitudes and beliefs). A similar procedure was followed for the selection of studies addressing the relationship between density and proximity of tobacco points of sale and smoking (related) indicators (i.e.,

smoking prevalence, experimental smoking, susceptibility to smoking, smoking abstinence, number of cigarettes per day). This procedure resulted in 47 publications on density and proximity and 32 publications on display bans. After reading the full-text, a number of studies were excluded from the systematic research because they did not address the main research questions of the systematic reviews (e.g., one study was an economic evaluation (Quinn et al., 2011) and another study was a study protocol (Haw et al., 2014)). This resulted in a final number of 21 publications on density/proximity and 19 publications on display bans being included in the systematic reviews (see figure 1).

Figure 1: Search results



Grey literature and other data

Similar search terms were used for online searches (using Google and Google Scholar) to collect references from grey literature, and reference lists were checked for additional sources. Documents were restricted to those written in English or Dutch.

Moreover, the databases of the Cochrane, WHO and EC and websites from national organisations active in the field of tobacco control were searched for information. Additional (unpublished) data on locations of purchase and support for a display ban among smokers were obtained from the Dutch International Tobacco Control surveys (G. Nagelhout). Additionally, data on public opinions on a variety of tobacco control measures collected by TNS NIPO were provided by the National Cancer Institute (KWF, F. van Bladeren).

Survey and consultation of experts

Occasionally, information from official reports, databases and publications appeared to lag behind the fast developments in national tobacco control policies and/or were not readily accessible due to language barriers. Moreover, some information, especially regarding issues related to the (planned) implementation of policies, is not always well documented and may to some extent rely on expert opinion. For these reasons, a questionnaire was developed broadly covering the topics addressed in the research questions, and experts from the public health field or official tobacco focal points (usually at the ministerial level) were contacted to complete these questionnaires, to provide us with additional relevant documents and to check information from their country included in the report for correctness. A number of European countries where policies on the measures under study were changed or are planned to change, were selected to function as cases for collecting additional information and describing 'experiences' (England, Finland, Ireland, Norway, and Hungary).

It should nonetheless be noted that, within the rather limited time period available for this work, it was difficult to obtain a comprehensive overview of the particulars of policies implemented abroad. Moreover, it was not possible to determine and comment on the feasibility of implementing such strategies in the Netherlands. Therefore, experiences reported for other countries should be merely seen as illustrating different policies rather than providing 'solutions' or sketching the whole arena of policy options.

The following experts courteously provided information:

- Ms. Fran Mente, Tobacco Control Program, Department of Health, England
- Ms. Amanda Sandford, Action on Smoking and Health, England
- Ms. dr. Meri Paavola, Ministry of Social Affairs and Health, Finland
- Mr. Tibor Demjen, Hungarian Focal Point for Tobacco Control, National Institute for Health Development, Hungary
- Ms. dr. Zsuzsa Cselkó, National Korányi Institute for Tb and Pulmonology, Hungary
- Mr. dr. Fenton Howell, Department of Health, Ireland
- Ms. Helena Wilson, Ministry of Health and Care Services, Dept. of Public Health, Norway
- Ms. dr. Ingeborg Lund, Norwegian Institute for Alcohol and Drug Research (SIRUS), Norway

The information collected by these three different approaches was synthesised in the form of both a systematic and narrative review.

Advisory committee

The study was supported by an advisory committee consisting of the following experts:

Ms. dr. M. Gacsbaranyi-Smink, NVWA

Ms. dr. M. Kleinjan, University of Nijmegen

Prof. dr. R. Knibbe, University of Maastricht (emeritus professor)

Mr. dr. A. Kunst, University of Amsterdam

Ms. dr. G. Nagelhout, University of Maastricht/Smoke-Free Alliance, Holland

Ms. dr. E. Croes, Trimbos Institute

PART II POINTS OF SALE OF TOBACCO PRODUCTS

Chapter 2 Points of sale: locations of purchase and policies

2.1 Introduction

In §2.2 and 2.3, information is presented on locations at which tobacco products may be purchased. While the survey data commonly include questions on where smokers buy their tobacco products, data on the numbers of points of sale are not easily available, as official registers do not exist in most countries.

In §2.4, current policies with regard to regulating the number and type of points of sale for tobacco products are reviewed. While a reduction of tobacco outlet density is not actively promoted as a means of controlling tobacco use in the WHO Framework Convention on Tobacco Control (except for vending machines), there is increasing interest in applying this strategy. In this regard, a parallel is commonly drawn with alcohol policies. Licensing of retailers may be one instrument that can be employed to achieve reductions in tobacco outlet density. Special attention is devoted to policies on a specific type of point of sale -vending machines- and the impact of restricting or banning access to such devices, which has been pursued in an increasing number of countries.

2.2 Where do smokers buy their tobacco products in the Netherlands and other countries?

There are several sources for buying tobacco products in the Netherlands. Evidence shows that grocery stores are by far the most common sources for buying tobacco, both among adults and youth, followed at some distance by tobacconists (specialised tobacco shops) and gas stations.

Vending machines and the Internet do not seem to be major sources for obtaining tobacco products. At the European Union level, differences exist between countries, with some countries limiting sales mainly to specialised tobacco shops (France, Italy, and Hungary as of 2013). Within the EU-15, the proportion of (ex)smokers who usually buy tobacco products in supermarkets is highest in the Netherlands.

General population in the Netherlands

Data on locations for purchasing tobacco products are available from the 7th wave of the longitudinal International Tobacco Control (Netherlands) Survey conducted in May and June 2013 among 1,570 smokers 15 years and older (data provided by dr. G. Nagelhout). The majority of the respondents were daily smokers (92%). Table 2.1 shows the locations of the last purchase of cigarettes for the total sample and for different age groups and levels of smoking, expressed as the number of cigarettes smoked per day. Note that the answers refer to the last occasion of purchase, *not* where smokers most often buy and/or buy the greatest quantities of tobacco products.

- It is clear that grocery stores are by far the most common location to buy cigarettes (approximately half of smokers), followed at a distance by tobacconists (17%) and gas stations (14%).
- Older smokers (over 55+) tend to buy more often at a tobacconist (26%) and less often at a gas station (6%) compared to younger age groups (12%-17% for tobacconist; 17%-19% for gas station).
- Although bars and restaurants are on average mentioned by only 1% of the smokers, younger people and the less frequent smokers (0-10 cigarettes per day) seem to buy slightly more often at these locations (see table 2.1).
- Vending machines are mentioned infrequently (0.4%). Note, however, that vending machines are mainly located in bars and restaurants. It is therefore possible (or likely) that people who indicated that the location of their last tobacco product purchase was a bar or restaurant actually made their purchase through vending machines.
- Furthermore, the more cigarettes people smoke daily, the more often they seem to buy at a tobacconist (increasing from 12% up to 24%) or at a location outside the country but still within the EU (increasing from 5% up to 14%), and the less often they buy in grocery stores, although the latter is still the most frequently reported location for all smokers.

A study of cross-border purchasing in France, Germany, Scotland, England & Wales, Ireland and the Netherlands (using 2007/2008 data) also showed that daily and heavier smokers, as well as more highly educated smokers and those not planning to quit smoking, were more likely to purchase cigarettes outside their country (Nagelhout et al., 2013). However, at that time, frequent cross-border purchasing was uncommon (2%-7%) in countries or non-border regions where the price differences between neighbouring countries/regions were small (less than 1 euro), such as in the Netherlands (2.4%). In contrast, in regions bordering countries with lower cigarette prices, buying cigarettes outside the country was more common (13% and 24%, respectively, for provinces in France and Germany). More recent data showed that the proportions of smokers in the Netherlands for whom the location of their *last tobacco purchase* was 'outside the country but in the EU', increased from 1.4% in 2008 to 2.7% in 2010 and remained stable at 2.9% in 2011 (Guindon et al., 2014).

In 2012, the EC Special Eurobarometer 385 showed that in 2012, 12% of the total population aged 15 years and older in the Netherlands had bought tobacco products outside the country (but in the EU) in the past 12 months. However, only 5% did so *intentionally* and not because they simply happened to be in another country.

Table 2.1: Location of last purchase of cigarettes or shag among smokers in the Netherlands by age group and number of cigarettes^I (2013)

	Total	Age group				Number of cigarettes per day		
		15-24 year	25-39 year	40-54 year	55+	0-10 cigarettes	11-20 cigarettes	> 21 cigarettes
Grocery store	49.5%	49.6%	49.9%	49.3%	49.2%	54.4%	48.6%	41.3%
Tobacconist	17.4%	12.7%	12.1%	16.7%	26.3%	11.9%	19.3%	23.6%
Gas station	14.2%	16.7%	18.6%	16.7%	5.6%	15.3%	13.0%	15.9%
Outside the country, but in the EU	9.2%	9.5%	9.7%	10.1%	7.3%	5.0%	11.0%	13.5%
Newsstand	3.6%	2.8%	1.9%	2.7%	6.8%	3.0%	4.3%	2.4%
Bar, restaurant ^{II}	1.1%	2.4%	1.6%	0.2%	1.0%	3.0%	0.0%	0.5%
Outside the EU	0.9%	0.4%	1.9%	1.0%	0.0%	1.3%	0.7%	0.5%
Kiosk	0.5%	0.8%	1.3%	0.0%	0.3%	0.6%	0.3%	1.4%
Duty-free shop	0.5%	0.4%	0.8%	0.4%	0.3%	0.7%	0.3%	0.0%
From someone else	0.5%	1.2%	0.3%	0.6%	0.0%	0.2%	0.7%	1.0%
Vending machine	0.4%	1.6%	0.5%	0.0%	0.0%	1.1%	0.0%	0.0%
The Internet	0.1%	0.8%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Other	2.1%	1.2%	1.3%	2.3%	3.3%	3.5%	1.6%	0.0%

I. Factory-made cigarettes or rolling tobacco. II. May (also) concern vending machines. Source: International Tobacco Control (ITC) Netherlands Survey, wave 7, 2013 (personal communication, dr. G. Nagelhout). Note that the legal age for the sale of tobacco was 16 years at the time of the study; it was raised to 18 years in January 2014.

Youth

Grocery stores are also by far the most common source for buying cigarettes among young people aged 16-19 years (79%), while gas stations rank highest among youth younger than 16 years, which was the legal age at the time of the study (table 2.2; Verdurmen et al., 2014)¹.

Note that 6.3% of the 10-15-year-olds were current smokers, of whom 44% reported (illegally) buying tobacco products. Half (50%) of all young people younger than 16 years who bought cigarettes themselves, which was illegal, indicated that they were hardly ever checked for their age. Data from another source in 2009 showed that 9% of all young people between 13 and 15 years of age attempted to buy tobacco, and approximately 90% of those who tried to do so succeeded (Bieleman et al., 2010).

¹ As of January 2014, the legal age for sale of tobacco products is 18 years. Therefore, the data for 2013 may not be representative for the current situation.

As mentioned in the introduction, these figures feature in the political debate concerning problems relating to the enforcement of the legal age limit (now 18 years) for buying tobacco because data from international studies strongly suggest that a reduction of retail points selling tobacco to minors can only be effective if the age limit is widely enforced (e.g., DiFranza, 2012). Note also that vending machines seem to be a more important source for buying tobacco for young people compared to the adult population, with a slightly higher proportion among adolescents below the legal age. Moreover, cigarettes purchased in pubs and bars are likely to originate from vending machines as well. Therefore, the actual proportion of buyers purchasing from vending machines is likely to be higher than 8%, but as respondents were allowed to give more answers, the proportions for these two sources cannot be summed.

Table 2.2: Sources from which cigarettes were obtained by young smokers (10-19 years) in 2013 in the Netherlands^I

	Total	≥16 years	<16 years
Grocery store	69.5%	78.5%	29.3%
Gas station	40.5%	40.8%	39.1%
Tobacconist	27.2%	28.9%	19.4%
Snack bar	22.0%	21.7%	23.0%
Pubs/bars ^{II}	14.8%	14.6%	15.7%
At the railway station	10.6%	12.4%	2.7%
Newsstand/kiosk	8.6%	8.5%	9.2%
Discotheque	8.4%	8.8%	6.7%
Vending machine	8.3%	7.9%	9.8%
Friends	3.5%	2.4%	8.8%
Parents	2.2%	1.7%	4.5%
Other	1.2%	1.6%	4.2%
Don't know	0.3%	0.3%	0%

I. Location where cigarettes are usually bought or obtained. More answers were possible; therefore, the percentages do not sum to 100. II. May (also) concern vending machines. Note that the legal age for the sale of tobacco was 16 years at the time of the study; it was increased to 18 years in January 2014. Source: Youth Smoking Monitor (Verdurmen et al., 2014).

European comparison of tobacco purchase locations

In 2012, a survey was carried out on smoking behaviour and attitudes towards tobacco among 26,751 residents of the 27 EU Member States² (EC, Special Eurobarometer 385, 2012). While this survey has been criticised for yielding prevalence rates of smoking that are different from the rates of national surveys and because samples sizes per country are rather small (roughly 1,000) (Bogdanovica et al., 2010), the survey has the advantage of a standardised methodology, which allows comparisons between countries. Nonetheless, the data should be viewed as indicative, especially because the base sample for table 2.3 consists of both current and ex-smokers. Ex-smokers made up approximately 43 percent of the total number of respondents asked to disclose their usual place of purchase. Hence, the data may not reflect the current situation, especially in countries where relevant policy changes have occurred (e.g., bans on vending machines, increase in the legal age for sale of tobacco or restriction of sales (and smoking) in specific locations).

Table 2.3 shows the usual locations at which tobacco products were purchased for the EU-15 Member States, Hungary and the EU-27 average in 2012. It is clear that there are differences between countries.

- The Netherlands stands out with the highest proportions of respondents usually buying tobacco products in a supermarket (58%). Gas stations are also mentioned relatively often (33%), although Luxembourg scored much higher (58%).
- In France and Italy, virtually all (ex) smokers (>90%) reported buying tobacco in a specialised tobacco shop or from a tobacconist.
- Vending machines are common points of tobacco purchase in Austria (35%), Portugal (42%) and Spain (31%).

The survey also included questions on buying from vending machines *in the past 12 months*. The results showed that between 2009 and 2012, buying from vending machines has generally decreased at the EU level (see also §2.5).

The proportion of people in the Netherlands indicating that they usually bought tobacco at a gas station is much higher in this survey compared to the proportion indicating that they bought at a gas station during the last purchase, as measured in the ITC study (33% against 14%, see table 2.1). There is no explanation for this difference, except for methodological incomparability between the studies.

² Note that Croatia joined the European Union on 1 July 2013, and the number of Member States is now 28. However, in the report, reference may be made to sources that are based on the situation before July 2013 based on 27 EU Member States.

Table 2.3: Location at which tobacco products were regularly purchased in a selection of EU Member States and the EU-27 average in 2012

	At a news-stand	In a specialised tobacco shop	In a convenience store	In a super-market	In a gas station	From a tobacco vending machine	In a pub/bar /restaurant/hotel ^{II}	Other ^I	Don't know
EU27	26%	37%	20%	22%	11%	10%	6%	5%	2%
Austria	85%	17%	1%	5%	13%	35%	5%	5%	0%
Belgium	49%	16%	13%	41%	18%	4%	5%	5%	2%
Denmark	20%	9%	45%	52%	29%	1%	2%	5%	1%
Finland	25%	0%	63%	31%	19%	1%	2%	9%	0%
France	10%	93%	1%	1%	3%	0%	4%	5%	1%
Germany	13%	22%	11%	44%	28%	22%	1%	6%	1%
Greece	90%	2%	10%	2%	0%	0%	0%	2%	1%
Hungary	6%	20%	71%	26%	10%	1%	7%	2%	1%
Ireland	70%	2%	42%	25%	11%	2%	4%	3%	1%
Italy	0%	94%	1%	1%	2%	13%	8%	2%	1%
Netherlands	6%	35%	5%	58%	33%	5%	7%	2%	1%
Portugal	31%	14%	2%	5%	7%	42%	41%	5%	2%
Spain	7%	73%	3%	1%	2%	31%	20%	3%	1%
Sweden	16%	30%	55%	21%	21%	2%	1%	6%	1%
UK	49%	2%	24%	39%	8%	1%	2%	8%	2%

UK: United Kingdom. More answers were possible; therefore, the percentages do not sum to 100. I. On the street, on the Internet, from friends/family etc. II. May (also) concern vending machines. Source: EC, Special Eurobarometer 385, 2012

2.3 How many and which points of sale are known in the Netherlands and other countries?

In many countries, the type and location of points of sale are not systematically recorded, and data on numbers are not readily available, except for countries or jurisdictions that maintain a legal national register of retailers, either by themselves or linked to a license system. This may be the reason why the majority of studies on tobacco outlet density (or proximity) stem from the US, where many jurisdictions require tobacco retailers to be licensed (albeit often at the local level). Nonetheless, numbers from registrations or estimates have been reported for several countries. It

appears that, when roughly calculated as outlets per population, the differences are considerable and do not seem to co-vary with overall prevalence rates of smoking. Studies suggest, however, that retail density may differ widely at the community level, with generally higher densities in socioeconomically poor neighbourhoods (and associations with smoking can be found – see chapter 3).

Number of points of sale in the Netherlands

In the Netherlands, tobacco retailers are not required to register; this is also the case for alcohol outlets. The Dutch Tobacco Act does not provide directives for where tobacco products can be sold legally, but it stipulates where sales are forbidden. In summary, it is forbidden to sell tobacco products in establishments for health care, welfare, social services, arts and culture, sports, social-cultural work or education or in settings, services, and companies related to the government or other public institutions (www.wetten.overheid.nl/BWBR0004302). Moreover, designated categories of companies and organisations or businesses may be prohibited by order of the Council from providing individuals with tobacco products or having them present.

Estimates used in the political debate range from approximately 30,000 to 60,000 points of tobacco sale in the Netherlands (TK, brief 15 April 2013). According to the Secretary of State for Health, the higher bound estimate, reported by the Netherlands Food and Consumer Product Safety Authority, was obtained several years ago and may overestimate the true number. On the other hand, the lower bound estimate, reported by the trade organisation for tobacco retail business, may underestimate the figures because they did not take into account 'non-organised' points of sale (e.g., some pubs and snack bars). A recent report estimates that 95% of all tobacco products in the Netherlands is distributed through 23,000 points of sale (Gerritsen et al., 2014). These include 4,300 grocery stores (51% of the sales), 2,407 (manned) gas stations (23%), 1,550 tobacconists or convenience stores (2%), and 15,000 pubs/restaurants (vending machines; 2%).

Numbers of points of sale in other countries

There is no overview of the numbers of points of sale in different European countries. This is most likely related to the fact that in most countries retailers are not obliged to register, whether by themselves or in the framework of a license application. However, the introduction of a legal requirement to register or apply for a license to sell tobacco registration systems is increasingly reported, for example, by Hungary, Finland, Ireland and Scotland. Additionally, in Northern Ireland, under the Tobacco Retailers Act 2014 (dated 25 March 2014), tobacco retailers have to apply for registration (date of enactment 1 May 2014)³. In these countries, the figures of the number of (legal) retail outlets are more reliable and easy to generate, although it should be kept in mind that the number of retailers do not necessarily equate to the number of points of sale, as one retailer can have more points of sale.

³ <http://www.legislation.gov.uk/nisr/2014/125/article/2/made>

In the literature on tobacco outlet density and smoking prevalence (see chapter 3), figures are commonly reported on the number of inhabitants per point of sale or retail outlet or retailer. In the political debate, these figures are sometimes used as proof of the (lack of) effects of restricting the number of points of sale. For illustration, we have collated figures provided by the experts consulted in a number of European countries along with data on population sizes and smoking prevalence. These data are very rough, as they do not take into account population density variations within countries or differences in demographic distribution of the population. Moreover, the numbers may refer to points of sale or retailers. In the latter case, it is possible that one retailer may have multiple points of sale (as in Finland). In Ireland in 2014, for example, a total of 11,409 retailers were registered, covering a total of 13,342 locations. Note also that smoking prevalence figures from the EC Special Eurobarometer 385 may be different from those reported by national surveys (Bogdanovica et al., 2010).

Taking these considerations into account—and accepting the wide error margin of the presented figures—table 2.4 nonetheless suggests that the number of outlets (or retailers) per population differs widely between countries. On the one hand, France seems to have the lowest retail density, or the highest number of inhabitants that should be 'served' with one tobacco retail outlet. The Netherlands and Norway seem to show the opposite situation, with a fairly high retail density and relatively low number of inhabitants per point of sale. In contrast, the variations in smoking prevalence do not seem to co-vary to the same extent, in that the rates for the Netherlands, Norway and France are between 24% and 28%. Thus, these data indicate that there is no simple straightforward relationship between numbers of tobacco points of sale and smoking prevalence across countries.

Does this mean that a restriction on the number of points of sale is a useless measure? The answer is that such a conclusion simply cannot be drawn on the basis of these data. Prevalence rates of smoking in the population are influenced by a multitude of factors, and tobacco control policies differ widely (e.g., Joossens & Raw, 2014). Moreover, many different mechanisms may underlie an association between the number of points of sale and smoking. Additionally, associations at the national level may be too rough to identify any association (if one is present). Studies, mostly those conducted at the local level, suggest an association between density and smoking outcomes, although this too is not proof of causality (see chapter 3).

Moreover, these figures refer to legal points of sale, not illicit sources. For example, in France, according to estimates in 2011, 20% of the tobacco purchases are conducted outside the official system and thus escape French taxation and regulation, with approximately 5% of sales coming from the black market (contraband, counterfeits or internet sales) (Petkantchin, 2012). However, it is difficult to obtain a reliable picture of this phenomenon, as comparable data between countries are lacking.

Various ratios have also been reported outside Europe. For example, Marsh et al. (2013) identified approximately 5,000 tobacco retail outlets in New Zealand, including 40% convenience stores (e.g., dairies, small supermarkets), 18% service stations, 13% licensed premises (e.g., bars, restaurants), 9% supermarkets, 7% cafes, 4% liquor stores, and 9% other sources. This number equates to approximately one outlet per 617 *adults* and one outlet per 129 adult smokers in NZ. In

this study, nearly half of all secondary schools had at least one tobacco retailer within a 500 m walk, and three quarters had at least one tobacco outlet within a 1000 m walk. Just over half (53%) of tobacco retail outlets were located within 1,000 m of a secondary school.

Using data from 2006, Tilson (2011) reported that Ontario counted approximately one retailer or vendor for every 114 smokers 15 years or older. For comparison, there was one alcohol or liquor outlet for every 460 alcohol users.

Table 2.4 Number of tobacco points of sale (POS)* in some European countries

	Netherlands	Norway	France	England	Ireland	Hungary	Finland
Total number ^I	30,000-60,000	15,000	27,000	56,000	13,342	6,500 IV	10,500
Type of 'POS'	Points of sale	Points of sale	Retailers/ premises	Retail premises	Points of sale	Retail premises	Retailers
Total population 15+ (x million) ^{II}	13.8	4.1	53.2	44.1	3.6	8.5	4.5
% smokers 15+ (2012) ^{III}	24%	26%	28%	27%	29%	32% ^V	25%
No inhabitants 15+ per POS	230-460	273	1970	787	270	1307	428
No smokers 15+ per POS	55 - 110	71	555	213	78	419 ^V	107

I. In France, one retailer may have one POS. In Finland, one retailer may have more than one POS. The figures for the Netherlands are drawn from parliamentary documents; recent data suggest that the lower bound estimate may be more likely, as 95% of the total sales of tobacco products occur at 23,000 points of sale (GERRITSEN ET AL., 2014). For France, the data are reported by Insee, 2012. For other countries, estimates have been provided by the consulted experts (see Introduction). The estimates pertain to the most recent year for which data were available. II. Source: EUROSTAT. III. Source: EC Special Eurobarometer 385 (2012). Prevalence in the population of 15+. Note that prevalence rates may differ between this EC survey and national surveys. IV. Number for 2013 (as of July 1). Note that before July 2013, the number of retail outlets was estimated at approximately 40,000. V. According to a national survey, the smoking prevalence in 2013 was 21% (dropping from 28% in 2012). If this prevalence rate is used, the number of smokers per POS would be 275 instead of 419.

Associations between tobacco outlet density and socioeconomic factors

In addition to the variations between countries in outlet density, differences within countries at the community level may be even more pronounced. One key determinant of these differences seems to be socioeconomic status. Studies on this issue have been carried out predominantly in North America (e.g., Siahpush et al., 2010; Rodriguez et al., 2013; Novak et al., 2006) but also in Canada (Chaiton et al., 2013), New Zealand (Marsh et al., 2013), Australia (Paul et al., 2010; Kite et al., 2012), and Germany (Schneider et al., 2011). Except for the study of Paul et al. (2010), these studies showed that tobacco retail outlets were more likely to be present in areas that were low income or otherwise socioeconomically deprived, independent of population density (i.e., living in an urban or rural area). For example, in Cologne (Germany), the number of commercial tobacco sources increased from approximately one per 1,000 inhabitants in areas with the highest above average SES (based on an income indicator) up to 6-9 per 1,000 inhabitants in the lowest SES areas. Under the assumption that higher availability promotes smoking prevalence, the higher tobacco retail densities in deprived neighbourhoods could contribute to an increase in social and health inequalities in the population.

It has been suggested in studies that controlled for a wide range of confounding factors, including smoking prevalence, that the higher tobacco retail density in specific areas points to a deliberate strategy of the tobacco industry (Kite et al., 2012) rather than reflecting a response to increased demand. However, because these studies are cross-sectional in nature, it remains difficult to determine whether density follows demand for tobacco, whether supply creates demand, or both.

In the Netherlands, smoking is appreciably more prevalent among less- and middle-educated people compared to highly educated people (see Annex), but no studies have been conducted examining the association between living in a socioeconomically deprived neighbourhood and density of tobacco retail outlets. Studies have demonstrated, however, that living in a socioeconomically disadvantaged community increases the risk of a variety of lifestyle risk factors, including smoking (e.g., Van Lenthe & Mackenbach, 2006). Moreover, smoking cessation may be less likely among those living in deprived areas, independent of educational level and many other potential confounding factors (Giskes et al., 2006). Whether this is associated with a greater availability of tobacco outlets or other (social, cultural) factors is not known.

2.4 What policies do countries pursue with respect to the number and types of POS, and what options are available to restrict their number and/or type?

Regulating the commercial and public availability of alcohol by implementing a licensing system and reducing the of number and location of alcohol outlets (among other methods) is identified by the WHO as an effective strategy to reduce harmful alcohol use, as stipulated in the European action plan 2012-2020 (WHO, 2012). In contrast, regulating or restricting the density of retail outlets for tobacco has not been explicitly promoted in international treaties or guidelines (e.g., Henriksen, 2012). An exception is the ban on vending machines. In the FCTC, reducing the number

of vending machines is promoted not only as a measure to reduce easy access to youngsters (FCTC, Article 16) but also because they constitute by their very presence a means of advertising and promotion (Guidelines FTCT, article 13, 2013).

Nonetheless, regulating and restricting the number and locations of tobacco retail outlets has been advocated by a range of health authorities and non-governmental organisations (e.g., Institute of medicine, 2007; Tilson, 2011; Cohen & Anglin, 2009; Chapman & Freeman, 2009). Cohen & Anglin (2009) plead for a reduction of the number of retail outlets, for example, by requiring retailers to be **licensed**. The core argument underlying this proposal is the inconsistency in public health messages that discourage smoking but tolerate high outlet density and a retail environment that "...practically spews cigarettes out of every crevice". They draw a parallel with alcohol policies and evidence showing that increased alcohol availability leads to increased consumption and harms, but they acknowledge at the same time that the evidence base underlying a reduction in tobacco outlet density remains inconclusive and deserves further research.

A variety of policy measures have been implemented nationally and locally. These measures have had the effect, either deliberately or as consequence of other tobacco control measures, of reducing the number and types of points of sale of tobacco. Examples of 'deliberate' policies include the prohibition of sales at particular types of points of sale or locations, such as vending machines, pharmacies, hospitals or state buildings. Policies rarely target an overall reduction of outlets and specify a (limited) number of legal points of sale, with Hungary being an exception (see §2.4.1). In Hungary, the sale of tobacco products has been restricted to a specified number of state-governed stores, thereby significantly limiting both the type and number of retail outlets.

Reductions may also occur in the slipstream of **other tobacco control measures**, such as increases in the legal age for tobacco sale and bans or restrictions on smoking in public or work places, while (associated) factors may also play a role, e.g., reduced smoking prevalence and economic factors. For example, in Germany, the number of cigarette vending machines decreased from approximately 700,000-800,000 units in 2001-2006 to 430,000 in 2007 and to 420,000 in 2008. A detailed policy analysis showed that this major reduction in the number of vending machines as well as sales through this distribution channel could be attributed to a large extent to the implementation of an electronic age verification system on vending machines in 2007, affecting mainly outdoor vending machines (Kvasnicka, 2010; Schneider, 2011). However, sales through indoor vending machines also decreased following the implementation of a statewide smoking ban in public spaces in 2007/2008. Moreover, increasing tobacco taxes and cigarette smuggling in the past decade may also have contributed to the reduction in vending machines (Schneider, 2011). Additionally, raising tobacco taxes, resulting in declined sales, may 'motivate' other retailers to stop selling tobacco products (McDaniel and Malone, 2014).

Note that reductions in the number and type of points of sale do not automatically imply a reduced availability of tobacco. The term "availability" may refer to the ease and degree of convenience experienced by consumers in obtaining tobacco products, as affected by the number, density and location of outlets, hours of sale, in-store accessibility (including asking for tobacco products covered behind walls) and legal age restrictions for selling tobacco (Marsh et al., 2013). Whether a sales ban can have an impact on availability depends on whether alternative sources of tobacco

supply replace prohibited sources (Tilson, 2011). Similarly, imposing a legal age limit can only be expected to affect the availability of tobacco to youth when the measure is strongly enforced and if alternative sources are not readily available (Stead & Lancaster, 2005).

In many countries, including the Netherlands, **legal restrictions** have been implemented with regard to specific locations of sale of tobacco products (see §2.2). For example, in Canada, many provinces prohibit tobacco sale in pharmacies, hospitals, and government buildings, and in the US, 111 counties and cities have banned tobacco sales in close proximity to schools (McDaniel & Malone, 2014). Several municipalities in California and Massachusetts have also banned tobacco sales in pharmacies (Brennan & Schroeder, 2014; Tilson, 2011), and it has been estimated that a nationwide ban on pharmacy sales would reduce the number of tobacco retailers in the US by approximately 7% (Henriksen et al., 2012).

Voluntary 'bans' on the sale of tobacco products by retailers have also been reported. For example, the largest US retail pharmacy chain, CVS/Caremark, has announced that they will cease the sale of tobacco products as of October 2014 (Brennan & Schroeder, 2014). CVS declared that they are increasingly developing programs to improve the quality of care and reduce health care costs, which is incompatible with the sale of tobacco products. At the same time, it is acknowledged that this action may not lead many people to stop smoking: smokers will most likely go elsewhere to buy cigarettes. However, if other retailers follow, tobacco products may be more difficult to obtain (Brennan & Schroeder, 2014). Moreover, the social unacceptability of smoking would be reinforced.

Other retailers have also been reported to **voluntarily end tobacco sales** altogether (McDaniel & Malone, 2011, 2014). For example, in 2008, a US regional supermarket chain announced that it would no longer sell tobacco products because of its harmful effects and would offer smoking cessation programs to all employees (Cohen & Anglin, 2009). In a qualitative study in New York and Ohio, grocery store owners offered two reasons for ending tobacco sales: health/ethics-related reasons or business-related reasons (alone or in combination). For example, the grocery store owners may end tobacco sales due to declining sales or a poor fit with the store's image (McDaniel & Malone, 2014). Retailers also noted several advantages (both expected and unexpected) of their decision, including improved cash flow (due to less inventory sitting on shelves), the elimination of the problem of stolen cigarettes (usually by employees), positive media attention, and an improved public image. Moreover, it has been reported that tightening controls on tobacco sales practices, including licensing requirements, have motivated some retailers with low sales volumes to stop selling tobacco (Tilson, 2011; McDaniel & Malone, 2011). In addition to these measures, retailers might be stimulated or **rewarded for stopping sale** of tobacco (Cohen & Anglin, 2009).

To what extent these measures actually affect tobacco availability is not known. According to Tilson (2011), despite the restrictions imposed in Canada on the locations of purchase (e.g., pharmacies and other health-promoting institutes and establishments serving the needs of youth) "... tobacco products continue to be available 24 hours a day, seven days a week in most communities in Canada, sold in essentially every corner store, gas station and grocery store, as well as a myriad of other outlets".

The impact of deliberate or voluntary restrictions on the number, density or type of tobacco retail outlet has been rarely assessed. With a few exceptions, reliable trend data on the numbers of

retailers in a country or other jurisdictions are not available. Although outlet density and proximity have been associated with smoking indicators (see chapter 3), studies investigating *changes* in tobacco outlet density or proximity along with smoking status or other precursors relevant to smoking are scarce.

Finally, instead of focusing on reducing the availability of tobacco products by limiting the number of tobacco retailers, some researchers suggest focusing on the supply side at the level of the manufacturers (Wilson et al., 2013; Langesen, 2010) or posing limitations at the other side of the chain, at the level of the consumer (Chapman, 2012; Magnusson & Currow, 2013).

With regard to the first option, it has been proposed that **quotas for the legal import and sale** of tobacco products could gradually be reduced, similar to fish quotas or CO₂ quotas in other domains. This is sometimes referred to as the 'sinking lid' strategy (Wilson et al., 2013; Laugesen, 2010). Governments could set percentage point reductions in annual tobacco sales/imports quotas from either the market share of each tobacco company at a baseline year or available tradable quotas to either tobacco companies or wholesalers. This is viewed as an 'endgame' strategy that aims to fully ban tobacco use in a society. The authors consider several advantages of this strategy, including the clear timetable that can be set on the 'tobacco end-date' and the expected price increase when supply reduces, which has been shown to be an effective tobacco control intervention. They also see potential drawbacks, such as the need for strong political will, high public support for passing a new law on this issue, legal challenges posed by the tobacco industry, and risk of illegal supply and corruption.

Nonetheless, Laugesen et al. (2010) assume that it would be more effective and simpler to impose a sales quota on manufacturers and to gradually reduce the quota than to reduce the much higher number of retailers. Moreover, they argue that the reduction of the number of outlets may concentrate sales in the remaining outlets rather than affect total sales, at least in the near future.

Regarding the second option, Chapman (2012), supported by Magnusson and Currow (2013), proposed introducing a **smoker's license** to provide disincentives to smoking and major financial incentives to quit. In brief, it is proposed that all smokers be required to obtain a smart swipecard license to transact any purchase from a licensed retailer with registered tobacco products in stock. Penalties for sales to unlicensed persons would be severe, as is the case for pharmacists supplying restricted drugs to persons without prescription. Smokers would be registered, which would give the government the opportunity to provide smokers with smoking cessation information. The smart card license would be encoded with a maximum purchase limit, and the more cigarettes opted for, the higher the fee. As an incentive to quit, all license fees paid by a smoker would be refunded if he or she ceased smoking. Opponents of this system argue, however, that it shifts focus away from the real player in the epidemic—the tobacco industry—and that by focusing on individuals it would censure victims, increase stigmatisation of smokers, and marginalise the poor (Collin, 2013). Instead of focusing on the end-user, regulation of the retail environment and availability should receive attention, as is the case for alcohol.

Finally, making the **sale of tobacco illegal**, as has been done in Bhutan—the only country in the world to do so—has not been described as successful in ending tobacco use (WHO, European Tobacco Control Report, 2013; Givel, 2011; Tilson, 2011). While trend data on the prevalence of

smoking in Bhutan is lacking, the available data show that smoking still occurs. Moreover, smuggling and black markets for illegal tobacco seem to have increased.

The next paragraph will further elaborate on the option most commonly referred to with regard to restricting tobacco availability and the number of tobacco retail outlets, i.e., the **licensing** of retailers. We will also describe experiences in several European countries where licensing schemes have been proposed and/or introduced.

2.4.1 Licensing (and registration)

Licensing is a common practice by which governments regulate businesses such as alcohol retailers, pharmacists, or the gambling sector, and it may serve to ensure a minimum level of quality or safety to protect consumers. Tobacco licensing is less common, at least in Europe, but generally aims to facilitate the provision of the following:

- adequate knowledge/information to enforcement officials to enable them to adequately enforce the laws regulating tobacco sales;
- appropriate and adequate information to retailers regarding their obligations; and
- efficient and effective sanctions for use against retailers who contravene relevant tobacco point of sale laws (Allen Consulting Group, 2002).

Licensing schemes may vary considerably in their terms and conditions as well as rationale. Tilson (2011) mentions that in many cases, licensing mainly aims to promote compliance with tax laws, although as of 1990, some jurisdictions (in North America and Canada) started using licensing as a tool to encourage compliance with legislation prohibiting tobacco sales to minors. Nonetheless, Tilson notes that many current licensing systems are inadequate, as penalties for violating laws are too low to act as a deterrent, and judges seem to be reluctant to suspend a retailer's license.

In California, many counties may have implemented local retailer licensing laws that are considered 'strong' and that at least include the following:

- A requirement that all tobacco retailers obtain a license and renew it annually
- An annual licensing fee high enough to fund sufficient reinforcement
- Meaningful penalties for violators through fines and penalties, including the suspension and revocation of the license
- A provision stating that any violation of existing (federal, state or local) tobacco laws constitute a violation of the local law (ChangeLabSolutions, 2012).

Licensing is not viewed as a prerequisite or undeniable need for the enforcement of tobacco laws. However, while there are policy options other than licensing, these approaches seem to struggle to achieve the three licensing objectives listed above (Allen Consulting Group, 2002).

Licensing may be differentiated at the level of retailers or wholesalers. Moreover, four alternative licensing schemes can be differentiated: 1) registration or notification; 2) accreditation or certification; 3) negative licensing; and 4) positive licensing. Usually, in policy documents and the research literature, the term licensing predominantly refers to 'positive licensing', while

'registration' is viewed as a qualitatively different policy option. The differences between these schemes are briefly summarised in table 2.5 (Allen Consulting Group, 2002).

Table 2.5: Properties associated with various forms of licensing

	Notification/regi- stration	Accreditation	Negative licensing	Positive licensing
Notification	x	X		X
Prior approval		X		X
Standards	Optional	X	X	X
Enforcement or compulsion	X		X	X

Source: Allen Consulting Group (2002)

A detailed discussion of the pros and cons of the different licensing schemes and on implementation issues and best practices is beyond the scope of this report. The reader is instead referred to other documents on this topic, especially the report by the Allen Consulting Group (2002) commissioned by the Commonwealth Department of Health and Ageing in Australia.

(Positive) licensing of tobacco retailers is in place in five Australian states as well as in Singapore, Canada and 39 states of the United States. Moreover, in Europe, the licensing of tobacco retailers has been implemented in Finland and Hungary and proposed (but not implemented) in Norway. In France, a specific licensing system has been operating for many years, but license requirements do not include health-related community purpose conditions.

In England, Wales and Northern Ireland, retailers do not need a license to sell tobacco, but they break the law by selling tobacco to someone under 18 years of age, and if they do so on a number of occasions they may lose their right to sell tobacco for up to one year. This is a form of 'negative licensing'.

The focus of this paragraph will be on 'positive' licensing at the level of retailers because this is the form most of the tobacco literature addresses, although several countries have explicitly opted for a registration scheme (e.g., Scotland and Ireland), which is assumed to be less costly and creates less administrative burden. With a registration scheme, fees are usually minimal (and may not be a deterrent for stopping sales), and there is no assessment of retailers ('they are simply included in a list').

The implementation of licensing schemes has been described as a potentially effective instrument to achieve reductions in points of sale for tobacco. However, so far it has rarely been explicitly used as a tool to limit retailer numbers (Tilson, 2011; The Center for Public Health and Tobacco Policy, 2010; ChangeLabSolutions, 2012). This may be because government interventions in the tobacco market seem to be most easily justified when it concerns the protection of children and deterring youth from smoking (Allen Consulting Group, 2002), which seems to be the most cited reason for implementing license schemes (i.e., to improve enforcement of the legal age to sell tobacco

products). In addition to licensing, a related instrument is 'zoning', which focuses not on the retailer itself but on the way land is used. As with licensing, zoning laws have been proposed to reduce tobacco availability, for example, by prohibiting the sale of tobacco within a certain distance from schools or youth-oriented facilities or in residential areas or by limiting the proximity of tobacco retailers to each other (www.Countertobacco.org; Tilson, 2011).

Tilson (2011) lists a number of ways a licensing system might serve to reduce the number and/or density of tobacco vendors (although this has been rarely done yet):

- by attrition
- by not permitting any new licenses or limiting the total number of licenses
- by not renewing the licenses of retailers who contravene tobacco laws
- by not granting new licenses to a particular class of trade (e.g., pharmacies)
- by holding a lottery for a limited number of available licenses
- by auctioning off the limited number of available licenses to the highest bidders.

Moreover, a licensing law could also prohibit licenses for tobacco retailers operating too close to a school or other areas frequented by youth or in residential areas (as with zoning laws).

Cohen & Anglin (2009) also suggest imposing a moratorium on the number of new licenses until a target has been reached (such as 10 per 20 square miles). They also mention that, ideally, licenses would be expensive, causing some retailers to abandon sales. These measures may result in a gradual reduction of retail outlets, allowing sufficient time to adjust for untoward effects but at the cost of potentially delayed health benefits.

2.4.2 Evaluation studies of licensing schemes

Thus far, only two studies in peer-reviewed journals could be identified that explore the effects of introducing (positive) licensing schemes (Bowden et al., 2014; Coxe et al., 2014). The first study suggests that increasing license fees may be effective in reducing some types of tobacco retail outlets (Bowden et al., 2014). The second (small scale) study showed that after implementing a (local) tobacco retail permit, with a four-fold higher fee compared to state retail license fees, there was an immediate reduction in density, proximity to schools, and overall tobacco retailers.

On the first of January 2007, the South Australian (SA) Government increased the annual fee for a retail tobacco license from 12.90 to 200 AUD (\approx from 8.8 to 136 euro; exchange rates as of April 2014), with annual indexation. Bowden et al. (2014) found that according to data from the SA Government Tobacco Licensing System database, the total number of retail licenses decreased by 24% from December 2007 to December 2009. This reduction occurred predominantly in entertainment establishments, where 31% of the licensees recorded in 2007 no longer had a license in 2009, while 20% had reduced the number of points of sale within the same venue. The authors reported that this reduction might to some extent also be attributed to the implementation of an indoor smoking ban in entertainment outlets that sell liquor. There was almost no impact on other business types, which appeared to have much higher volumes of tobacco sales.

This seems in line with reports from Finland, where after the introduction of a license system, including a fee, a major reduction occurred in the number of retail outlets for tobacco. However, this mainly occurred in restaurants and cafes where sales volume was already low. The authors conclude that an increase in license fees from a low base (or the introduction of licenses where they do not yet exist) is likely to be an effective method of reducing the number of retail outlets when consumer demand for cigarettes (as in the hospitality sector) is low. It remains to be seen whether a further increase in fees would also discourage retailers with high volumes of tobacco sales at locations from renewing or purchasing licenses or whether other additional measures are required to reduce tobacco availability at locations where demand is high.

The second study, which was carried out in Santa Clara County (California), evaluated the impact of introducing a local retail licensing system on the number and location of tobacco retailers, with the primary goal of reducing youth smoking (Coxe et al., 2014). In California, retailers must obtain a state-issued license at a one-time fee of USD 100 (approximately 72 euro) to sell tobacco, with no fee to renew. The state-wide licensing program does not enforce illegal tobacco sales to minors due to lack of funding, and it has been reported that "no California state tobacco license has ever been revoked by the state licensing agency as a result of selling tobacco to a minor". Therefore, in 2010, Santa Clara County implemented a local license ordinance requiring all tobacco retailers to obtain an annual permit to sell tobacco and to pay an annual fee of USD 425 (308 euro). It also included the prohibition of permits to any new retailer applying to operate within 1000 feet of a (K-12) school or within 500 feet of another tobacco retailer. However, existing tobacco retailers operating at the time the ordinance went into effect were 'grandfathered' in. Tobacco retailer permits could also not be transferred when a business was sold. Moreover, retailers had to comply with all other state and federal tobacco laws.

The results showed that after the implementation of the local retail permit, one-third of the retailers (11 out of 36) decided to discontinue the sale of tobacco products in lieu of paying the annual permit fee. The remaining 25 (69%) completed the permitting process. Many of the retailers that chose to stop selling tobacco following implementation of the ordinance were non-traditional tobacco outlets (91%), including bait and tackle shops, bars and restaurants, wineries, and sport and country clubs. Three of the four retailers who stopped were located within 1000 feet of a (K-12) school.

The investigators indicate that this finding (of a 'voluntary' reduction) was surprising because they assumed that the ordinance would prevent more retailers from obtaining permits and not that existing retailers would stop selling tobacco. Moreover, while none of the stores were checked to ensure that they were not selling to minors before the implementation of the local retail permit, after implementation, enforcement operations occurred in March 2011 and May 2012 at 14 (48%) of 25 tobacco retailers, and all 14 were found to be in compliance. Note, however, that the study design did not allow the inference of causation, and the reported changes could be explained by other tobacco control measures introduced at the same time.

Data reported by the Center for Tobacco Policy and Organizing of the American Lung Association in California also suggest that the implementation of local tobacco retailer licensing ordinances is highly effective in reducing illegal sales of tobacco to minors (Center for Tobacco Policy and

Organizing of the American Lung Association, 2012), although a licensing ordinance by itself will not automatically decrease sales rates: "...proper education and enforcement about the local ordinance and state youth access laws are always needed."

Finally, a study granted by the US National Cancer Institute and National Institutes of Health has been planned to evaluate the impact of a ban on the sale of flavoured tobacco products⁴ in licensed retail outlets within 500 feet of all public or private elementary, middle or secondary schools in Chicago.⁵ Research questions include, among others, whether the policy led to store closures or any relocation of affected licensed retail outlets beyond the 500 feet boundary, whether the policy led to any reduction in the number of licenses issued or not renewed, and whether there was any voluntary implementation of the flavoured tobacco product ban among licensed retail outlets located beyond 500 feet of schools. Although this study does not explicitly evaluate the license system itself, it does address the feasibility of evaluating the implementation of a policy measure, which might have been more difficult without a licensing system.

2.4.3 Experiences with tobacco licensing or registration in some EU countries

In this paragraph, cases are described for several European countries with regard to the implementation of tobacco retailer licensing schemes. It is shown that Hungary is thus far the only (European) country where the implementation of retail licenses has been explicitly linked to the restriction of the number of retail outlets. In Finland, improved options for enforcing the legal age limit for the sale of tobacco products were the main reason for implementing a license system. In Norway and Scotland, the topic has been on the political agenda; however, thus far, no steps have been taken for further implementation. In the next paragraph, the situation and experiences with licensing and registration will be described in more detail for Finland, Hungary, Norway, Ireland and France. This description is based on a consultation with experts in the respective countries (see chapter 1) and sources obtained from the Internet.

Finland

In Finland, changes in the Tobacco Act (entering force on 1 October 2010) ambitiously aim to put an end to smoking in Finland. In the prior year, as of April 2009, retail trade in tobacco products were already subject to license (according to Section 10b in the Tobacco Act, with a transition period of 1 year). As a consequence, the number of tobacco retailers decreased: before the law, there were approximately 30,000-40,000 tobacco retailers; now, there are approximately 10,000. Note that one retailer may have more than one point of sale, and information on the exact numbers of sales points is not readily available.

The primary goal was, however, not to reduce the number of retailers or points of sale, but to make the ban on the sale of tobacco products to children and young people more effective and to

⁴ Defined as any tobacco product with a constituent that imparts a characterizing flavor, including menthol and electronic cigarettes.

⁵ <http://ihrp.uic.edu/study/city-chicago-flavored-tobacco-product-ban-near-schools-policy-evaluation>

prevent the sale of illegal tobacco products (Ministry of Social Health and Affairs). However, the "Tobacco-free Finland 2040" network, in which many health organisations and other relevant stakeholders have been involved, called for a series of concrete measures, such as "...*Dramatically reduce the number of sales points for tobacco products so that by 2020 their number has reduced to 500*" (Hara & Simonen, 2013). It is not indicated how this could be realised (for example, by restricting tobacco sales to pharmacies—approximately 800 in Finland—or to the government's alcohol retail monopoly stores—approximately 350).

Before April 2009, selling tobacco products was a free enterprise for anyone, and the supervisory officials had no information on the location and number of tobacco retailers. Moreover, supervision was paid for by all taxpayers, including non-smokers, who make up 85% of the population.

As of April 2009, the regulations are much tougher and facilitate the enforcement of Tobacco Act regulations, including the legal age for purchasing tobacco. The Regional State Administrative Agency maintains a license register containing the addresses of all outlets with a tobacco retail license. Local authorities grant the licenses and determine the license fees, which may vary from 100 to 180 euro. Moreover, there is an annual surveillance fee from 100 to 200 euro ('the polluter pays' principle), and in many cases, there is a special fee of 40-50 euro for each cashier (for example, if tobacco products are sold in many 'points of sale' in one shop).

All retailer applicants must present an acceptable self-monitoring plan for the sale of tobacco products and a report complying with the provisions on the location of tobacco products and tobacco accessories at the point of sales. They also must prove they can assume responsibility for the adequacy of the monitoring arrangements. Furthermore, they are obliged to have a license visible to all customers. If a customer sees tobacco being sold to minors, there is a phone number they can call to report the license number to the officials. There is also a public register on the Internet. Moreover, it is standard procedure to withdraw the license in case of offences, for example, for two weeks or a month or even permanently after serious violations, such as selling illegal (Swedish) "snus". This would not have been as easy without a license system.

Although in theory, all points of sale that operated as a 'normal business' and complied with the licensing requirements were granted a license, it appears that quite a number of retailers gave up selling tobacco, notably restaurants and cafes, in which tobacco retail was minor. According to the EC Special Eurobarometer survey in 2012, only 2% of the population of (ex)smokers in Finland usually purchased tobacco in restaurants, bars or pubs. Any direct effect on the availability of tobacco products is therefore not expected.

Evaluation. No published studies have evaluated changes in smoking behaviour as a function of the reduced number of retail outlets in Finland. One study (Halonen et al., 2013) did, however, show that under the current license system (with nearly 10,000 outlets), living in close proximity to a store selling tobacco products and having one or more tobacco stores within 0.50 km (especially walking distance) from home was associated with a decreased likelihood of smoking cessation. However, this effect was only found among men who were moderate or heavy (10 or more cigarettes daily) smokers at baseline. For women who were light smokers, some effects were in the opposite direction.

According to the authors, reducing the availability of tobacco products is not easy, although their findings suggest that the licensing authorities should aim to decrease the number of sales outlets to increase the prevalence of smoking cessation. Another factor that could contribute to the reported associations include restrictions on tobacco advertising. In Finland, however, retail and other advertising of tobacco (or its price) had long been banned by the Tobacco Act, which suggests that local availability of tobacco products may affect smoking cessation regardless of the restrictions on tobacco advertising. Other more recent legal restrictions, such as the smoking ban 'in the joint and public indoor premises of workplaces', took place in 2010 and were therefore not considered to play a role in explaining the findings.

Hungary

Hungary is the first country where policy measures directly target a reduction in the number and type of tobacco retail outlets. In July 2013, a new tobacco retail system in Hungary was introduced, in line with Act CXXXIV "on reducing smoking prevalence among young people and retail of tobacco products", adopted by the Hungarian Parliament in September 2012.

During the interim period, on behalf of the Minister of State responsible for the regulation of state-owned store management, on 15th December 2012, a public tender was launched to apply for a retail license. All applications were invited on the basis of the most economically advantageous tender for selection of the applications. On 22 April 2013, the National Tobacco Trading Non-profit Company (a 100% Government-owned joint-stock company established by the relevant minister under the mandate of this law) published the names of the applicants who will be allowed to open supervised tobacco stores. The Act regulates access to and sales of tobacco products and aims to prevent illicit trade in such products by ensuring that they are sold through licensed shops in a supervised system (http://www.who.int/fctc/implementation/news/news_hung/en/).

It was also expected that as a result of the measures contained in the Act, it will become more difficult for young people to purchase tobacco products. Tobacco products are only allowed to be sold to people 18 years or older. If there is any doubt, official documents showing the age of the customer must be provided. Fines may be imposed if retailers do not adhere to this provision.

Licenses for tobacco stores are coupled with the size of the population. In a municipality with less than 2,000 residents, the maximum is one; for more than two thousand, there is one license for every two thousand residents. In addition to tobacco products, tobacco retail stores are only authorised to sell gambling games, alcoholic drinks, energy drinks, coffee, mineral water, soft drinks, newspapers and magazines.

From 1 July 2013, approximately 7,000 such stores were allowed to operate, which is a significant reduction from the more than 40,000 retail outlets selling tobacco products before this date. Their number is currently estimated at 6,500, including 5,900 national tobacco stores and 600 'not assessed' stores.

Evaluation. No evaluation studies have been conducted or planned. Some information is available from monitoring studies, but the results must be interpreted with caution. Population surveys showed a decrease in proportion of daily smoking in the past year from 28% in 2012 to 19% in

2013. However, due to demographic differences between the samples from these surveys and the low sample sizes in both surveys, it remains undetermined whether the change in the tobacco retail system has had any impact. Global Youth Tobacco Surveys (GYTS) suggested a (nonsignificant) decrease in smoking prevalence among pupils of 13-15 years from 2012 to 2013. In 2012, 27% were current (cigarette) smokers, and the rate of daily cigarette smoking was 7%. In the 2013 GYTS, the rate of daily smokers has *increased* by less than 2%, but the prevalence of occasional smoking has decreased by 7%.

However, in both cases, it is difficult to draw any conclusions on causality relating to the reduction in points of sale, as there were many other measures implemented in the past years in Hungary, including a ban on smoking in public places, an increase in prices of tobacco products, the use of pictorial warnings on cigarette packages, and campaigns. All these measures may have contributed to the positive trends in smoking prevalence in the population.

Norway

In Norway, smoking prevalence in the general population is 24%, with 15% of the population identifying as daily smokers, which was considered high in light of the much lower prevalence rates in some other countries. Additionally, the use of smokeless tobacco (snus) has been reported to have increased dramatically among young people. Therefore, the Norwegian Strategy for Tobacco Control 2013-2016 ('A tobacco free future') gave highest priority to preventing the uptake of smoking and use of snus among the population.

In December 2012, the Norwegian Ministry of Health presented a bill with proposals for numerous changes to the Tobacco Control Act, including the introduction of a municipal licensing system for the sale of tobacco products (*Proposition to the Storting 55 L (2012-2013) Amendments to the Tobacco Control Act*). The main motivation underlying this proposal was the lack of adherence to the age limit of 18 years for the sale of tobacco products, which is evidenced by the fact that nearly half of the minors who smoke or use snus buy their own tobacco. In addition to Norwegian studies, several international studies formed the basis for this proposal (e.g., Cummings et al., 2003; DiFranza et al., 2001; Novak et al., 2006).

To a certain extent, the proposed scheme was based on the existing licensing scheme for the sale of alcoholic beverages. The proposal implied that all outlets wanting to sell tobacco products must apply for a permit from the municipality, which will oversee that the outlet complies with the age limit and other provisions of the Act. Retailers should have to pay one fee for applying the license and another fee for controls 3 times per year. A ban on self-service and smaller tobacco packages was also proposed. With these proposals, the Norwegian strategy aimed to restrict the access of children and young people to tobacco products by making tobacco products less accessible, both physically and cost-wise.

When the licensing system was proposed, a report was published on the costs and benefits of the system that discussed the option of restricting the sale of tobacco products exclusively in grocery stores (as for alcohol). This would decrease the number of tobacco retail outlets from approximately 12,000-15,000 to approximately 4,500. However, because the retail industry is

strongly opposed to such a regulation, the licensing system was proposed without a restriction on the number or type of tobacco outlets.

The municipal licensing system was intended to come into effect in 2015. However, after the elections in September 2013, the new government has not yet decided on a strategy for implementation. The government may opt for a 'less bureaucratic' solution, replacing the licensing system with a legal requirement to register.

According to the Norwegian expert, a consultation paper from the Directorate for Health was recently published on how a license system (or, rather, a supervisory system for sale of tobacco) should be organised. In summary, this system is designed to

- increase compliance with relevant laws and regulations, with particular focus on the ban on sale of tobacco to minors;
- be cost effective and not lead to unnecessary increases in the need for resources in the municipalities;
- have a registration system that is as simple as possible and will not lead to unnecessary use of resources (e.g., training, case management, counselling for retailers).

The suggestion is a mandatory (municipal) registration of tobacco retailers, without specifying an upper limit. Wholesalers have a responsibility to check that retailers are registered and must not sell tobacco unless documentation on the registration is presented. If the tobacco law is violated, a punishment (fee) may be imposed. A minimum 1-year control is suggested, and the municipality should, in total, perform three times as many controls as the number of retailers registered. Relevant training of retail staff and routines for age control will be required. The costs related to the system will be financed through a yearly fee payable by the registered firms.

Scotland

In 2007, a member of the Scottish Parliament drafted a proposal for introducing a positive licensing scheme for the sale of tobacco products and asked for comments in a public consultation procedure (C. Graham, 2007). The main argument for introducing such a licensing scheme was the increase in legal age for the purchase of tobacco from 16 to 18 years in 2007 and data from surveys showing that children as young as 13 years had little difficulty in gaining access to cigarettes. There was no mention of directly reducing or restricting the number of points of sale.

It was proposed that a positive licensing scheme be introduced with sanctions for retailers who break the law with regard to sales to underage customers. These sanctions were expected to be highly effective when backed with active enforcement activity. However, no such licensing scheme has been introduced in Scotland. The Scottish Government has opted for a registration scheme (www.tobacco.retailing.com), stating that " ...whilst a licensing scheme has certain advantages it is also more burdensome on local authorities and retailers, as the retailer has to provide a sufficient level of information to allow the relevant authority to determine whether a retailer should be allowed to sell a product. A registration scheme merely requires a retailer to notify authorities that they are selling a product and is therefore simpler and less costly to administer." As of the 1st of April 2011, all tobacco retailers must register (www.Tobaccoregisterscotland.org), and after the 1st of October 2011, it was illegal for unregistered retailers to sell tobacco. For the first time under s

tobacco sales law, those found to be selling tobacco illicitly could be fined up to £20,000 (≈ 24,564 euro) and sent to prison for up to six months.

Ireland

As of July 2009, all tobacco retailers in Ireland must apply for a register (Office of Tobacco Control, 2010). The Irish Public Health (Tobacco) Act, 2002 (as amended), provides for the establishment and maintenance by the National Tobacco Control Office (HSE) of a register of all persons who carry on in whole or in part the business of selling tobacco products by retail. A person who proposes to commence the business of selling tobacco products by retail (whether over the counter or from a self-service vending machine) must register with the OTC before they can sell tobacco products. Applicants must provide an eight-page application providing details on the applicant themselves, their premises and their suppliers. Registration may be completed online, and there is no requirement to renew the registration.

There is a flat fee for registering of 50 euro. A person who is registered with the HSE and who is convicted of an offence under the Public Health (Tobacco) Act, 2002 (as amended) will be suspended from the register for a period of time as determined by the Court and, hence, will not be allowed to sell tobacco products for the period of time determined by the Court.

By the end of 2010, the Office of Tobacco Control (now HSE) registered a total of 9,389 retailers covering 11,437 premises (Department of Health, 2011). Approximately half (5,882) of the premises were licensed premises (clubs, restaurants, hotels, nightclubs); the other half were retail shops (5,443), and 122 were other premises. In 2010, six retailers were suspended from the Register following convictions under sales to minors legislation, with suspension periods varying from 24 hours to 14 days. In 2014, a total of 11,409 retailers were registered, covering a total of 13,342 locations.

In the 2013 report *'Tobacco Free Ireland'* of the Tobacco Policy Review Group, installed by the Minister for Health, proposals are made to further reduce the prevalence and incidence of smoking in Ireland (Tobacco Policy Review Group, 2013). Denormalisation of tobacco within Irish society is one of the core principles to achieve these goals. In this context, it was recommended that a licensing system be developed for retailers that sell tobacco products, as, despite the existence of the Retail Register, *"...tobacco retailing is currently 'normalised', i.e., tobacco products can be sold by any person, at any location, at any time"*. The limited restrictions on who can sell tobacco products or where they can be sold is viewed as contradictory to the vision of a tobacco-free society and may undermine public understanding of how seriously tobacco damages health.

Other recommendations made by the Tobacco Policy Review Group to regulate the tobacco retail environment include the prohibition of tobacco sales in mobile units/containers, the prohibition of sale of tobacco products by those under 18 years, the prohibition of *all* self-service vending machines and the introduction of a minimum suspension period for retailers convicted of an offence.

France

In France, the sale of tobacco is officially a monopoly of the state. It is delegated to independent professionals who are licensed by the state to sell tobacco ('the *buralistes*', or *tobacconists*). Every *tobacconist* has exclusive rights to sell tobacco for a specified period in a specific area; these rights are granted by the French tax office ('Administration des Douanes et des Droits Indirects'). A licensee must meet several community purpose conditions, but none of these objectives are health-related. Every license is valid for three years and must be confirmed periodically. In 2012, there were 27,000 licensed *tobacconists* in France. Because no *tobacconist* is allowed to operate more than one outlet, this means there are 27,000 points-of-sale for tobacco in the whole country. Most of the *tobacconists* combine the sale of tobacco with a newsstand/kiosk or a pub/bar. The gross profit for the *tobacconists* on a pack of cigarettes is 8.5% (www.buralistes.fr).

2.5 Vending machines

2.5.1 Policies on tobacco product vending machines

Generally, a tobacco product vending machine is any automated, self-service device that, upon insertion of money, tokens or any other form of payment, dispenses cigarettes or other tobacco products. However, exact definitions may differ between jurisdictions. Tobacco vending machines are commonly thought to provide young people easy access to tobacco products (e.g., Rigotta, 1999; Schneider et al., 2009).

The number of tobacco vending machines in the Netherlands is not exactly known but has been estimated at 15,500 (see §2.2). Outdoor vending machines for the sale of cigarettes have been prohibited as of January 2004. Moreover, cigarette vending machines have been locked as of Jan 1, 2003, and are only accessible by smart card to smokers older than 16 years (NB: 18 years as of January 2014) (Kolschooten, 2012). Cigarette machines have been restricted because Dutch tobacco law implemented a legal age for the sale of cigarettes to young people younger than 16 years in 2004; this was increased to 18 years in January 2014. Coins to unlock machines can be issued at the counter after the age of the purchaser has been verified, which is the responsibility of the owner of the premises where the machine is located. Despite this system, in 2009, some 3% of a sample of underage young people (13-15 years) had attempted to buy cigarettes from vending machines (commonly in the food service industry) in the past year, and 100% of the young people succeeded in this task (Bieleman et al., 2010).

Restrictions or bans on the sale of tobacco products have been incorporated in the WHO Framework Convention on Tobacco Control. According to article 13, recommendations to undertake a comprehensive ban on tobacco advertising, promotion and sponsorships include a ban on vending machines, which constitute by their very presence a means of advertising or promotion (WHO, Guidelines article 13). This is an extension and reinforcement of article 16 on the protection of minors. More specifically, article 16.2 includes 'ensuring that tobacco vending machines under each Party's jurisdictions are not accessible to minors and do not promote sale of tobacco products to

minors". Additionally, article 16.5 stipulates that "...a Party may, by means of a binding written declaration, indicate its commitment to prohibit the introduction of vending machines within its jurisdiction or, as appropriate, to a total ban on vending machines..."

According to the WHO European Tobacco Control Status Report 2013, tobacco vending machines are banned in 30 countries (57%) in the European region, with nine countries implementing a ban between 2007 and 2012 (WHO, 2013). Many other countries have partial restrictions, e.g., with regard to access of youngsters and location (indoor or outdoor).

Within the EU, tobacco vending machines are still allowed in 15 Member States (Austria, Belgium, Czech Republic, Denmark, France, Finland, Germany, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden). The other 13 EU Member States as well as Norway have banned, or have never allowed, sales from vending machines of tobacco (Matrix Insight, 2013; ENSP, 2011), and in January 2015, a ban will be implemented in Finland as well. Table 2.6 provides details on tobacco vending machine policies in the EU-15, Norway and Hungary.

Table 2.6: Tobacco vending machines in the EU-15, Norway and Hungary

Country	Ban	Allowed [†]	Comments
Austria		X	Sales are prohibited to minors (<16 years). There is electronic age control by bank card or mobile phone. Access is still possible by using expired bank cards from parents or older siblings/friends.
Belgium		X	Sales are prohibited to minors (<16 years). Automatic vending machines can be (un)locked by a person of 16 years or older. Most machines can be unlocked with an age coin.
Denmark		X	Electronic vending machines must be placed under surveillance. They do not seem to be a major problem and are mainly present inside bars, restaurants and hotel lobbies. Staff must ensure that no tobacco is sold to people < 18 years.
Finland	As of 01-01-2015		Sales are prohibited to those <18 years, and vending machines must be under supervision. The number of tobacco vending machines is most likely low, but estimates are lacking.
France	x		
Germany		X	Tobacco vending machines must contain electronic devices (bank card or ID) for age verification. The legal age is 18 years. The number of machines has greatly decreased since 2007 (see §2.5).
Greece	x		
Hungary	x		Banned since 2006
Ireland		X	As of July 2009, self-service vending machines are prohibited, except for licensed venues and registered clubs, and the machines must be located within the line of sight of a member of staff at all times. Customers must obtain a disc or card from staff to activate

			the machine. Sale is prohibited to individuals below 18 years. In 2013, proposals were made to ban all self-service vending machines (Tobacco Policy Review Group, 2013)
Italy		X	Vending machines must be equipped with electronic devices to verify the age of the customers. Draft legislation to ban vending machines in 2010 was halted.
Luxembourg		x	Sales to minors < 16 years are prohibited, and customers must get a coin from the counter to activate the machine.
Netherlands		x	Sales to minors < 18 years are prohibited, and customers must get a coin from the counter to activate the machine.
Norway	x		There has been a ban on unsupervised self-serviced vending machines since 2003. Many shops keep their tobacco in vending machines, but customers must buy their products at the cash desk and obtain a receipt/card to get the product from the machine. Sales to minors < 18 years are prohibited.
Portugal		x	Indoor vending machines should have a technical age verification device to prevent access of minors (under 18 years) and should be under direct surveillance of the owner/staff. Outdoor vending machines are prohibited.
Spain		x	Sales to people <18 years are prohibited, including sales from vending machines.
Sweden		x	Vending machines should be placed and controlled so that no one below 18 years can buy tobacco.
United Kingdom	x		In England, Northern Ireland and Wales, and Scotland, bans on sales of tobacco from vending machines came into force in 2011, 2012, and 2013, respectively.

I. With or without restrictions. Sources: ENSP, 2011; Matrix Insight, 2013; The Scottish government, 2013; ASH UK, 2011; www.tobaccoregister.ie; consulted experts (see chapter 1).

The EU Special Eurobarometer 385 also showed a decrease in the use of tobacco vending machines in the general population of 18 years and older in countries where these devices were accessible in the 12 months preceding the survey in 2012 (n=15).

- In 2012, 85% of the *total* population in all EU Member States where vending machines were accessible had *not* bought tobacco products through these devices in the past 12 months. In 2009, this proportion was 79%.
- There were, however, major differences between countries. In 2012, the prevalence of buying tobacco products in the past 12 months through vending machines was highest in Austria (34%), Spain (31%) and Malta (29%). For the Netherlands, the prevalence was 10% (1% often, 4% from time to time and 5% rarely).
- Overall, since 2009, the use of vending machines has decreased in the EU, with the largest reductions being reported in Spain. In 2009, 17% of the Spanish population often bought

tobacco products through vending machines (compared with 11% in 2012); for 'time to time' use, the prevalence decreased from 18% to 14%. This decrease has been linked to the introduction of a smoking ban in public spaces. Declines in purchases from vending machines were also reported for Portugal, Austria, Germany, Belgium and the UK⁶.

- Only in Malta has the prevalence of buying tobacco products from vending machines in the past 12 months increased, from 25% to 29%.

Moreover, this survey showed that in 2012, 54% of the total EU-27 population would be in favour of banning the sales of tobacco products through vending machines; 37% were opposed to such a measure, and 9% did not know.

- Remarkably, the proportion of citizens in favour of a ban was *lowest* in the Netherlands (36%) and highest in Cyprus (where no tobacco vending machines are allowed).
- Little support was also reported for Austria (37%), where the proportion of (ex)smokers usually buying tobacco products from vending machines is fairly high (34%).

Other research shows that the proportion of the Dutch citizens in favour of a ban on tobacco vending machines is relatively low but has increased (TNS NIPO/KWF, 2014). According to annual polls in the population 18 years and older, in 2009, one in five people (21%) supported a ban on tobacco vending machines. This proportion progressively increased to 32% in 2013, but remained stable in 2014 (32%).

In line with the reductions in buying from vending machines, economic analyses of the EU market of tobacco and related products showed the following (Matrix Insight 2013):

- Overall, sales through vending machines as a percentage of sales through all retail outlets are modest, showing a decrease from over 20% in 2006 to approximately 16% in 2010, after reaching a peak in 2006.
- From 2000 to 2010, sales through vending machines declined by 38% across 10 Member States. The largest decline was reported for Ireland (83%), followed by Germany (nearly 80%), Denmark (approximately 60%), Portugal and Sweden (approximately 30%) and the Netherlands (approximately 25%). In contrast, increases were reported for Austria and Italy (approximately 40%) and the Czech Republic (approximately 80%)⁷.

It has been suggested that reductions might have been caused both by restrictions on vending machines and in the wake of smoking bans in bars, clubs and restaurants, where vending machines are commonly located. It is assumed that buying cigarettes from vending machines in these locations is less common if people cannot smoke them on these premises.

Evaluation. Somewhat older studies suggest that vending machines are common sources for young people and that implementing age locking systems may be effective in reducing sales to minors but that banning them altogether may be more effective (Stead & Lancaster, 2005/2008). Additionally, Hublet et al. (2009) report cross-country associations between the prevalence of regular (at least

⁶ Note that in England, the ban on vending machines was implemented as of 1 October 2011, while field work for the survey was conducted in February-March 2012.

⁷ Percentages were read from the figure, with the exception of Ireland.

weekly) smoking among 15-year old pupils and a (partial) restriction of vending machines, especially among boys.

There are no studies published evaluating the effects of a partial or total restriction on tobacco sales through vending machines on smoking-related indicators. However, in Germany, where the number of vending machines per capita used to be the highest in the world, several studies have been conducted evaluating the effects of implementing age locking devices, which had the effect of lowering the number of vending machines (Schneider et al., 2009; 2011). Moreover, a report was published that analysed whether the large reduction in sales through vending machines in Germany could be attributed to specific tobacco control measures (Kvasnicka, 2010); however, no prevalence or smoking indicators were included. The results of these studies will be summarised in the next paragraphs. Moreover, the policy on banning vending machines in the United Kingdom will be described.

2.5.2 Experiences with restrictions or bans on vending machines in Germany and the United Kingdom

Germany

Until 2007, there was approximately one tobacco vending machine per 16 adolescents in Germany, with those located outdoors in public spaces (e.g., near schools and sports fields) providing unhindered access to cigarettes (Schneider et al., 2009). To reduce youth smoking, cigarettes were forbidden to be sold to those under 16 years of age in 2003 and to those under 18 years of age in 2007. In 2007, all cigarette vending machines were equipped with an electronic age-coded card reader to ensure that only adults use the machines (German Cancer Research Institute, 2014). The number of cigarette vending machines decreased from approximately 700,000-800,000 nationwide in 2001-2006 to 430,000 units in 2007 and further to 350,000 in 2013 (German Cancer Research Institute, 2014). This was not due to a 'deliberate' policy targeting a reduction, but might have been caused by multiple factors, as will be shown in the next paragraphs.

Schneider et al. (2009) evaluated the trend in the number of vending machines between 2005 and 2007 within 2 selected districts in Cologne after the implementation of electronic locking devices. Moreover, in a survey, pupils 11-15 years of age were retrospectively asked to disclose their sources for obtaining tobacco in 2007 and in 2005 (for those who also smoked in that year). Because a register for tobacco retailers is lacking in Germany, commercial sources were counted by 'field work' and then mapped and geocoded. It was shown that there were a total of 315 commercial tobacco sources in the two districts in 2005, including 58 outdoor and 126 indoor cigarette vending machines. By 2007, these numbers had decreased to 277 commercial tobacco sources (-12%), including 30 outdoor (-48%) and 116 indoor (-8%) vending machines. In 2007, 9% of the 11-15-year-old pupils smoked, and another 29% had occasionally smoked but had quit. The majority of those who were regular smokers in 2005 reported to have found a way of bypassing the electronic locking devices (e.g., by borrowing licenses, asking older friends to buy cigarettes). Moreover, while the proportion of regular underage smokers buying from vending machines decreased from 41% to 25%, they increasingly switched to other commercial sources

(e.g., kiosks, petrol stations, drug stores, tobacco stores) and social sources (schoolmates, friends) to obtain their cigarettes. Most likely, the high costs associated with the installation of the electronic locking devices were a major factor underlying the reduction of vending machines, although tax increases and cigarette smuggling may have played a role as well. With such a cross-sectional design, it was not possible to determine the impact of a decrease on intra-individual smoking behaviour. Although smoking prevalence among German adolescents progressively decreased from 2001 to 2007 (and thereafter) (German Cancer Research Institute, 2014), several measures could have contributed to this change, such as tax increases, media campaigns and school intervention programs.

In the second study, Schneider et al. (2011) showed that between 2005 and 2009, the total number of commercial cigarette sources had also decreased in four districts of Cologne, mainly due to a reduction in outdoor vending machines (-44%). In both years, the number (and density per 1,000 inhabitants) of commercial sources of tobacco was appreciably higher in below-average socioeconomic status (SES) areas compared to above-average SES areas. Moreover, the reduction (mainly in vending machines) was greater in above-average SES areas, contributing to the social inequalities between these areas.

Kvasnicka (2010) conducted a detailed analysis of the impact of four different tobacco control measures on trends in cigarette sales through over 130,000 vending machines of one leading provider present in 15 of 16 German federal states. These measures were as follows:

- 1) The implementation of electronic age verification devices (using bank cards or drivers licenses in card format) on 1 January 2007;
- 2) An increase in legal age for purchasing tobacco from 16 to 18 years - with vending machines being exempted from this measure until January 2009.
- 3) Federal smoking bans in federal buildings, public transport and railroad stations.
- 4) State smoking bans in public spaces (differences in implementation dates, dates of fining, presence of smoking rooms in bars/restaurants and/or clubs).

Using regression analyses, the investigators showed that there was a large effect of the electronic age verification system on sales at vending machines (reduction of 23% on revenues), especially those located outdoors and in locations frequented by youth (e.g., hostels, youth centres, discotheques). The federal smoking ban had no effect, while the increase in legal age for purchasing tobacco only marginally affected sales at youth locations. Moreover, state-level smoking bans appeared to have reduced sales at indoor vending machines (especially in bars), but the magnitude of the effect was relatively modest.

Together, these studies suggest that because of the implementation of age locking devices, the number of (and sales from) vending machines decreased, especially those located outdoors. This decrease was more severe in areas with above average socioeconomic status compared to areas with below average socioeconomic status. Moreover, a public smoking ban may have affected sales through indoor vending machines. The question of whether the decreases in number of (and sales from) vending machines also affected smoking behaviour, either in the short term or the long term,

remains to be answered. There are indications that availability and access to tobacco products has not changed significantly.

United Kingdom

England – tobacco vending machines

In the 2011 Tobacco Control Plan for England, the Government confirmed that, having robustly and successfully defended the legislation against two judicial review cases brought by the tobacco industry in the courts, tobacco products would no longer be sold from vending machines as of 1 October 2011 (HM Government, 2011). The reasons underlying this decision are that vending machines are self-service and offer young people easy and poorly supervised access to tobacco, including young people under the legal age at which they may be sold tobacco (18 years). Moreover, reference is made in the Impact Assessment for England to Article 13 and 16 of the FCTC.⁸

Although sales of tobacco products from vending machines were estimated to represent just 1% of the overall tobacco market, a disproportionate number of purchases from vending machines were made by young people due to their automated and often unsupervised nature (ASH, 2011). For example, a survey by LACORS (Local Authority Trading Standards) reporting on test purchases by young people in 2010/2011 (before the ban on sales from vending machines) showed that of the 601 visits to (coin-operated) vending machines, 320 (56%) resulted in the illegal sale of cigarettes to underage young persons (Local Government Group, September 2011).

With the ban on tobacco sales through vending machines, the Government aimed to “...reduce the number of young people taking up smoking and support adult smokers who are trying to quit...”.

The impact assessment estimated the costs (e.g., lost tax revenues, one-off costs for machines) and benefits (e.g., health benefits of preventing young people from starting smoking and of smoking less or quitting by adult smokers) of the ban on tobacco sales from vending machines. For these purposes, a number of assumptions and estimates were made, for example, that there were 58,000 vending machines in the UK, excluding Scotland, which would cost £ 375 (≈ 461 euro) (second hand) each; that 25% to 75% of the vending machine sales are not offset by increased sales elsewhere; that youth below age 18 would, on average, consume 4.5% less cigarettes per day and that adult smokers would smoke between 9 and 28 fewer cigarettes per year, or 0.03 and 0.08 per day (see the reference in footnote 6 for a link to a detailed description). Overall, the estimated effect of a ban on vending machines would be a net benefit of £ 116 million (≈194 million euro) over ten years.

The prohibition of the sale of tobacco products from vending machines was included in the Health Act 2009 and related regulations. The legislation does not ban vending machines themselves. Vending machines can be retained if they are no longer used to sell tobacco products and all advertisements of tobacco products are removed from them or covered up.

⁸ Impact assessment for a prohibition on the sale of tobacco for vending machines (27 January, 2010; www.dh.gov.uk/tobacco).

Other areas of the UK – tobacco vending machines

The Northern Ireland Assembly and Welsh Government implemented bans on tobacco sales from vending machines on 1 March 2012 and 1 February 2012, respectively.

In Scotland, a ban on automatic vending machines was introduced (together with a tobacco product display ban) through the Tobacco and Primary Medical Services (Scotland) Act 2010. Following the successful defence of these measures against legal challenges from the tobacco industry, the ban on vending machines was implemented on April 29, 2013 (The Scottish Government 2013).

Other tobacco control measures

The legal age for tobacco sales was increased from 16 to 18 years in 2007.

The open display of tobacco products will end in two stages across England, Wales, Northern Ireland and Scotland (see chapter 5).

Evaluation. Data from the Annual Smoking, Drinking and Drug Use Survey among pupils aged 11-15 years in England showed that in 2012, 44% of teenagers who smoked (and 60% of the regular (i.e., weekly or more often) smokers) said they bought cigarettes from a shop. Moreover, the proportion of regular smokers who usually buy cigarettes from vending machines decreased from 11% in 2010 to 2% in 2012 but was still existent despite the ban (Fuller, 2013). There may be a number of reasons for this. First, while levels of compliance are high, it is possible that a few tobacco vending machines were still available during the early days after the new law came into force. Second, the survey relies on self-reporting, and young people may have thought about earlier sources from which they had previously obtained cigarettes, forgetting or overlooking the fact that those machines were no longer available.

The survey also suggests that the main impact on how children obtain cigarettes could be attributed to the increase of the age of sale from 16 to 18 years in 2007, which resulted in a 23% decrease in the proportion of regular smokers reporting that buying cigarettes in shops was their main means of obtaining cigarettes. At the same time, between 2006 and 2008, the proportion of regular smokers who said they usually bought cigarettes from other people increased from 40% to 52%.

The Children and Families Act 2014 enables the government in England to introduce regulations to stop adults from buying tobacco for people under the age of 18 (known as proxy purchasing). The new law could result in anyone caught buying cigarettes for a child being given a £50 (≈71 euro) fixed penalty notice or a fine of up to £2,500 (≈3,037 euro). The Act also provides England and, in some cases, Wales, Northern Ireland and Scotland with power such that they can enact regulations to ban smoking in private cars carrying children, introduce requirements for standardised packaging of tobacco products and introduce an age of sale of 18 years for nicotine products such as electronic cigarettes. No dates have yet been set for these measures, although it is expected that some regulations will be drafted in Parliament within the next 12 months.

In conclusion

Tobacco vending machines have been banned in an increasing number of countries in the past decades, mainly to curtail the ability of young people to access tobacco products but also to support adult smokers who want to quit. These machines have also been banned because their presence can be argued to be a form of tobacco promotion and advertising. While in most countries, vending machines do not seem to constitute a major channel of distributing tobacco, limited data suggest that both a partial (e.g., age restriction) and a full ban on vending machines may reduce sales through this distribution channel. However, this effect may, in the short term, be partly or fully compensated for by other sources. It remains to be demonstrated whether smoking prevalence, incidence or impulse purchases are affected by a ban on vending machines, as no studies have convincingly addressed this question. It is unclear whether such effects would be mediated through limiting access to tobacco products or by decreasing exposure to tobacco product advertising associated with tobacco vending machines.

Moreover, banning vending machines in establishments where smoking is already prohibited, such as hospitality venues, would complement smoke-free laws and reinforce social norms against smoking (Henriksen, 2012). Additionally, a ban on tobacco vending machines could reinforce (an increase in) legal age limits for the sale of tobacco products, as both measures aim to reduce access to tobacco products by young people.

Chapter 3 Findings of a systematic review of research on the effects of tobacco retail outlet density or proximity and smoking indicators

In this chapter, we will present the findings of a systematic review and other research evidence on the impact of tobacco outlet density and proximity on smoking behaviour in the youth and adult populations. Until now, relatively little attention has been devoted to the promotion of smoking via the widespread retail availability of tobacco products (Paul et al., 2010). A limitation is that no studies have been published that have directly evaluated the effects of changes (whether an increase or a reduction) in tobacco outlet density on smoking behaviour. As described in chapter 1, this may prevent the formulation of clear-cut conclusions on the effects of this policy measure. However, there are several sources of information available that may be useful in guiding conclusions on this topic. First, we will examine the plausibility of an effect and the underlying mechanisms. Second, we will review the available studies that predominantly employ cross-sectional designs, in which outlet density and proximity (see later) are associated with different smoking-related outcomes. Third, we will 'reason by analogy' by discussing the evidence on the impact of alcohol outlet density and alcohol consumption.

In the international literature, two aspects of retail availability of tobacco are generally studied:

1. Tobacco retailer density: usually measured by the number of tobacco outlets within a certain radius around the home or the school or within a certain geographical area or within a certain population.
2. Proximity of tobacco outlets: usually measured as the distance to the nearest outlet from, for instance, the persons' home or school. This can either be the straight-line distance from home to the outlet (i.e., 'as the crow flies'), or the walking distance to the nearest tobacco outlet.

A higher density and closer proximity of tobacco outlets are believed to promote smoking by making cigarettes more accessible and available and by increasing environmental cues to smoke (Henriksen et al., 2008).

In the first paragraph (§3.1), we will describe suggested mechanisms to explain the (possible) relationship between density and proximity of points of sale (POS) and smoking (related) indicators. In §3.2, we will discuss the findings of the systematic review of studies on the relationship between density and proximity of POS and smoking behaviour and other related outcomes. Findings will be presented for youth (§3.2.1) and adults (§3.2.2) separately. In §3.3, we will briefly summarise findings on differences between subgroups with regard to the association between density or proximity and smoking indicators. In §3.4, results from the literature on the density and proximity of alcohol will be summarised briefly. Finally, in §3.5, we will summarise the main findings of the systematic review, followed by a discussion of the results and other research findings on this topic.

3.1 What mechanisms are suggested to explain the relationships between density and proximity of POS and smoking-related variables?

Key findings

The density of tobacco points of sale may influence smoking behaviour by

- making tobacco more accessible, especially for youth, as they have less means to travel farther
- increasing the exposure to advertising at points of sale
- increasing exposure to smoking cues
- increasing the perceived acceptability of smoking (social norm)
- increasing competition between outlets, which may lower the price of tobacco or may reduce compliance to rules regarding sales to minors.

Several mechanisms are suggested in the literature that might explain the relationship between the density and proximity of POS and actual smoking behaviour. We will describe them briefly below:

- Theories such as the Theory of Planned Behaviour (Ajzen, 1985, in Paul et al., 2010) would suggest that high availability would lead to increased smoking behaviour via increasing the perceived acceptability of smoking (social norm).
- Results from an Australian study (Paul et al., 2010) found that 27.8% of smokers indicated that they would either quit or cut down if cigarettes were not available within walking distance of their residence or usual activities.
- A high density or close proximity of retailers in an area is thought to be especially relevant to smoking behaviour among youth. Compared to adults, adolescents often do not have the means to travel farther from home or school to buy tobacco. Additionally, the availability of points of sale in their neighbourhood may increase their (perception of) access to cigarettes (Lipperman-Kreda et al., 2013).
- In addition, a higher density of retailers may cause normalisation of tobacco use. Placing cigarettes and tobacco products in stores alongside other consumer goods such as sweets, chewing gum and newspapers makes them seem like normal products (Tilson et al., 2011). As a consequence, when tobacco seems easy to obtain and readily available, young people may get the impression that smoking is condoned and acceptable (Adams et al., 2013).
- A higher density of tobacco retailers in their neighbourhood may also increase the exposure to advertising at points of sale, for instance, posters or banners that display information about the available tobacco products (Lipperman-Kreda et al., 2013, Novak et al., 2006; Reitzel et al., 2011), which in turn may increase smoking behaviour. When tobacco products are readily available, impulse buys may be a problem, which will be especially relevant for experimental or occasional smokers and smokers trying to quit (Tilson et al., 2011).
- Competition between outlets may increase in an area with a high density of tobacco outlets, which in turn might reduce compliance by retailers with laws regarding sales to minors. In a competitive situation, retailers may be less likely to request ID or to implement effective

policies to reduce sales to minors. As a consequence, the likelihood will increase that young people will be able to locate an outlet that will sell tobacco to them (Lipperman-Kreda et al., 2013). In addition, competition may lead retailers in a high-density area to lower the price of cigarettes (when they are not regulated) (Lipperman-Kreda et al., 2013; Tilson et al., 2011, Paul et al., 2010), which is attractive especially for young people.

- Finally, a tobacco outlet close to home may represent a cue for smokers trying to quit, as it can increase cravings. Consequently, it may be more difficult for people to quit smoking, and it may increase the risk of relapse for people who have quit smoking (Reitzel et al., 2011).

In addition to a higher density of outlets making tobacco more accessible and available, the relationship between outlet density and smoking could also be explained by tobacco retailers responding to the demand in a certain area (higher prevalence of smokers) (e.g., Lipperman-Kreda et al., 2013).

3.2 Findings of a systematic review

Characteristics of the studies

We identified 21 unique studies investigating the relationship between tobacco outlet density and/or proximity and one or more smoking-related indicators (see chapter 1 for a description of the search strategy). The majority of studies examined the relationship between outlet density and/or proximity and smoking behaviours in the youth population (N=13), with a further eight studies examining this relationship in adults (see table 3.1). Eighteen studies examined the relationship between density of tobacco outlets and smoking behaviour, and ten studies examined the relationship between proximity of tobacco outlets and smoking behaviour. All but three of the studies used a cross-sectional design (N=18); the three remaining studies were prospective cohort studies among adult smokers, of which two focussed on smokers enrolled in a quit attempt. Most studies on the effects of density and proximity of points of sale were performed in the USA (N=15), with additional studies originating from Canada (N=2), Australia (N=1), New Zealand (N=1), Finland (N=1), and England (N=1).

Density and proximity of outlets in the youth population were both measured in relation to the home address and the location of the school, with several additional studies calculating density as the number of outlets in relation to the size of the population in a certain area. Density and proximity of outlets in the adult population were measured in relation to the home address or a certain area/neighbourhood (table 3.1).

Table 3.1: Characteristics of the included studies (N=21)

Author/ Year	Country	Density/proximity	Population	Design	Outcomes
Adachi-Meija 2012	USA, nationwide	<u>Density</u> : no. of outlets per 1000 people <u>Proximity</u> : distance from home to closest outlet along the road.	Youth	Cross-sectional	Tried smoking, smoking intensity in the past 30 days among experimental smokers.
Adams 2013	USA, Illinois	<u>Density</u> : within a half-mile radius around school	Youth	Cross-sectional	Smoking during the past 30 days, lifetime smoking
Chan 2011	Canada, Ontario	<u>Density</u> : radius of 1 <u>km</u> around school	Youth	Cross-sectional	Susceptibility among never smokers, daily smokers and occasional smokers
Henriksen 2008	USA, California	<u>Density</u> : number of outlets within a half-mile of the school <u>Proximity</u> : at least 1 outlet within 1000 feet of school; distance from school to the nearest outlet	Youth	Cross-sectional	Prevalence in the past 30 days; no. of cigarettes smoked in the past 30 days; no. of cigarettes per day
Leatherdale, 2007	Canada, Ontario	<u>Density</u> : number of tobacco retailers surrounding a school within a six-block radius.	Youth	Cross-sectional	How do they usually obtain cigarettes (buy themselves, someone else buys, get them from a friend)?
Lipperman-Kreda 2012	USA, 50 midsized California cities	<u>Density</u> : number of retail tobacco outlets per 10000 persons.	Youth	Cross-sectional	Ever smoked a whole cigarette, any past 12 months/30 days smoking, frequency of smoking in the past 12 months/30 days
Lipperman-Kreda, 2013	USA, 45 midsized California cities.	<u>Density</u> : number of tobacco outlets within a 0.75 and 1 <u>mile</u> radius of home and school <u>Proximity</u> : distance to the closest tobacco outlet from home and school as the crow flies.	Youth	Cross-sectional	Past 30 days smoking frequency

Loomis 2012	USA, New York	<u>Density</u> : number of tobacco outlets per 1000 youth in each county and year	Youth	Cross-sectional	Past 30 days smoking, frequent smoking (at least 20 days in the past 30 days), no. of cigarettes per day.
McCarthy, 2009	USA, California public schools	<u>Density</u> : no. of retailer outlets within a 1 mile radius from school <u>Proximity</u> : Average straight line distance from school to each retailer.	Youth	Cross-sectional	<u>Established smoking</u> : at least 1 day in the preceding 30 days and ever smoked 100 or more cigarettes. <u>Experimental smoking</u> : at least 1 day in the preceding 30 days limited to less than 100 cigarettes. Average number of cigarettes smoked on the day respondents smoked.
Novak, 2006	USA, Chicago	<u>Density</u> : no. of block faces with a retail outlet divided by the total no. of block faces	Youth (11-23)	Cross-sectional	Past month smoking
Pokorny, 2003	USA, Illinois	<u>Density</u> : no. of tobacco outlets as a function of the youth population in each community	Youth (6 th -8 th grade)	Cross-sectional	Ever smoked/ continued smoker/ former smoker
Scully, 2013	Australia, Victoria	<u>Density</u> : no. of tobacco outlets within a 500 m radius of the school	Youth (12-17 years)	Cross-sectional	Past month smoking, no. of cigs smoked on each of seven days preceding the survey
West, 2010	USA, San Diego-Tijuana border	<u>Proximity</u> : distance from the home to the nearest alcohol & tobacco retailer.	Youth (13-19)	Cross-sectional	Index reflecting lifetime use of both A&T (0-2)
Chuang 2005	USA, Northern California	<u>Proximity</u> : distance between a home and convenience store <u>Density</u> : no. of convenience stores per square mile No. of convenience stores within a 1 mile radius of the home	Adults	Cross-sectional	No. of cigarettes per day

Halonen 2013	Finland	<u>Density</u> : number of stores within 0.50 km from home <u>Proximity</u> : straight-line and walking distance from home to the nearest tobacco store	Adults	Prospective cohort study	% of light and moderate/heavy smokers who had quit
Han et al., 2014	England	<u>Density</u> : number of outlets within different buffer zones (250, 500, 1000 and 300 m) around the participant's residence. <u>Proximity</u> : shortest travel distance from the participant's home along the road network to the closest outlet	Adults	Prospective cohort study	Smoking abstinence at six months
Kirchner 2013	USA, Washington DC	Number of contacts with a POS during a cessation attempt (proximity?)	Adults	Cross-sectional	Daily assessment of smoking status (abstinent, lapse, relapse)
Pearce, 2009	New Zealand	<u>Proximity</u> : Travel time by car from the population-weighted centroid of each neighbourhood to the closest tobacco outlet	Adults (15 years and over)	Cross-sectional	Smoker: at least one cigarette per day Heavy smoker: >10 cigarettes per day
Peterson, 2005	USA, Iowa	<u>Density</u> : no. of tobacco outlets per 50 km of roadway.	Adults	Cross-sectional	Smoked at least 100 cigarettes and smoked cigarettes every day or some days.
Reid, 2005	USA, Iowa	<u>Density</u> : no. of tobacco outlets per 50 km of roadway	Adults	Cross-sectional	% smoked at least 100 cigarettes; % smoked every day or some days
Reitzel, 2011	USA, Houston, Texas	<u>Density</u> : no. of tobacco outlets within a 500 m/ 1 km/ 3 km radius from the residence, measured along the street network <u>Proximity</u> : shortest travel time from home to closest outlet	Adults	Prospective cohort study	Continuous abstinence for 26 weeks

In the following paragraphs, we will describe the results of these studies in more detail. First, the studies examining the possible influence of the density and proximity of tobacco outlets on smoking indicators in the youth population will be discussed (§3.2.1), followed by studies on the relationship

between density and proximity of tobacco outlets and smoking outcomes in the adult population (§3.2.2). At the beginning of each paragraph, we will summarise the main conclusions of the studies and discuss their limitations.

3.2.1 Density and proximity of POS and smoking behaviour in the youth population

Key findings of studies among youth

- The systematic review of associations between density and proximity of tobacco points of sale on smoking (related) behaviours among youth included 13 studies, all of which originated from North America except for one study, which was carried out in Australia.
- The most consistent evidence was found for a relationship between *density* (but not proximity, 0 out of 3 studies) of tobacco points of sale around the *school* and smoking behaviour, reported in 6 of 7 studies.
- More specifically, three studies found a positive association with *initiation* of smoking by youth. Additionally, in two of these studies, an effect on established smoking was measured but not found, indicating that density may impact smoking initiation or experimentation but not current smoking.
- The evidence for a relationship between *density* of tobacco points of sale around the home and smoking behaviour among youth is inconsistent, with three out of six studies finding no evidence, while the remaining studies did find a relationship with different types of smoking outcomes. Only one out of three studies investigating proximity of tobacco points of sale to the home found a positive effect, but the outcome measure included both alcohol and tobacco use.

Thirteen studies investigated the association between density and/or proximity of POS and smoking behaviour among youth. In these studies, the density and/or proximity of POS was measured in relation to the school (Scully et al., 2013; Leatherdale and Strath, 2007; Chan & Leatherdale, 2011; McCarthy et al., 2009; Henriksen et al., 2008; Lipperman-Kreda et al., 2013; Adams et al., 2013) and/or in relation to the neighbourhood or the home of the respondent (Pokorny et al., 2003; Novak et al., 2006; Adachi-Mejia et al., 2012; Lipperman-Kreda et al., 2012; Lipperman-Kreda et al., 2013; Loomis et al., 2012, West et al, 2010) .

A positive association was found in all but one of seven studies examining the relationship between the density of tobacco outlets around the school and smoking (related) behaviour among adolescents (see table 3.2). The findings suggested that a higher density of POS in the area surrounding schools increased the risk that adolescents were susceptible to smoking (Chan & Leatherdale, 2011), had ever smoked (Adams et al., 2013), were experimental smokers (McCarthy et al., 2009), were current smokers (Henriksen et al., 2008), usually bought their own cigarettes (Leatherdale & Strath, 2007), and increased the number of cigarettes smoked (Scully et al., 2013). However, the findings on these outcomes could not always be replicated in different studies.

In addition, no evidence could be found for an association between the proximity of POS to the school and smoking-related outcomes in any of the three studies that addressed this relationship.

Table 3.2: Evidence on the relationship between density/proximity of POS and smoking behaviour among adolescents in the available studies

Home/school	Study	Density	Proximity
School	Adams et al., 2013	+	x
	Chan & Leatherdale, 2011	+	x
	Henriksen et al., 2008	+	-
	Leatherdale & Strath, 2007	+	x
	Lipperman-Kreda et al., 2013	-	-
	McCarthy et al., 2009	+	-
	Scully et al., 2013	+	x
Home/neighbourhood	Pokorny et al., 2003	-	x
	Novak et al., 2006	+	x
	Adachi-Meija et al., 2012	-	-
	Lipperman-Kreda et al., 2012	+	x
	Lipperman-Kreda et al., 2013	+	-
	Loomis et al., 2012	-	x
	West et al., 2010	x	+

+: higher density/proximity positively related to smoking

-: no relationship found between higher density/proximity and smoking

x: density/proximity not measured in the study

A positive association between the density of tobacco outlets around the home or in the neighbourhood and smoking (related) outcomes was found in three of the six studies on this subject (table 3.2). The findings suggested that density around the home was related to lifetime and past month cigarette use (Lipperman-Kreda et al., 2012; Novak et al., 2006) as well as a higher frequency of smoking (Lipperman et al., 2013), while only one additional study (out of three studies on the subject) found a relationship between the proximity of POS to the home and the use of alcohol and/or tobacco (West et al., 2010).

An important limitation of all studies among youth is the cross-sectional design. Therefore, at this point in time it cannot be established to what extent the results of these studies reflect a causal relationship between the density and/or proximity of POS and smoking outcomes. Furthermore, in the study by West et al. (2010), it was not possible to assess the unique effects of the proximity of

tobacco retailers on tobacco use, as a composite variable including the use of both alcohol and/or tobacco was used as the outcome variable.

In the next two paragraphs, the results of studies on the associations between smoking behaviour and density and/or proximity of POS in relation to the school will be described in more detail, followed by the results of studies on the density and/or proximity of POS in relation to the home or neighbourhood of the youth.

POS around the school and smoking behaviour among youth

Density

The relationship between the density of POS around the school and smoking behaviour in the adolescent population was addressed in seven studies (Adams et al., 2013; Chan & Leatherdale, 2011; Henriksen et al., 2008; Leatherdale & Strath, 2007; Mc Carthy et al., 2009; Lipperman-Kreda et al., 2013 & Scully et al., 2013). A positive association was found in all but one of these studies, with a higher density being associated with smoking-related outcomes.

Individual study results

Scully et al. (2013) studied the influence of the density of tobacco retail outlets and the price of cigarettes near 35 schools in Victoria, Australia on the smoking behaviour of students aged 12-17 years. Density was measured as the number of tobacco outlets in a 500-metre radius around the school. After controlling for covariates, neither tobacco outlet density (OR=1.06; 95% CI: 0.90–1.24) nor cigarette price (OR=0.95; 95% CI=0.83–1.08) was related to past month smoking when tested in the same model. However, the number of cigarettes smoked in the previous seven days was significantly related to density, with a unit increase in the number of tobacco outlets surrounding the school, corresponding to a 13% increase in the number of cigarettes in the previous seven days (IRR=1.13; 95% CI: 1.02-1.26). When price was removed from the model, tobacco outlet density remained a significant predictor of cigarette consumption (IRR=1.14; 95% CI: 1.03-1.25), suggesting that the effect of the density of retail outlets is independent of the effect of price. The authors conclude that their findings provide some support for restricting the number of tobacco outlets near schools as a means of reducing the number of cigarettes smoked.

A Canadian study by Leatherdale and Strath (2007) investigated how the number of tobacco retailers surrounding a school was related to cigarette access behaviours, i.e., the way students obtained their cigarettes. Smokers attending a school surrounded by many tobacco retailers were more likely to buy their cigarettes themselves (OR=1.04; 95% CI: 1.01-1.08) and were less likely to let someone else buy them (OR=0.96; 95% CI: 0.94-0.98). In addition, the study found that schools with a greater density of tobacco outlets surrounding the school had higher smoking rates but that the number of tobacco retailers was not related to whether a student was a smoker or not (OR=1.01; 95% CI: 0.99-1.03). Although these results appear contradictory, they involved

different analyses, with the first being at the group level and the second at the individual level. The authors conclude that the density of tobacco retailers is associated with an increased likelihood of minors buying their own cigarettes. This finding is significant given that research shows that perceived accessibility is associated with higher rates of youth smoking. Doubeni et al. (2008), for example, found that perceived accessibility contributed to the escalation of tobacco use both independently and through its interaction with peer smoking. That is, youth were more likely to smoke regularly when they also had friends who smoked.

In another Canadian study, Chan & Leatherdale (2011) examined how retailer density surrounding schools was associated with stages of smoking among 27,000 youth (ranging from smoking susceptibility among never smokers to occasional and daily smoking among current smokers). The results showed that the odds of a never smoker being susceptible to future smoking increased with each additional tobacco retailer within a 1 mile radius of the school (OR 1.03, 95% CI: 1.01-1.05). However, there was a significant interaction with gender: as the number of tobacco retailers surrounding a school increased, the odds of a never smoker being susceptible to smoking increased among male never smokers, but not among female never smokers. The authors propose that this may be due to female smokers being less likely to purchase their own cigarettes and more likely to seek alternative sources, such as friends and family. The number of tobacco retailers surrounding the school was not found to be related to being an occasional or daily smoker. The authors suggest, therefore, that prevention activities should be targeted to the non-smoking students who are at the greatest risk at the school-level.

McCarthy et al. (2009) used data from the 2003-2004 California Student Tobacco Survey combined with retail licensing data to study the relationship between retailer density and students' tobacco use. Analyses showed that the density of retailers was associated with experimental smoking (OR=1.11; 95% CI: 1.02-1.21), but not established smoking (OR=1.06; 95% CI: 0.94-1.20). In addition, the effects on experimental smoking were limited to high school students (OR=1.17; 95% CI: 1.06-1.29) and urban areas (OR=1.11; 95% CI: 1.01-1.21). These findings were explained by the fact that, compared to other students, high school students and students in urban areas obtained their cigarettes more often from a tobacco retailer.

A similar study was carried out by Henriksen et al. (2008), where data from the same California Student Tobacco Survey in 2005-2006 were combined with retailer licensing data about the locations of tobacco outlets within half a mile of the schools (as the crow flies). After adjusting for school and neighbourhood characteristics, the prevalence of current smoking was slightly higher (3.2%) at schools in neighbourhoods with the highest tobacco outlet density (more than 5 outlets). Smoking prevalence in neighbourhoods with moderate tobacco outlets (1-5) was not different from neighbourhoods without any outlets. No association was found between the density of outlets and the average number of cigarettes smoked.

Lipperman-Kreda et al. (2013) examined the association between tobacco outlet density around schools and past 30 days cigarette smoking frequency among 832 13-16-year-old youth across different areas (0.75 or 1 mile) in 45 midsized Californian communities. The results showed no association between tobacco outlet densities and smoking frequency.

In another American study in Illinois (Adams et al., 2013), the relationship of the density of tobacco retailers and the illegal tobacco sales rate within school neighbourhoods with students' smoking behaviours was assessed. For this study, baseline data from an intervention study in the year 2002 were used that included nearly 10,000 middle and high school students in 24 Illinois towns. The authors hypothesised that the density of tobacco retailers and the illegal tobacco sales rate within school neighbourhoods would be related to current and lifetime smoking among students. The number of tobacco retailers in a school neighbourhood ranged from 0 to 9 outlets, while the illegal sales rate varied from 0% to 100%, with a mean of 13%. The density of tobacco retailers within a half-mile radius of the school was significantly related to the prevalence of lifetime smoking among students (OR=1.10; 95% CI: 0.999-1.20), but not to current smoking (OR=1.04; 95% CI: 0.95-1.14). The illegal tobacco sales rate was not related to current or lifetime smoking. Based on their findings, the authors concluded that density may impact smoking initiation or experimentation, but not current smoking. Neighbourhood factors may have a greater impact on youth who are not already regular smokers.

Proximity

The relationship between the proximity of POS and smoking behaviour in the adolescent population was described in three studies (Henriksen et al., 2008; Leatherdale & Strath, 2007; Mc Carthy et al., 2009). However, no evidence could be found for an association between the proximity of POS to the school and smoking-related outcomes in any of the three studies addressing this relationship.

Individual study results

McCarthy et al. (2009) used data from the 2003-2004 California Student Tobacco Survey combined with retail licensing data to study the relationship between retailer proximity and students' tobacco use. Proximity was measured as the average straight line distance from the main office of the school to each retailer within a 1-mile radius. In contrast to the results on outlet density, tobacco outlet proximity was not found to be associated with either established or experimental smoking by adolescents.

A similar study was carried out by Henriksen et al. (2008). Data from the same California Student Tobacco Survey in 2005-2006 were combined with retailer licensing data about the locations of tobacco outlets within a half-mile of the schools (as the crow flies). Two measures of proximity were computed: the presence of at least one outlet within 1000 feet of the school and the distance from each school to the nearest tobacco outlet. After adjusting for school demographics and other characteristics, no associations were found between the two proximity measures and smoking prevalence.

Lipperman-Kreda et al. (2013) also measured proximity of the school to the closest tobacco outlet 'as the crow flies' among 832 youths in 45 midsized communities in California. The results showed that distance from the school to the nearest tobacco outlet was not associated with past 30 day smoking frequency.

POS around the home or in the neighbourhood and smoking behaviour among youth

Density

The relationship between the density of POS around the home or in the neighbourhood and smoking behaviour in the adolescent population was described in six studies, all of which used a cross-sectional design (Pokorny et al., 2003; Novak et al., 2006; Adachi-Mejia et al., 2012; Lipperman-Kreda et al., 2012; Lipperman-Kreda et al., 2013 & Loomis et al., 2012). Three of the six studies showed a positive association between the density of POS around the home or in the neighbourhood and smoking behaviour.

Individual study results

Pokorny et al. (2003) investigated the relationship between individual (i.e., age, race), social (i.e., presence of tobacco users), and environmental factors (i.e., retail tobacco availability) and smoking behaviour among more than 5000 6th to 8th grade students (ages 12-14) in 11 communities in Illinois. The researchers were particularly interested in the influence of retail tobacco availability (RTA), which was measured by the number of retailers who illegally sold tobacco to youth as a function of the youth population in each community. The results showed that higher levels of RTA were related to adolescent smoking initiation (OR=1.49; P<.01), but not to continued cigarette use. Continued use was predicted by peer tobacco users (OR=2.65; 95% CI: 2.07-3.40) and living with smokers (OR=1.56; 95% CI: 1.21-2.01). The density of tobacco retailers was originally included in the model but was omitted from subsequent analyses because of a lack of major effects or interactions with smoking outcomes. The results of the study suggest that efforts to restrict RTA may help prevent youth from initiating smoking. However, other measures may be needed to prevent continued use once youth start smoking.

From 1995 to 1999, Novak et al. (2006) conducted a cross-sectional survey among 2116 respondents aged 11-23 years living in Chicago. The results of this study showed a relationship between retail outlet density and last month smoking prevalence (OR=1.21; 95% CI: 1.04-1.41). This relationship remained after controlling for confounding variables (OR=1.20; 95% CI: 1.001-1.44). The results did not differ significantly between minors and those legally permitted to smoke.

In a nationwide cross-sectional observational study among 3646 US adolescents aged 13-18 years, Adachi-Mejia et al. (2012) compared individual and community risk factors for adolescent smoking. Community outlet density was measured as the number of tobacco outlets per 1,000 people. Individual factors were, for instance, participation in a team sport, exposure to movie smoking, friends' smoking, and sensation seeking. The results showed that one-third of the participating adolescents had tried smoking. However, after controlling for individual risk factors, tobacco outlet density was not associated with having tried smoking or smoking intensity. According to the authors, the small potential effect across a broad range of tobacco outlet densities suggests that policies designed to lower outlet density would only have a small effect on adolescent smoking.

Individual risk factors seem to be more important. An important limitation of the study was that the establishments that were likely to sell tobacco products were selected from a national database. Businesses were classified according to their primary activity. Hence, there may be a possibility that misclassification of tobacco retailers occurred.

Lipperman-Kreda et al. (2012) studied the associations between tobacco outlet density (measured as the number of outlets per 10,000 population) and local tobacco policy and youth smoking in 50 midsized Californian cities. The study was conducted among 1491 youth aged 13-16, and the primary research question focused on whether local tobacco policy moderated the relationship between outlet density and youth smoking. The results showed significant effects of outlet density on smoking behaviour (lifetime and past 12 months smoking), with a higher outlet density being related to a higher prevalence of youth smoking. Local tobacco policy was not directly related to smoking behaviour. However, the analyses did show that the positive relationship between outlet density and youth smoking was stronger at the lower level of clean air policy. Based on these findings, the authors conclude that the results of the study support both controls over tobacco outlet density and local tobacco policy. The authors suggest that the combination of both policies may have the greatest impact on youth smoking.

Lipperman-Kreda et al. (2013) examined the association between tobacco outlet density within a 0.75 and 1.00 mile radius of each participant's home and cigarette smoking among 832 13-16-year-old youth in 45 midsized Californian communities. The results showed that a greater density of tobacco outlets around the home was significantly related to a higher frequency of smoking in both zones examined.

A study in New York (Loomis et al., 2012) investigated the association between the density of tobacco retailers and smoking-related attitudes and behaviour among middle and high school students. They used biennially pooled data from the New York Youth tobacco surveys from 2000 to 2008 (N=70.427) combined with lists of licensed tobacco retailers. The dependent variables were current smoking (in the past 30 days), frequent smoking (at least 20 in the past 30 days), and the number of cigarettes smoked per week among current smokers. Density was measured as the number of LTRs per 1000 youth aged 17 or younger. The results showed that the density of local tobacco retailers was associated with increased rates of self-reported exposure to point of sale advertising among all youth (OR=1.15; 95% CI: 1.02-1.30) and among non-smokers (OR=1.14; 95% CI: 1.01-1.30), but not among current smokers (OR 1.19; 95% CI: 0.80-1.77). In addition, LTR density was associated with an increased likelihood of youth thinking that smoking will make them look cool, both overall (OR=1.75; 95% CI: 1.22-2.52) and among non-smokers (OR=1.68; 95% CI: 1.11-2.55) in the rest of New York State (excluding New York City). LTR density was not associated with susceptibility to smoking, purchasing outcomes or smoking. However, there was a counterintuitive negative relationship between LTR density and frequent smoking in NYC. The authors propose that this could be due to the low prevalence of frequent smoking in NYC.

Proximity

The relationship between the proximity of POS to the home and smoking behaviour in the adolescent population was described in three studies, two of which had a cross-sectional design (Adachi-Mejia et al., 2012 & Lipperman-Kreda et al., 2013) and one of which used a prospective design (West et al., 2010). Evidence for a relationship between the proximity of POS to the home and smoking behaviour among youth was only found in the study performed by West et al. (2010).

Individual study results

In a nationwide cross-sectional observational study among 3646 US adolescents aged 13-18 years, Adachi-Mejia et al. (2012) compared individual and community risk factors for adolescent smoking (see p 66). Outlet proximity was measured as the distance to the closest tobacco outlet from the adolescent's home along the road network. After controlling for individual risk factors and tobacco outlet density, proximity to the nearest outlet was not associated with trying smoking or smoking intensity.

Lipperman-Kreda et al. (2013) examined the association between tobacco outlet proximity from the participants' school and home 'as the crow flies' and cigarette smoking among 832 13-16-year-old youth across different buffers (0.75 or 1 mile) in 45 midsized Californian communities. The results showed no association between tobacco outlet proximity to the participants' home or school and the past 30 days smoking frequency.

In a study among Latino adolescents from 7 high schools along the San-Diego-Tijuana border, West et al. (2010) examined the influence of the structural environment on alcohol and tobacco use. Baseline data from a randomised controlled trial were used for the analyses. The dependent variable was a created index reflecting lifetime use of both alcohol and tobacco. Proximity was measured as the distance from the participants' home to the nearest alcohol and tobacco retailer. The results showed that a decreased distance to the nearest retailer was related to an increased use of alcohol and tobacco (OR=0.90; 95% CI= 0.82-0.99). In addition, an interaction between parental consistency and proximity to the nearest retailer was found, with the impact of consistent parenting practices being reduced as the proximity to the nearest retailer decreased.

3.2.2 Density and proximity of points of sale and smoking behaviour in the adult population

Key findings of studies among adults

- Evidence on associations between density and proximity of tobacco points of sale and smoking (related) behaviours among adults is limited, and studies are heterogeneous with regard to design and outcome measures.
- Eight studies were found for this age group; these studies were carried out in the USA, Finland, England, and New Zealand.
- Different measures of density and/or proximity (i.e., proximity measured 'as the crow flies' or 'along the road network') were used in different studies, and the outcomes were inconsistent.
- Three of four studies suggest that the proximity (and, to a lesser extent, the density) of tobacco retailers is associated with outcomes related to smoking cessation, although the association was sometimes only found for subgroups.
- Of the other four studies, three reported positive associations between density and different smoking indicators (prevalence, no. of cigarettes per day).

Eight studies investigated the relationship between the density and/or proximity of tobacco outlets around the home or in a certain area and smoking (related) behaviour among adults. Five of these studies used a cross-sectional design (Peterson et al., 2005; Reid et al., 2005; Kirchner et al., 2013; Chuang et al., 2005 & (Pearce et al., 2009), with the remaining three being prospective studies following a cohort of adults (Halonen et al., 2013; Han et al., 2014 & Reitzel et al., 2011) (see table 3.3).

Table 3.3: Evidence on the relationship between the density/proximity of POS and smoking behaviour among adults in the available studies

Type	Study	Density	Proximity	Indicator
Cross-sectional	Peterson et al., 2005 ¹	+	x	Smoked at least 100 cigarettes and smoked cigarettes every day or some days.
	Reid et al., 2005 ¹	+	x	% smoked at least 100 cigarettes; % smoked every day or some days
	Kirchner et al., 2013	x	+	Smoking status (abstinent, lapse, relapse)
	Chuang et al., 2005	+	+	No. of cigarettes per day

	Pearce et al., 2009	x	-	Smoker: at least one cigarette per day Heavy smoker: >10 cigs per day
Cohort study	Halonen et al., 2013	+	+	% of light and moderate/heavy smokers who had quit
	Han et al., 2014	-	-	Smoking abstinence at six months
	Reitzel et al., 2011	-	+	Six months continuous smoking abstinence

+: higher density/proximity positively related to smoking

-: no relationship found between higher density/proximity and smoking

x: density/proximity not measured in the study

¹ In these studies, countries were split into two categories (high density and high smoking prevalence vs. low density and low smoking prevalence).

Density

Six studies investigated the relationship between density of POS and smoking behaviour in the adult population. Of these studies, four originated from the USA, with two publications (Peterson et al. 2005 and Reid et al. 2005) using data from the same study. The additional two studies were carried out in Finland and the UK. Three studies among adults had a prospective design, following a cohort of smokers (Halonen et al., 2013; Han et al. 2014; Reitzel et al., 2011); the remaining three studies had a cross-sectional design (Chuang et al., 2005; Peterson et al., 2005; Reid et al, 2005).

One of the cross-sectional studies (Chuang et al., 2005) found a positive relationship between the density of POS and the smoking behaviour of adults in general, while a second (prospective) study only found an effect among men who smoked heavily (Halonen et al., 2013). Two additional prospective studies among smokers during a quit attempt (Reitzel et al., 2011; Han et al., 2014) found no effect of outlet density on smoking abstinence. In these studies, the effects of outlet proximity on continuous abstinence after six months were measured.

The two remaining cross-sectional studies (Peterson et al. 2005; Reid et al, 2005) investigated the characteristics of counties with a high density of tobacco outlets and a high prevalence of smoking compared to counties with low density and low prevalence.

Three out of four studies (Kirchner et al., 2013; Reitzel et al., 2011; Halonen et al., 2013) investigating the relationship between density and/or proximity of tobacco retail outlets and smoking cessation found an effect.

Individual study results

In a study in Iowa (Peterson et al., 2005; Reid et al., 2005), data on the density of tobacco retail outlets (calculated as the number per 50 km of roadway) was combined with information from statewide telephone interviews with a random sample of 3662 Iowa residents. Counties were split into two categories based on the density of tobacco outlets and the cigarette smoking prevalence. The first (and larger) group consisted of counties with lower tobacco outlet density and cigarette smoking prevalence, while the second group had a higher outlet density and higher smoking prevalence. First, Peterson et al. (2005) showed that these two clusters of counties could be differentiated by demographic variables. They found that counties with a greater density of tobacco outlets and higher smoking prevalence tended to have a higher percentage of African Americans and (contrary to previous studies) a higher medium household income compared to counties with lower outlet density and lower smoking prevalence. As a possible explanation for the latter finding, the authors posed that Iowa was considered a low-inequality state compared to other U.S. states.

In a second study on the same data, Reid et al. (2005) examined the moderating effect of race on the geographic relationship between tobacco outlet density and smoking prevalence. Their findings corroborated the results of Peterson et al. (2005): the percentage of African Americans was a significant predictor, accounting for 28% of the variance in smoking prevalence, with outlet density accounting for an additional six percent. In addition, the interaction between the percentage of African Americans and tobacco outlet density was significant. In counties with a higher percentage of African Americans, the correlation between outlet density and smoking prevalence was stronger ($r=0.50$) compared to counties with a lower percentage of African Americans ($r=0.19$). The authors propose that initiatives decreasing the density of tobacco outlets may have a greater effect on African Americans (Reid et al., 2005). The results of both studies showed that the relationship between outlet density and smoking prevalence is higher in counties with a higher percentage of African Americans.

A study among 8121 women and men aged 25-74 in four Californian cities (Chuang et al. 2005) assessed the effects of neighbourhood level socioeconomic status and convenience store concentration on individual smoking after consideration of individual level characteristics. Convenience stores were used to measure tobacco availability, as they account for the largest proportion of tobacco sales. Data were derived from five cross-sectional surveys between 1979 and 1990. The results showed that a high density of convenience stores and lower neighbourhood SES were both related to a higher level of individual smoking.

In addition, the association between the density of POS and individual smoking was modified by SES, with high SES people having a lower individual smoking level in neighbourhoods with low density, while no SES differences were found in neighbourhoods with high density (both high levels of smoking). In neighbourhoods with a high density of convenience stores, individuals with high SES had a similar level of smoking as those with low SES. The same pattern was found when neighbourhood SES was used instead of individual SES. The authors conclude that neighbourhood influences may operate through different mechanisms for people with different socioeconomic status. The protective effects of high SES may be reduced if people live in neighbourhoods with a low SES or neighbourhoods with a high density of tobacco outlets.

Reitzel et al. (2011) followed a cohort of 414 racially/ethnically diverse adult daily smokers enrolled in a quit attempt. Their study examined the effect of outlet density on continuous smoking abstinence 6 months after the quit attempt. All analyses were controlled for demographics and tobacco-related variables, and smoking abstinence was biochemically verified. However, no effects of outlet density on smoking abstinence were found. In their conclusion, the authors note that the lack of findings on smoking abstinence do not preclude the importance of outlet density on smoking initiation or other smoking behaviours.

The study by Reitzel et al. (2011) was replicated in England by Han et al. (2014). Data were used from a cohort of 611 smokers participating in a RCT assessing the impact of nicotine replacement therapy. Participants who wanted to quit smoking were recruited from 29 general practices in two English cities. In this study, the effects of outlet density on continuous abstinence after six months were measured. At the six-month follow-up, 66 participants had quit. In line with Reitzel et al. (2011), the results showed that smoking abstinence at six months was not predicted by outlet density around the participants' homes.

A third cohort study with quitting as the outcome variable was conducted in Finland by Halonen et al. (2013). This study used data from a cohort of adults (76% women) working in the public sector and examined whether (the number of) stores within 0.5 km from the person's home was associated with smoking cessation among adult men and women. Baseline data were used from the period 1997-2005, and follow-up data were from 2008 and 2009. Forty percent of the participants quit smoking during the follow-up (a mean of 5.5 years). Density was measured as the number of stores within 0.5 km of the home (scored as zero, one, > one). The results only showed an effect among men who were moderate to heavy smokers (10 or more cigarettes per day) at the baseline. Having one versus no stores within 0.50 km of the home decreased the likelihood of smoking cessation among men who were moderate to heavy smokers (prevalence ratio of one store: 0.63, 95% CI 0.49-0.81). The association was negative, although slightly weaker, for having more than one store (vs no store) within 0.50 km of home (prevalence ratio > one store: 0.78, 0.62-0.99). No effect was found for men who were light smokers at baseline or for women.

Proximity

The relationship between the proximity of POS and smoking behaviour in the adult population is described in six publications. Of these, three originated from the USA (Kirchner et al., 2013, Chuang et al., 2005 and Reitzel et al., 2011). The additional studies were carried out in England (Han et al., 2014), Finland, (Halonen et al., 2013), and New Zealand (Pearce et al., 2009).

Three of the studies among adults followed a cohort of smokers during a quit attempt (Halonen et al., 2013; Han et al. 2014; Reitzel et al., 2011), and the remaining three studies had a cross-sectional design (Kirchner et al., 2013; Chuang et al., 2005; Pearce et al., 2009).

Positive effects between the proximity of POS and smoking-related variables were found in four of the six studies. A relationship was found between days with POS contact(s) and lapsing after a quit attempt (Kirchner et al., 2013) and between living in proximity to a convenience store and smoking more (Chuang et al., 2005; Pearce et al., 2009), although the latter study (Pearce et al., 2009)

concluded that this relationship disappeared after correction for neighbourhood factors. In addition, proximity was found to be related to smoking cessation (Halonen et al., 2013) and smoking abstinence after a quit attempt (Reitzel et al., 2011). However, the latter relationship between the proximity of POS and quitting could not be replicated in a second study (Han et al., 2014).

Individual study results

A study among 12.529 adults aged 15 years and older in New Zealand investigated whether neighbourhood access to a retail outlet selling tobacco was associated with individual smoking behaviour (Pearce et al., 2009). To establish the accessibility to outlets selling tobacco, the travel time by car from the population-weighted centroid of the neighbourhood to the nearest supermarket or convenience store was calculated. After controlling for individual-level demographic and socioeconomic variables, individuals living in the quartiles of neighbourhoods with the best access to supermarkets (OR 1.23; 95% CI= 1.06-1.42) and convenience stores (OR 1.19, 95% CI= 1.03-1.38) had higher odds of smoking compared with individuals in the worst access quartiles. However, the relationship between neighbourhood accessibility to these retail outlets and smoking disappeared once neighbourhood-level variables (deprivation and rurality) were included in the analyses. Based on their findings, the authors conclude that, once adjusted for neighbourhood deprivation, there is little evidence for an association between better locational access to tobacco retail stores and individual-level smoking behaviour in New Zealand.

Kirchner et al (2013) examined whether individuals in Washington DC who experienced an increased craving to smoke as their daily point-of-sale tobacco exposure increased would be more likely to relapse. The study was carried out among 475 smokers aged >18 years who had quit smoking for at least 24 hours. Exposure to point-of-sale tobacco retailers was measured by geolocation tracking via the participants' mobile phones. The phones recorded the location of the person every fifteen minutes over the first month of a quit attempt. This information was combined with the POS locations. On average, the participants had 2.7 contacts with a POS per day. Lapsing was more likely to occur on days with any POS contact (OR=1.19; 95% CI: 1.18-1.20), and it increased when the number of contacts with POS increased (OR=1.07; 95% CI: 1.06-1.08). Furthermore, the analyses showed that the incremental effect of another POS contact was highly significant (mean OR=1.26) and fairly stable (range 1.11-1.38). Contrary to expectation, the association between POS contacts and lapsing was especially strong in the absence of craving (OR=1.22; 95% CI: 1.20-1.23), whereas it progressively decreased by 9% when it was associated with low craving levels (OR=1.13; 95% CI: 1.12-1.14) and decreased by another 13% and to non-significance when associated with high daily craving (OR=1.0; 95% CI: 0.99-1.01). The authors concluded that, overall, daily exposure to POS was associated with lapsing when craving was low.

A study among 8121 women and men aged 25-74 in four Californian cities (Chuang et al. 2005) assessed the effects of neighbourhood-level socioeconomic status and convenience store proximity on individual smoking after consideration of individual-level characteristics. Convenience stores were used to measure tobacco availability, as they account for the largest proportion of tobacco sales. The straight line distance from the participant's home to the nearest convenience store was measured. Data were used from five cross-sectional surveys between 1979 and 1990. The results

showed a high correlation between living near a convenience store and neighbourhood SES, with a higher percentage of respondents in low SES neighbourhoods living close to a convenience store (49%) compared to respondents in high SES neighbourhoods (18%). Regression analyses showed that people living close to a convenience store smoked more than people living farther away ($b = -0.182$). The results remained the same after accounting for individual characteristics ($b = -.154$).

Reitzel et al. (2011) followed a cohort of 414 racially/ethnically diverse adult daily smokers from Houston, Texas enrolled in a quit attempt. Their study examined the effect of outlet proximity⁹ (measured at distances of 250 m and 500 m) on continuous smoking abstinence 6 months after a quit attempt. All analyses controlled for demographics and tobacco-related variables, and smoking abstinence was biochemically verified. The proximity of the participant's home to the closest tobacco outlet was a significant predictor of smoking abstinence 6 months later. This applied to both the 250 m proximity measure (OR=0.54; 95% CI=0.33-0.87) and the 500 m measure (OR=0.68; 95% CI=0.46-0.99). For an explanation of their findings, the authors refer to a large body of evidence that supports that smoking cues can provoke subjective and autonomic responses among smokers, including an increase in craving, which might increase the risk of relapse. They suggest that a single outlet in close proximity to the home might be enough to complicate quit attempts by offering easy access to cigarettes when an urge to smoke strikes. The authors suggest that zoning laws restricting POS around residential areas may be an important addition to existing regulations.

The study by Reitzel et al. (2011) was replicated in England by Han et al. (2014). Data were used from a cohort of 611 smokers participating in an RCT assessing the impact of nicotine replacement therapy. Participants were recruited from 29 general practices in two English cities. In this study, the effects of outlet proximity on continuous abstinence after six months were measured. At the six-month follow-up, 66 participants had quit. Contrary to Reitzel et al. (2011), the results showed that smoking abstinence at six months was not predicted by the proximity of residences to the closest tobacco outlet. The authors give several possible explanations for the differing results. First, the participants in the Han et al. study were recruited via general practices in which all smokers were written to, and those motivated to both stop smoking and participate in the RCT were recruited. By contrast, Reitzel et al. (2011) contacted smokers through print and radio advertisements. This might have resulted in a group with lower motivation to quit smoking, which might have made them more sensitive to tobacco retail outlets. An additional possible explanation for the different findings suggested by the authors is the lack of a licensing system or a retail register in the UK, which might have resulted in inaccuracies in mapping the retail outlets.

Another cohort study with quitting as the outcome variable was conducted in Finland by Halonen et al. (2013). This study used data from a cohort of adults (76% women) working in the public sector and examined whether the proximity to outlets stores within 0.5 km of the person's home was associated with smoking cessation among adult men and women. Baseline data were used from the period 1997-2005, and follow-up data were from 2008 and 2009. Forty percent of the participants quit smoking during the follow-up (a mean of 5.5 years). Proximity was measured both as the

⁹ Outlet proximity was measured along the road network. This is preferable to the 'as the crow flies' method, as it more accurately describes the person's travel time.

shortest travel distance along the road network and as the shortest straight-line distance (as the crow flies). A lower cessation prevalence was found (prevalence ratio: 0.73; 95% CI: 0.60-0.88) among men who were moderate to heavy smokers at baseline who lived <0.50 km walking distance from the nearest tobacco store compared to those living >0.50 km from a store. No effects were found for men who were light smokers at baseline or for women.

3.3 Subgroup differences

Several studies indicate that an association between density and/or proximity and smoking-related variables may be higher in specific subgroups, although few studies have investigated different subgroups within the same study. As described in the previous paragraphs, differences are found with regard to youth and adults. The following can be added:

- Several studies among the youth population indicate that the density of tobacco POS is mainly related to smoking initiation but not to established smoking (Chan & Leatherdale et al., 2011; Mc Carthy et al., 2009; Adams et al., 2013, Pokorny et al., 2003), while among adults, three out of four studies suggest that the *proximity* of tobacco POS is especially associated with outcomes related to smoking cessation (Kirchner et al., 2013; Halonen et al., 2013, Reitzel et al., 2011).
- There may also be an interaction with gender. One study found that susceptibility to smoking increased with an increase in the density of tobacco retailers among male, but not female, never smokers (Chan & Leatherdale, 2011).
- In addition, studies indicate that the association between density/proximity and tobacco use may be reduced by parenting practices (West et al., 2010) or local clean air policies (Lipperman-Kreda et al., 2012).
- Socioeconomic status (SES) may modify the association between density and smoking. Chuang et al. (2005) found, for instance, that in neighbourhoods with a high density of POS, both low and high SES people had high levels of smoking, while in low density neighbourhoods, only high SES people had a lower individual smoking level.

Finally, the study by Paul et al. (2010) in Australia shows that light smokers (10 or less cigarettes per day) were more likely than heavy smokers (more than 10 cigarettes daily) to reduce or cease smoking when cigarettes were not available within walking distance of their residence or usual activities. It remains to be seen, however, whether these intentions will translate into behaviour if outlet density or proximity were to be decreased.

3.4 Results from the literature on the density and proximity of alcohol points of sale

Compared to tobacco points of sale, the research regarding the relationship between the density and proximity of alcohol points of sale and alcohol use is more developed, especially regarding the use of prospective studies.

Stockwell et al. (2009) studied the impact of an *increase* in density of alcohol outlets in British Columbia on alcohol sales. The researchers concluded that there was a significant increase in per capita alcohol consumption for every 10% increase in alcohol outlet density. Similarly, Gruenewald and colleagues (1993) conducted a time series cross-sectional analysis of alcohol consumption and the density of alcohol outlets in all fifty US states. The study found that a 10% decrease in the density of outlets would reduce consumption of hard liquor by 1-3% and of wine by 4%. An additional study in New Zealand (Huckle et al., 2008) found alcohol density to be associated with quantities of alcohol consumed among teenage drinkers.

In 2009, a major review by Campbell et al. (2009) was published that led a US task force to recommend limiting the concentration of retail alcohol outlets as an important measure to curb excessive alcohol use and related harms. Importantly, the authors made a distinction between primary and secondary evidence. Primary evidence included studies comparing alcohol-related outcomes before and after a density change (that are largely missing in the tobacco literature). This category included 1) studies assessing the impact of privatising alcohol sales, commonly associated with increases in density; 2) studies assessing the impact of bans on alcohol sales, associated with decreases in density; and 3) studies on other alcohol licensing policies that directly affect outlet density. Time series analyses in which associations between changes in outlet density and alcohol-related outcomes were assessed were also included, although the cause of the observed change in density was not known. Secondary evidence included cross-sectional studies, which do not allow inference of causality.

In this review, the following conclusions were formulated:

- All five studies that assessed the association between outlet density and population-level alcohol consumption (using a time series design) found that they were positively associated, i.e., increased density was associated with increased consumption and vice versa.
- Most of the studies included in the review found that greater outlet density was associated with increased alcohol consumption and related harms.
- Four studies of national or local licensing policy changes consistently indicated that more permissive licensing increased the number of on- and off-licence alcohol outlets, which in turn led to increased alcohol consumption, most notably among heavy drinkers in two studies.
- In addition, studies of changes over time in outlet density that were not particularly linked to policies also consistently found higher density related to higher consumption.
- The number of studies investigating the effects of reduced outlet density or a ban on sales was very limited. Insofar as studies were available, the outcomes were highly dependent on whether communities were isolated. In isolated communities (e.g., in Alaska), alcohol-

related harms were reduced, and in less isolated communities the evidence was mixed, with some studies showing an increase in harms (e.g., traffic accidents) due to increased travelling to areas where alcohol was available.

Based on the evidence in the Campbell review, the independent, non-federal Task Force on Community Preventive Services found sufficient evidence of a positive association between outlet density and excessive alcohol consumption and related harms to recommend limiting alcohol outlet density through the use of regulatory authority (such as licensing and zoning) as a means of reducing or controlling excessive alcohol consumption and related harms (Jernigan et al., 2013). In addition, the WHO identified restricting retailer density as an effective method to reduce alcohol consumption and alcohol-related harms (WHO, 2013; see also chapter 2).

An important difference regarding the effects of tobacco density and proximity in comparison with similar measures regarding alcohol is that the negative consequences of tobacco use are mainly limited to tobacco users themselves, except for the effects of environmental tobacco smoke. And the effects of environmental smoke are also ameliorated when there are widespread smoking bans within a society. In the case of alcohol, both the level of consumption and additional effects that involve (innocent) bystanders (e.g., traffic accidents, injuries, violence) are also related to the use of alcohol. These outcomes are not relevant for the evidence base associated with reducing the density and/or proximity of tobacco POS.

3.5 Discussion and conclusion

We will first examine the weight of the evidence and the methodological quality of the studies with regard to the core research question, i.e., the effects of a restriction of tobacco points of sale or retail outlets on smoking behaviour.

Research design

The primary aim of this systematic review was to assess the research evidence related to the question of whether a reduction in the density and/or proximity of tobacco points of sale will reduce tobacco use in the population. As noted in the methods section, questions on the effect of this type of 'real world' intervention generally do not allow straightforward answers.

The number of studies, and therefore the level of evidence, on the relationship between density and proximity of POS and smoking behaviours is fairly limited, especially among adults (eight studies). Moreover, studies on the relationship between density and/or proximity of tobacco points of sale and smoking behaviours have mainly applied a cross-sectional design. In fact, among the youth population, this was the only design used. Three adult studies employed a longitudinal design, but only the outcome variables (quitting levels) were measured repeatedly. The longitudinal designs did not extend to measuring the effects of changes in density and/or proximity of tobacco outlets over time on changes in smoking behaviour.

As explained above, based on the results of these types of studies alone, it cannot be established whether a higher density or closer proximity of tobacco points of sale causes an increase in smoking (related) indicators or the other way around, or if the relationship is bidirectional. However, in a prospective study, Doubeni et al. (2008) observed that in youth who had never smoked cigarettes, perceived availability predicted future smoking. This would suggest that the density of tobacco points of sale is likely to influence smoking behaviour among youth.

Based on these findings, it seems likely that at least part of the association found in cross-sectional studies reflects a causal effect of density and/or proximity of tobacco points of sale on smoking (related) behaviour. In other words, it seems unlikely that this association could be fully explained by an increase in smoking prevalence leading to a higher density of tobacco POS.

Because conclusions had to be based mainly on cross-sectional studies, it is essential that these studies are controlled for a variety of community factors that may confound the relationship between retailer density or proximity and tobacco use (Novak et al., 2006). This has been done to different degrees in the different studies. One cross-sectional study among adolescents (Adachi-Mejia et al., 2012) established that after including a broad range of individual risk factors, community risk factors were not related to smoking. This may suggest that the influence of community factors on the smoking behaviour of adolescents may be less than several other studies suggest. Further studies on this topic seem warranted, and it is recommended that in these studies a wide range of possible individual risk factors are included.

Overall, we must conclude that, at this point in time, the evidence for a reduction of tobacco POS leading to a lower smoking prevalence or incidence is still relatively weak. At present, the evidence is mainly based on cross-sectional studies (especially among adolescents), in addition to a few prospective cohort studies. No studies were found for either youth or adults in which changes in proximity or density of tobacco points of sale were related to changes in smoking behaviour.

Consistency

The results of the studies in the systematic review were not highly consistent, with some studies finding a relationship between density and/or proximity of tobacco points of sale and certain types of smoking (related) outcomes, while other studies did not. Most consistent were findings on outlet density around schools and youth smoking indicators.

The studies were performed using a variety of designs and with diverse samples (youth, adults, smokers, (attempting) quitters). None of the studies were conducted in the Netherlands. The majority of studies were performed in the USA (N=15), with two studies originating from Canada, two from Australia/New Zealand, and two from Europe.

Plausibility

Given the possible mechanisms underlying an association between tobacco outlet density and smoking indicators (e.g., cue exposure, reduced accessibility), an effect of reducing tobacco outlet density would be likely (although unintended consequences, possibly counteracting any positive

effect, have not been investigated). Moreover, the parallel with alcohol shows that there may be more ground for expecting effects from a reduction of tobacco outlet density, although the evidence base with high quality studies for alcohol is also limited.

In conclusion

The main question discussed in this chapter is whether a reduction in density and/or proximity of tobacco points of sale is likely to lead to a reduction in smoking behaviour in the population. This study showed that there are various mechanisms that make such an effect likely, and comparisons with research on alcohol outlet density support a confirmative conclusion, although the evidence in this field is not strong regarding a reduction of outlets. Moreover, there are indications from cross-sectional studies suggesting associations between tobacco outlet density/proximity in the neighbourhood of schools and smoking experimentation or incidence. So far, in the absence of evidence from studies among youth or adults in which changes in proximity or density of tobacco points of sale are investigated in relation to smoking behaviour (or any other design evaluating the impact of restrictions), the overall evidence supporting a reduction in POS is indicative rather than conclusive.

Taking these limitations into account, the results suggest that the greatest influence of the density/proximity of tobacco POS may be on adolescents who are not yet addicted but are willing to smoke opportunistically. The present results also suggest that for youth, *density* may be more relevant than proximity. This may imply that it is not the mere presence of a tobacco retailer near a school that influences students to experiment with smoking but rather the *number* of tobacco retailers (McCarthy et al., 2009). In addition to increasing access, this higher density may increase the level of exposure to smoking cues and possibly thereby promote smoking initiation. It is also suggested that a higher density of retailers around the school increases youth exposure to smoking models (i.e., those purchasing cigarettes, people smoking on the route to school), thus increasing their perceptions of tobacco's acceptability (Adams et al., 2013). Finally, a greater number of outlets might influence impulse buying by adolescents, possibly influenced by exposure to advertising in the tobacco POS around the school (Adams et al., 2013). Future studies should examine the effect of changes in outlet density over time to better understand these relationships.

In addition, there are indications that smoking cessation-related outcomes are associated with density/proximity. Whether these findings also imply that a *reduction* of outlets positively affects these behaviours remains to be seen, as no study thus far had addressed this research question.

There remain further questions regarding to what extent outlet density should be reduced before intended and unintended effects are 'best balanced' and whether reductions in certain types of outlets are more effective compared to others. For example, the market share of tobacco sales through vending machines is fairly small, so the impact on the availability of tobacco products induced by banning vending machines is minimal. However, their wide distribution and visibility may have effects on 'normalising' tobacco use.

Whether tobacco outlet density should be restricted may thus also depend on other aspects, for example, whether the wide availability of a substance that is seen as very harmful is compatible with health messages.

To create a stronger evidence base for changes in policies regarding the density and/or proximity of points of sale, more studies are required, preferably those that link changes in outlet density to smoking behaviour. For example, by using an interrupted time series design (or experiments) to examine the effects of changes in outlet density and proximity on smoking behaviour, the temporal relationship between density and/or proximity of points of sale could be clarified. However, these studies may be difficult to realise. The case of Hungary would have been an ideal situation for evaluating the impact of a rather large reduction in the number of points of sale. However, the other tobacco control measures implemented within the same time period make isolation of the effects of a reduction of POS on smoking behaviour a challenging endeavour.

Chapter 4 Facilitators and barriers to implementing policies restricting tobacco points of sale

Various factors may facilitate or hamper the implementation of policies aimed at a reduction of tobacco points of sale. We will address the following issues: public opinion and support for limiting tobacco sales (§4.1), unintended consequences for purchasing behaviour and the market (§4.2) and expected economic consequences (§4.3). Note that data on the actual (unintended) consequences of limiting tobacco retail outlet density are scarce due to a lack of research in this field.

4.1 Public opinion and support

Studies abroad and in the Netherlands show that there is (increasing) public support for restricting sales of tobacco, although there are differences according to the type of location and smoking status (e.g., Farley et al., 2014; Hayes et al., 2014; TNS NIPO/KWF, 2014).

In the Netherlands, opinions on tobacco control measures among members of the general population have been surveyed annually since 2009, except for 2010 (TNS NIPO/KWF, 2014).

- Table 4.1 shows that most support is found for a ban on the sale of tobacco at sports locations (71%) and in drug stores (63%), which may seem logical given the incompatible 'health messages' at these locations and smoking. The proportions of adults in favour of these measures increased between 2009 and 2014.
- Over four out of ten adults (44%) report being in favour of a ban in pubs, bars and restaurants.
- Only one in five adults support a ban on the sale of tobacco products in convenience stores.
- For all locations, the proportion of current smokers in favour of a sales ban was appreciably lower compared to both ex-smokers and never smokers. For example, for grocery stores, the respective proportions were 40% (ex-smokers), 36% (never smokers) and 11% (current smokers).

Table 4.1: Proportion of the general population (≥ 18 years) in the Netherlands in favour of prohibiting the sale of tobacco products (by location)

	2009	2011	2012	2013	2014
Grocery stores	25%	29%	28%	32%	31%
Cafeteria at sports locations	60%	61%	65%	68%	71%
Drug store	53%	53%	58%	61%	63%
Convenience stores	16%	19%	17%	21%	19%
Gas stations	19%	21%	20%	24%	24%
Music festivals				35%	38%
Pubs/bars/restaurants		40%	39%	42%	44%

Source: THS NIPO 2014 (commissioned by the National Cancer Foundation/KWF)

Table 4.2 shows that banning tobacco sales altogether is supported by only 14% of adults, but this proportion has significantly increased since 2009 (8%).

- Almost half the population would support a ban on selling tobacco products within 250 metres from primary and secondary schools.
- A ban on tobacco vending machines is supported by approximately one-third of the respondents, and this proportion has increased. Nonetheless, as shown in §2.5.1, according to the EC Special Eurobarometer survey in 2012, public support for this measure in the Dutch population is lowest among all EU countries.

Table 4.2: Proportion of the general population (≥ 18 years) in the Netherlands agreeing with specific measures related to the sale of tobacco products

	2009	2011	2012	2013	2014
POS >250 metres from primary school	43%	44%	45%	46%	47%
POS >250 metres from secondary school	42%	44%	45%	45%	47%
Sale only by tobacconist	36%	40%	44%	46%	46%
Ban on vending machines	21%	27%	29%	32%	32%
Total ban on sale	8%	11%	11%	14%	14%

Source: THS NIPO 2014 (commissioned by the National Cancer Foundation/KWF)

In their study on public support for limiting tobacco retail in New Zealand, Whyte et al. (2014) conclude that "Tobacco's wide availability supports its status as a ubiquitous and normalised product and is inconsistent with public opinion, which strongly supports additional restrictions on tobacco retail marketing. Policy makers have a clear mandate to introduce new measures that

would afford greater protection to young people and provide stronger support to smokers wishing to quit”.

Retailers and the tobacco industry

Proposals for reforming tobacco supply and the retail system aiming at reducing the availability of tobacco products may expect opposition from the tobacco industry and retail organisations, which is obviously linked to the foreseen economic consequences (e.g., Tilson, 2011; Wilson et al., 2013; Laugesen, 2010).

A qualitative small-scale study in 2013 by the Alliance Smoke Free Holland of headquarters and retail managers of drug stores, grocery stores, and convenience shops/newsstands suggests that most retailers have no fundamental or ethical problems selling tobacco and do not feel motivated to stop tobacco sales. If, however, legislation would restrict tobacco sales to specialised tobacco shops, they would of course respect the law. However, tobacco is seen as regular part of their assortment, and some of the interviewees strongly object to limiting sale to tobacconists. Missed revenue is the main reason underlying these objections, not only because of lost tobacco sales but also sales of other products customers may buy when visiting these specialised shops (e.g., books, newspapers). Including tobacco products in their assortment is also important to providing services and convenience to customers.

Tilson (2011) describes the case of the City of Buffalo (New York), where legislation had been developed that uses licensing as an instrument to decrease the number of businesses selling tobacco products and to eliminate tobacco sales from health- and education-oriented institutions. Noteworthy is the fact that rather than charging retailers for obtaining a license, tobacco manufacturers would be required to pay a substantial fee for each brand and sub-brand sold in the city (\$1,000, ≈ €721). This might have ‘softened’ the opposition of the retail sector and increased public support because local business owners are not targeted (Tilson, 2011). Nonetheless, although the proposal was supported by national health groups and the city council, it has ‘stalled’ due to concerns about (expensive) legal challenges by the tobacco industry.

In a discussion of the ‘endgame’ (or sinking lid) strategy, Wilson et al. (2013) report that the major disadvantage of the sinking lid strategy in democratic countries is most likely that it requires strong political leadership and public support to pass the necessary law. While an endgame and sink lid strategy is more drastic than a gradual reduction of points of sale, which may increase thresholds for purchasing but not fully eliminate tobacco products from society, it seems reasonable to assume that the requirements for both tobacco control strategies may show similarities.

4.2 Untended consequences: possible shift in purchasing behaviour and the market

According to Laugesen (2010), the decreased supply of tobacco products as a standalone policy implies unmet demand (scarcity) and risk of a black market, which can, however, be minimised by companion policies that lower demand in tandem.

It is, however, questionable whether a reduction of retail outlets, and especially a gradual reduction, actually reduces availability or instead enhances the concentration of sales within the remaining retail outlets.

When a shift towards other sources of tobacco reaches one hundred percent, the impact of a measure restricting the number of outlets would not be very effective (unless, for example, it limits smoking cues and prevents smoking uptake). A survey in New South Wales, Australia among current smokers suggested that if density or proximity were to decrease, many would change their purchasing behaviour, and light smokers may reduce or cease smoking (Paul et al., 2010). More specifically, 54% indicated that they would change their shopping patterns, such as buying in bulk or less often, traveling just to buy cigarettes or changing where they shop. Eight percent reported that they would try to quit, and 20% reported that they would cut down. The remainder reported no expected change, that they would look for alternative sources or that they did not know what they would do. Moreover, those smoking less than 10 cigarettes per day, compared to heavier smokers, reported being more likely to quit or cut down due to reduced availability. Given the addictiveness of nicotine, such an 'effect' is not unexpected. Whether these intentions will actually translate into behaviour remains to be investigated.

Additionally, a German study (Schneider et al., 2009) on a reduction in the number of tobacco vending machines after the implementation of electronic age locks suggests that reducing accessibility may, in the short term, cause a shift towards other sources of supply, which is compatible with the broader literature on the effects of increasing the legal age when enforcement is insufficient (DiFranza, 2012). However, reducing the number of outlets is not necessarily similar to making sales illegal (as is the case with implementing age limits), except for a ban on sales in specific locations (e.g., health or governmental institutes) or distribution channels (vending machines).

So far, no studies have examined *reductions* in outlet density along with smoking and purchasing behaviour to investigate whether major shifts in the market occur.

4.3 Economic consequences

A restriction of the number of points of sale may have economic consequences in the short or long term.

To our knowledge, no studies have been performed on this topic abroad, except for a German study analysing the reduction in sales through vending machines, which could be attributed to a variety of tobacco control measures (see §2.5). In this study, it was shown that the decrease in

sales through indoor vending machines, most likely associated with the implementation of a state smoking ban, was rather modest (-15%). Any adverse consequences for revenues and profits for the hospitality industry may, therefore, have been rather limited. Moreover, non-smokers may have increased attendance at these localities, compensating (at least) in part for any losses incurred from smokers (Kvasnicka, 2010). Note, however, that tobacco control policies in Germany did not 'deliberately' target a reduction in vending machines or impose a ban. Additionally, in England, an impact assessment was made of the implementation of the ban on tobacco sales from vending machines (see chapter 2.5).

A detailed economic analysis of the expected costs and benefits of a reduction of tobacco points of sale in the Netherlands has been made by SEO Economic research, in parallel with the current research project (Gerritsen et al., 2014).

Chapter 5 Policies on the display of tobacco products at points of sale

In this chapter, we will present an overview of current policies in several countries that have planned or implemented policies on point of sale tobacco product displays (POS-D)(§5.1). In §5.2, we take a detailed look at policies in five European countries that have recently implemented a display ban: Norway, Ireland, Finland, the United Kingdom (England, Scotland) and Hungary.

5.1 Introduction

Restrictions on tobacco promotion are generally considered a key strategy to reduce smoking in the population (WHO, 2003). In line with the World Health Organisation Framework Convention on Tobacco Control (FCTC, article 13), an increasing number of countries, including the Netherlands, have implemented comprehensive restrictions on the advertising of tobacco products (WHO database). These restrictions typically include bans on tobacco promotion through radio, television, billboards, print forms of marketing, and sponsorships (WHO database). However, very few countries have banned the display of tobacco products at the point of sale. As a result, tobacco displays, also called 'power walls', have become one of the major channels for the tobacco industry to market their products (Cohen et al., 2008; Harper, 2006; Lavak and Toth, 2006), and the involvement of tobacco companies in providing and monitoring retail displays appears to be extensive (Carter, 2003; Feighery et al., 2003; Rooke et al., 2010).

According to the tobacco industry, POS displays are primarily aimed at informing current smokers about alternative brands of cigarettes and not on recruiting new smokers or increasing consumption (Wakefield and Germain, 2006; Pollay et al., 2007). However, the results of several studies suggest that exposure to tobacco displays has an impact on smoking behaviour, including an increased risk of smoking initiation among young people (Paynter et al., 2009; Henriksen et al., 2010; Johns et al., 2013). These possible effects on smoking behaviour have motivated a number of countries to implement restrictions on the display of tobacco products. There is no 'universal' tobacco display ban; regulations differ considerably across countries. Some countries have implemented a comprehensive ban where all tobacco products must be stored from view of the customers, while other countries have only regulated that the display is not allowed to be visible from outside the store or have set limitations to the size of the tobacco display. Implementation processes differ as well, with some governments having phased in their display ban, applying it first to larger retailers and subsequently to smaller retailers. Furthermore, in some countries the display ban applies to all points of sale, while others provide an exception for tobacco specialist shops. To date, twelve countries (sometimes only part of the country, in certain jurisdictions) have implemented some sort of restriction on the display of tobacco products. Iceland was the first country to adopt a display ban in August 2001, and Ireland was the first country in the European Union to do so (July 2009). All Canadian provinces and territories have implemented a display ban, beginning with Manitoba (January 2004) and followed by Nunavut Territories (February 2004), Saskatchewan (January 2005), Northwest Territories (January 2007) and Nova Scotia (March

2007). Others followed, until the last one (Newfoundland) implemented the ban in January 2010. Thailand's display ban took effect in September 2005, Ireland's in July 2009, Norway's in January 2010, Finland's in January 2012 and New Zealand's in July 2012. In Australia, nationwide implementation of the display ban took place over a period of several years (December 2009-January 2012), starting with the Australian Capital Territory. In the United Kingdom, a difference was made between small and large shops. In England, the display ban for large shops (a shop with a floor area exceeding 280 square metres) took effect in April 2012, in Northern Ireland in October 2012, in Wales in December 2012 and in Scotland in April 2013. For small shops, the display ban is scheduled to take effect in all four countries in April 2015. In the meantime, a display ban took effect in Hungary in July 2013 and in Croatia in 2013 (see also table 5.1).

Table 5.1: Implementation of Tobacco Products Display Ban

Country	Date of implementation	Characteristics	Source
Norway	1 JAN 2010	The tobacco products must be hidden from consumers at the POS, but it is not stated in detail how this should be done. Most retailers use closed cabinets/cupboards. There are detailed requirements on the design of the pricelist: neutral lists with black writing on white paper, no illustrations, pictures, colours, trademarks etc. Only one list per pay desk. There may not be any information outside the POS, and inside only the pricelist may be shown at the pay desk. There is a ban on self-service of tobacco, so tobacco is always placed behind the pay desk. Tobacco specialist shops are exempt inside the shop, but exhibited tobacco products should not be visible from the outside (through windows etc.)	Scheffels 2013; Questionnaire (H. Wilson)
Ireland	1 JUL 2009	Section 33A of the Public Health (Tobacco) Acts, 2002 (as amended), prohibits all advertising of tobacco products in retail premises in which tobacco products are sold. All tobacco products must be kept out of view in a closed container or dispenser only accessible by the retailer and retail staff. A study assessing the level of compliance after the removal of POS displays in Ireland has shown there was high compliance with the law (McNeill et al 2011)	http://www.ntco.ie/rq-ban-on-point-of-sale-advert.asp Institute for global tobacco control, 2013
Finland	1 JAN 2012	Tobacco Act Section 8 a (20.8.2010/698) Display of tobacco products and their trademarks in retail sale facilities for tobacco products is forbidden. This does not apply to a sales point mainly selling tobacco products and smoking accessories that is provided with a separate entrance and whose tobacco products cannot be seen by the public from outside the sales point.	Ministry of Social Affairs and Health; Questionnaire (M. Paavola)

		<p>Furthermore, the regulations do not apply to the sales of tobacco products on board a vessel used in international maritime traffic.</p> <p>The retailer of tobacco products may show purchasers of tobacco products at their request a printed catalogue presenting packs of the tobacco products on sale in the retail sale facilities. At the purchaser's request, the retailer may also supply to the purchaser a printed list of the tobacco products and their prices.</p>	
Canada	<p>1 Jan 2004 Manitoba (first province/territory)</p> <p>1 Jan 2010 Newfoundland and Labrador (last province/territory)</p>	<p>The Tobacco Act prohibits the sale of tobacco products by means of a display that allows customers to handle the product before paying for it. However, duty-free shop retailers are exempt from this self-service display prohibition. Other types of visual display, e.g., behind the counter, are allowed. All provinces and territories have legislation banning retail displays, with some but not all provinces and territories providing exemptions for tobacconists (as defined in each sub-national law) and for duty-free stores. A minority of provinces/territories provide an exemption for retail outlets where minors are not permitted.</p>	<p>http://www.tobaccocontrol.laws.org/legislation/compare/advertising/45</p>
Iceland	1 JAN 2001	<p>Iceland was the first country to ban retail displays of tobacco products in 2001. Iceland's Tobacco Control Act states that "Tobacco and tobacco trademarks shall be placed at points of sale such that they are not visible to the customer".</p> <p>The typical solution in Iceland is for tobacco products to be kept in drawers under the counter, but Icelandic retailers have been able to choose the compliance that suits their business best.</p> <p>The law prohibits the display and visibility of tobacco products at retail points of sale. However, the law provides an exemption for specialist tobacco shops, which may display tobacco products in such a way that they are visible inside the shop but not from outside the shop.</p>	<p>http://www.tobaccocontrol.laws.org/legislation/country/iceland/aps-regulated-forms</p> <p>http://www.globalcstorefocus.com/0911/tobacco.html</p>
England	<p>6 APR 2012</p> <p>6 APR 2015</p>	<p>The Tobacco and Advertising and Promotion Act 2002 (as amended by the Health Act 2009, section 21) imposes a prohibition on the display of tobacco products at the point of sale (passed under the previous Labour government). The regulations were due to enter into force on 6 April 2012 for large shops (with a relevant floor area exceeding 280 square metres) and on 6 April 2015 for small shops and all other businesses selling tobacco to the public such as in the hospitality sector.</p> <p>The legislation creates a general prohibition of the public display of tobacco products and then further provides exemptions from this general prohibition. The exemptions provide that a maximum size of product display of 1.5 square metres is allowed when serving customers and carrying out</p>	<p>Questionnaire (F. Mente and A. Sandford)</p>

		<p>other specific tasks such as restocking or repairing the tobacco display unit. Displays must only last as long as is necessary to complete the activity.</p> <p>The legislation does not prescribe the manner in which tobacco products must be hidden from public view; the legislation does not include wording such as, "under the counter" or "closed case or container". The legislation also makes it illegal to display the prices of tobacco products except in the plain, unbranded formats set out in the new law.</p>	
Scotland	29 APR 2013 6 APR 2015	Retailers who wish to sell tobacco products must be registered on the Scottish Tobacco Retailer Register, which is held by the Scottish Government and which became operational on 1 April 2011. From 29 April 2013, the new legislation on tobacco products and prices will affect large shops (including bulk tobacconists) selling tobacco products. All other premises and businesses selling tobacco products will be affected as of 6 April 2015. After these dates, it will be illegal to display tobacco products and smoking-related products in the relevant premises in Scotland, except in the limited circumstances set out in the new legislation. It will also be illegal to display the prices of tobacco products and smoking-related products in the relevant premises in Scotland, except in the formats set out in the new legislation.	http://www.scotland.gov.uk/Resource/0041/00412868.pdf
Croatia	2013	The 2008 Act on Restriction of the Use of Tobacco Products prohibited all direct and indirect advertising of tobacco products associated with their sponsorship of events with the aim/effect/the possible effect of direct and indirect advertising or use of tobacco products, while advertising of tobacco products through trademarks/tobacco characters that do not cite any tobacco product/its package/its use on smoking accessories and in business premises with a total area up to 7 m ² was allowed. The 2013 amendment of the Act further restricted advertising at the point of sale by adding the text: "Displaying individual packs of cigarettes and other tobacco products in visible locations at points of sale of any type whatsoever where tobacco products are sold is also considered as direct advertising of tobacco products".	http://www.worldservicesgroup.com/publications.asp?action=article&artid=5848
Hungary	1 JULY 2013	The outside of the vendor may not display any visual image or text that refers to tobacco products or smoking. Tobacco stores possess a uniform look by requirement. The tobacco store is required to display an "18 sign" indicating that people under 18 years of age are forbidden to enter the store.	Questionnaire Ms. Z. Cselkó
Australia	1 January 2009 Australian Capital	Point of sale advertising is prohibited. Displays bans have been introduced in states and territories at different dates. Restrictions vary by state but may include no more than one packet of each product line, only one display area per store,	http://www.tobaccoinaustralia.org.au/chapter-11-

	<p>Territory (first state/territory)</p> <p>1 January 2012 South Australia (last state/territory)</p>	<p>and the area of the display cannot exceed 4 square metres and must be 2 metres from children's products. No lights or accents are allowed as part of display, the display must be behind the counter, not on it, and the display of graphic warning signs is required. Specialised tobacconists are exempted from a display ban in Western Australia (until 31 December 2014), Tasmania, and Victoria. In Victoria, after 1 April 2014, a person will not be able to apply to have a premise certified as a specialist tobacconist, which means that from this date, a person will not be able to apply to obtain the tobacco product display exemption for their premises.</p>	<p>advertising/1-4-state-and-territory-legislation</p>
<p>New Zealand</p>	<p>23 JUL 2012</p>	<p>Any display of a retail or trading name that contains words, phrases, trademarks or company names that have the effect of advertising the availability of tobacco products is prohibited as of 23 July 2012. Tobacco price notices can no longer be openly displayed. Information that does no more than identify what tobacco products are available and their price can be provided (printed, written or in spoken words) to a person over the age of 18 upon request. Tobacco sellers are able to display a sign inside their place of business that indicates that tobacco products are available for sale and their location in the store. This sign may be subject to future regulation that could prescribe, among other things, the size, colour and font allowable. Any other references to tobacco or smoking will be deemed advertisements and will be prohibited unless they are permitted or required by any subsequent regulations. The current 'SMOKING KILLS' and 'No Sales to Under 18s' signs will become tobacco product advertisements after 23 July 2012.</p>	<p>Ministry of Health, 2012</p>
<p>Thailand</p>	<p>2005</p>	<p>The display of cigarette logos at points of sale is prohibited. The display of tobacco products at the point of sale is prohibited except at duty free shops for persons leaving Thailand. For several years, youth in Thailand have performed public demonstrations against convenience stores' resistance to the Ministry of Health's restrictions on tobacco point of sale advertising in 2005.</p>	<p>Institute for global tobacco control, 2013</p>

5.2 Tobacco display regulations in five European countries

In this paragraph, we provide a more detailed description of the regulations and (experiences with) the preparation, evaluation, policy and implementation process in five European countries that have recently implemented a tobacco display ban: Norway, Ireland, Finland, the United Kingdom (England and Scotland – this report does not include separate accounts of tobacco display legislation in Wales or Northern Ireland, both of which follow the English model) and Hungary. This description is based on a consultation of experts in the respective countries (see chapter 1) and several sources on the Internet (e.g., WHO database). These experts were questioned regarding the state of the policy process, the type of regulations it concerns, expectations and main reasons for the regulations, support or resistance among different stakeholder groups, and the availability of evaluative studies (published or in preparation).

Ireland

Regulations

On 1 July 2009, Ireland removed point-of-sale tobacco advertising and displays through further provisions of its Public Health (Tobacco) Acts (2002 to 2009). It became the first country in the European Union to do so. No advertising or display of tobacco products is permitted in retail premises that sell tobacco products. Retailers must ensure that their tobacco products are stored out of view within a closed container or dispenser only accessible by the retailer and retail staff. The retailer may use a pictorial list (in accordance with Regulations) to inform a member of the public aged 18 years and older who intends to purchase a tobacco product as to the products that are available. Vending machines were also prohibited except in licensed premises and registered clubs. All persons selling tobacco products by retail had to register with the Office of Tobacco Control, later called the National Tobacco Control Office (see also chapter 2).

Preparation and implementation

Tobacco displays are considered a type of advertisement, and the location of the prominent tobacco displays in retail outlets in itself is expected to play a role in promoting tobacco consumption, especially among young people (<http://www.ntco.ie/rg-background.asp>). The stated aim of the ban on advertising at the point of sale is to protect the public from exposure to advertising that serves to normalise tobacco products, particularly among young people. Removing advertising is also expected to support adults who are trying to quit. The tobacco industry instituted proceedings in the High Court in late 2009 challenging the provisions relating to the point of sale advertising ban, the closed container requirement and the display ban, all of which were introduced in July 2009.

Evaluation

In 2011, two evaluative studies were published on the implementation of a display ban in Ireland. Quinn et al (2011) investigated the short-term economic impact on sales using time series regression analyses controlling for seasonality, trading day and cyclical variation and secular trends in the data. The results showed no short-term impact (1 year post ban) on retail sales of cigarette packs (Quinn et al., 2011). Furthermore, there was no impact on retail closures. The authors conclude that *'impact on sales will likely take effect over a much longer period, allowing retailers to adapt over time'* (Quinn et al., 2011).

A study assessing the level of compliance following the implementation has shown that there was a high compliance with the law (McNeill et al., 2011, see also §7.4). Recall of displays decreased significantly among adults (49% to 22%) and teenagers (80% to 22%) post-legislation. The proportion of adults supporting a ban on POS-D increased significantly from 58% 3 months before the ban to 66% in the 7 months after implementation of the ban. Support was slightly greater among non-smokers than smokers. The proportion of adult smokers who thought a ban on POS-D would make it easier to quit smoking decreased slightly from 20% 3 months before the ban to 14% in the 7 months after implementation of the ban. Among youth, the percentage of teenagers thinking that they or children of their age would be successful in buying tobacco decreased from 32% pre-ban to 25% post-ban, but this decrease was not statistically significant. The proportion thinking that more than 20% of children their age smoked (overestimation) decreased significantly from 62% pre-ban to 45% post-ban. Based on the latter findings, the authors suggest that the law helped de-normalise smoking (McNeill et al., 2011). There were no significant short-term changes in the prevalence of smoking among youths or adults. The authors note that their findings should be seen as preliminary because of the very short follow-up period and small sample size, particularly in the youth study (McNeill et al., 2011).

Norway

Regulations

Since 2010, a ban on POS displays has been in effect. The visual display of tobacco products and smoking accessories at points of sale is prohibited. The shops can decide how to do this, but most use closed cabinets/cupboards. The prohibition does not apply to tobacconist shops; however, there are only a few in Norway (estimated at <20, excluding 7 tax-free airport shops). The law states that tobacconist shops are exempt for *'setting up of tobacco products and smoking accessories inside tobacconist shops insofar as such positioning is appropriate to rational trading. This exemption does not apply to equipment for positioning products which, by reason of its size or design, will have an advertising effect'*. There are detailed requirements on the design of the pricelist, such as neutral lists with black writing on white paper, no illustrations, pictures, colours, or trademarks. There may not be any information outside the POS, and inside, only the pricelist may be displayed at the pay desk. There is a ban on self-service of tobacco, so tobacco is always placed behind the pay desk.

Preparation and implementation process

As part of the preparation for a proposal for a ban on visible displays, in 2007, The Norwegian Ministry of Health and Care Services commissioned SIRUS (the Norwegian Institute for Alcohol and Drug Research) to investigate the research base for such a regulation. SIRUS was asked to prepare 1) an updated summary of knowledge about the effects of advertising and advertising bans, including the importance of advertising for tobacco consumption and 2) identify any evaluations of the effectiveness of a ban on the visible display of tobacco products. This resulted in the report 'Knowledge basis for the proposal of a ban on visible display of tobacco products' (Lund and Rise, 2008). The main conclusions of this report were that tobacco product displays can be considered to influence buying behaviour along the same dimensions as ordinary advertising. It is, however, difficult to determine whether the strength of the influence on buying behaviour is greater or weaker than ordinary advertising and to what extent the health warnings on the packs modify the advertising effect of the packaging (Lund and Rise, 2008). Their overall evaluation was that *'results from the advertising effect research, psychological theories about consumer behaviour, an investigation into tobacco displays and impulse buying, research by the tobacco industry into packet design and the opposition from the industry against the proposal to ban visible displays of tobacco products indicate that the measure may be effective'* (Lund and Rise, 2008).

In April 2009, the Norwegian Parliament passed legislation to extend the prohibition on advertising to include displays of tobacco products and smoking equipment as of 1 January 2010.

On 9 March 2010, Philip Morris Norge AS, filed a lawsuit against the Norwegian state, claiming that the display ban was in breach of the EEA (Agreement of the European Economic Areas) and arguing that the display ban does not have a documented effect. In connection with this, SIRUS was asked to provide an update of the Lund and Rise (2008) report, which was published on 20 December in 2010 (Lund et al., 2010), and a second update followed on 1 March 2012 (Kvaavik, 2012). The main conclusions of both reports were as follows:

- (1) A display ban is expected to affect the behaviour of youth in the form of the number of users and/or the total consumption in this group, but the scope of the effect is difficult to estimate. Furthermore, it is reasonable to assume that this affect will only be visible after some time (years).
- (2) A display ban can be expected to influence individuals who have quit or are considering quitting smoking. However, it will be difficult to establish the precise magnitude of the effect.
- (3) A display ban can be expected to have a long-term impact on the number of tobacco users and/or total tobacco consumption. This will most likely be mediated by a reduced recruitment of new smokers, fewer relapses among former smokers, a further denormalisation of tobacco products and smoking.

On 14 September 2012, the Oslo District Court decided on the case of Philip Morris Norway AS versus The Norwegian Government. The Norwegian Government won the case, and the display ban remained in force.

Evaluation

At the time of writing of this report, one evaluative study was published in a peer-reviewed journal (Scheffels and Lavik, 2013; for a detailed description, see §6.2.2). In short, the study assessed retailer compliance immediately following the ban and consumer perceptions shortly before and after the ban (up to 11 months). The results showed that retailer compliance was high (97%). The ban was well supported among non-users (70%) and occasional smokers (50%), but support was somewhat low among daily smokers (30%). Interviews with focus groups showed that a majority of the respondents believed in and supported the ban as a means of preventing smoking initiation and contributing to the denormalisation of tobacco (Scheffels and Lavik, 2013).

Furthermore, on 20 March, 2012, a report was published that aimed to assess the effect of the display ban on the sale of cigarettes to consumers and sales on the retail segment (Melberg, 2012). According to one of the Norwegian experts, a paper on these data is being prepared and is intended to be published (Melberg, 'Does point of sale display bans reduce tobacco sales?'). The Melberg (2012) report was prepared at the request of the Ministry of Health and Care services. The Ministry further asked for comments on other reports and papers on the effect of the display ban. The analyses of sales to the retail segment were based on data from January 1994 to December 2011. Sales to consumers were based on data that were collected every four weeks between January 2008 and December 2011. The uncontrolled figures showed a significantly greater decline in 2010 and 2011 of sale of cigarettes to the retail segment and a distinct decrease in sales to consumers in 2010 (4%) and 2011 (5%) compared to the previous years. However, as noted by Melberg (2012), before concluding that the display ban had an effect, one must control for price changes and other trends that may have affected the sales. These analyses indicated that the ban had a significant effect on the sales to the retail segment between 1994 and 2011 (while taking price changes and seasonal effects into account). The analyses on the sale to consumers between 2008 and 2011 showed no significant effect of the ban when price changes, general trends, and seasonal effects were taken into account. However, it should be noted that the observation period of sales to consumers was only 1 year after the ban, which seems too short to expect to see an effect of the display ban (Melberg, 2012). Melberg (2012) concludes that, based on statistical analyses alone, it cannot be concluded with a high degree of certainty whether the display ban had an effect because there is not enough information in the data. However, the analysis with the highest number of observations (sale to the retail segment) indicates that the display ban is likely to have been effective.

Finland

Regulations

According to the Finnish Tobacco Act, Section 8 a (20.8.2010/698), the display of tobacco products and their trademarks in retail sale facilities for tobacco products is forbidden. This display ban came into force in January 2012. The display ban does not apply to a sales point mainly selling tobacco products and smoking accessories that has a separate entrance and ensures that tobacco products

cannot be seen by the public from outside the point of sale. Additionally, the ban does not apply to the sales of tobacco products on board a vessel used in international maritime traffic. The retailer of tobacco products may show purchasers of tobacco products, at their request, a printed catalogue presenting packs of the tobacco products on sale in the retail facility. At the purchaser's request, the retailer may also supply to the purchaser a printed list of the tobacco products and their prices.

Preparation and implementation process

The main reason for implementing a display ban was the need to reduce the smoking prevalence in the population, especially among adolescents. According to the Finnish expert, prior to implementation and immediately after, there were several discussions in the media on the display ban. Furthermore, there was resistance from some organisations (e.g., the Finnish Grocery Trade Association). Shortly after implementation, discussions stopped and the ban appeared to be generally accepted. In Finland, there were no legal challenges related to the introduction of the tobacco products display ban.

Evaluation

At the time of writing of this report, no studies had been published. The results of the Adolescent Health and Lifestyle Survey of 2013 suggested that the exposure of adolescents to tobacco products decreased after the introduction of the display ban. For example, the percentage of adolescents who had seen tobacco products in shops declined from 87% in 2011 to 65% in 2013 (Ministry of Social Affairs and Health).

England

Regulations

The Tobacco and Advertising and Promotion Act of 2002 (as amended by the Health Act of 2009, section 21) prohibits the display of tobacco products at the point of sale. This means that shops are required to cover up tobacco products (Conway, 2012). Retailers are free to do this as they deem fit, provided they comply with the regulations.

The regulations were due to enter into force in October 2011 for large shops and in October 2013 for small shops (a large shop is a shop which has a relevant floor area exceeding 280 square metres). However, after a change of government in May 2010, the Coalition government published a new Tobacco Control Plan on 9 March 2011 with a revised timetable giving smaller shops more time to implement the regulations (by April 2012 for large shops and April 2015 for small shops). The Coalition Government also reviewed the detailed provisions of the legislation and amended it to make it less burdensome on retailers. This was achieved in two ways: by enlarging the size of the tobacco display allowed when serving customers and by adding to the list of other circumstances in

which such displays can legally be made (e.g., stocktaking, refurbishing). The Tobacco Advertising and Promotion (Display) (England) Regulations of 2010 (as amended by the Tobacco Advertising and Promotion (Display and Specialist Tobacconists)(England)(Amendment) Regulations of 2012) allow for the practicalities of shops implementing the prohibition of tobacco displays. Most importantly, the regulations allow retailers to show a limited-size display (max. 1.5 square metres) on request when selling a tobacco product to a customer aged 18 or over. Where appropriate, age checks must be carried out before any tobacco product is shown to a customer who asks to buy tobacco or asks for information about a tobacco product.

Tobacco control legislation treats specialist tobacconists differently from other tobacco retailers. If they fall within the definition in the 2002 Act, the Tobacco Advertising and Promotion (Specialist Tobacconists) (England) Regulations of 2010 allow them to advertise and display tobacco products inside their shops, provided neither are visible from outside the shop. A shop is qualified as a specialist tobacco shop if 50% of their sales are from specialist tobacco products (not cigarettes or hand rolling tobacco). In 2010, it was estimated that approximately 45 shops met these criteria (Conway, 2012). The regulations come into force on 6 April 2015. The stated reason for the exemption of specialist shops is the specialist nature of their trade: (a) there are very few shops, and (b) very few children enter these shops. Specialist tobacco shops are not a significant source of tobacco for those under 18 years or a significant influence on those trying to quit smoking (Conway, 2012).

Preparation and implementation process

The stated aim of the regulations on tobacco display is to reduce smoking uptake among children and to support smokers who want to quit. The objective of amending the regulations in 2010 was to make the legislation more practical for shopkeepers to comply with in the day-to-day running of their business. The additional two years to comply with the regulations for small shops was consistent with other Government policies regarding burdens on small businesses and is intended to give these shops the opportunity to minimise the impact on their business and to benefit from the experiences and shopfitting solutions developed for large stores. According to the consulted expert, a report commissioned by Cancer Research UK and published in August 2008 was a key document in the UK's plans for the tobacco display regulations (Hastings et al. (2008), 'Point of Sale Display of Tobacco Products')¹⁰. The main recommendations of the report were as follows: *'Tobacco products should be put completely out of sight at point of sale. There is ample and rigorous evidence that this will a) protect children from tobacco promotion and reduce recruitment to smoking, and b) help current smokers to cut down and quit'*. Furthermore, *'controls must be comprehensive and tightly defined. It is now firmly established that any dubiety or loopholes will be ruthlessly exploited by the tobacco industry'* (Hastings et al., 2008). An Impact Assessment on the

¹⁰ http://www.cancerresearchuk.org/prod_consump/groups/cr_common/@nre/@pol/documents/generalcontent/crukmig_1000ast-3338.pdf

Prohibition of Display of Tobacco Products at the Point of Sale in England (2011) indicated that the positive effects on public health of the regulations far outweigh the cost to the business.

Evaluation

The Government of England has a legal duty to evaluate the effect of the tobacco display legislation by April 2020 so that a decision can be made as to whether the legislation should continue in place, be revoked, or continue to be effected in an amended form. Spanopoulos et al. (2014) conducted a study 1 year prior to the implementation of the display restrictions for large shops. They found that POS display exposure and awareness among 11-15-year-olds was associated with smoking susceptibility. This association was predominantly due to exposure in small shops. Based on this finding, the authors expect that the prohibition of displays in large shops is likely to have a somewhat lesser impact on adolescent smoking behaviour than the small shop prohibition scheduled for April 2015 (Spanopoulos et al., 2014). The authors therefore recommend a one-off comprehensive tobacco display ban approach for other countries (Spanopoulos et al., 2014).

Scotland

Regulations

Proposals for restrictions on tobacco displays similar to those in England were passed in Scotland as part of the Tobacco and Primary Medical Services (Scotland) Act 2010. There are a few differences with England. The size of each temporary display allowed must not exceed 1000 square centimetres (compared to 1.5 square metres in England). It will also be illegal to display the prices of tobacco products and smoking-related products in the relevant premises in Scotland, except in the formats set out in the new legislation (e.g., the general requirements for all tobacco price lists and labels are black Helvetica or Arial font (bold or plain) in the same size throughout the text on a white background). The aim of the specific and detailed requirements is to ensure that price lists and labels cannot be exploited as forms of tobacco promotion. These rules are the same as those in place in England, Wales and Northern Ireland. However, Scottish retailers remain bound by the requirements of the Price Marking Order of 2004, which sets out requirements as to how the price of a product has to be indicated (i.e., unambiguous, easily identifiable, clearly legible and given in proximity of the product).

In Scotland, the display ban in large shops came into force on 29 April 2013. For small shops, the display ban will take effect on 6 April 2015 (the same date as in England, Wales and Northern Ireland). In Scotland, retailers who wish to sell tobacco products must be registered on the Scottish Tobacco Retailer Register, which is held by the Scottish Government and which became operational on 1 April 2011.

Preparation and implementation process

Implementation was delayed due to a legal challenge by the tobacco industry (Imperial Tobacco), which was subsequently rejected by the Scottish High court in February 2012. The statement of the judge on the proposed display regulations was that '*such display is conceived to encourage the purchase of such products. As the consumption, particularly by smoking, of such products is believed to be adverse to health, the section is designed to inhibit, without prohibiting, their purchase*'.

Evaluation

We did not identify any published studies evaluating the (effects of) the implementation of the display regulations for large shops on April 2013. The consulted experts did not report any studies in preparation.

Hungary

Regulations

In Hungary, Act CXXXIV on reducing smoking prevalence among young people and the retail of tobacco products was adopted by the Hungarian Parliament on 11 September 2012. Included in the Act is a display ban indicating that no display of any visual image or text that refers to tobacco products or smoking may be visible from the outside of the vendor. Tobacco stores are obliged to possess a uniform look. The tobacco store is required to display an "18 sign", indicating that people under 18 years of age are forbidden to enter the store. The regulations came into force on 1 July 2013. The regulations apply to all tobacco stores, which are the only points of sale of tobacco products in Hungary.

Preparation and implementation process

The primary reasons for regulating the display of tobacco products on the outside of tobacco stores and forbidding those under 18 years of age to enter such stores was to control young people's access to tobacco products and to consequently minimise smoking prevalence among the Hungarian youth, thereby improving society's public health status in the medium and long term. Civil society organisations and professionals supported the decision making process. However, the professional groups did not show specific interest in this element, as it was an integral part of the new regulations.

Evaluation

We did not identify any published studies evaluating the (effects of) the implementation of the display ban in Hungary. The consulted experts also reported that this type of study is not available.

Chapter 6 Findings of a systematic review of research on (restrictions of) the display of tobacco products at points of sale

In this chapter, we will review the evidence from studies on the effects of a POS display (ban) on smoking-related variables. In §6.1, we will first discuss suggested mechanisms to explain the (possible) relationship between POS-D and smoking (related) indicators. In the next paragraph (§6.2), we will describe the findings of the systematic review of studies on the impact of POS-D on smoking behaviour and other related indicators. Findings are presented for four types of indicators: smoking behaviour (smoking status, frequency, initiation, susceptibility, quit attempts and relapse) (§6.2.1), purchase behaviour of tobacco products (§6.2.2), and smoking perceptions (§6.2.3). When relevant, sub-group differences will be reported within these sections. In §6.3, we will discuss the results of the systematic review and refer to other research findings on this topic.

6.1 What mechanisms are suggested to explain the relationship between the display of tobacco products and smoking-related variables?

Key findings

Exposure to points of sale displays may influence smoking behaviour by

- functioning as a type of advertisement by making smoking attractive, especially for youth;
- providing visual cues that may elicit cravings among smokers and those trying to quit;
- normalise smoking by influencing smoking perceptions.

There are three pathways by which POS-D can potentially influence smoking levels in the population: POS-D may stimulate non-smokers (particularly young people) to take up smoking, POS-D may increase levels of smoking among established smokers, and POS-D may complicate quit attempts. The literature suggests several mechanisms that could theoretically explain the effects of POS-D on smoking behaviour. First, tobacco displays function as advertising to increase sales. Lovato et al. (2011) defined advertising as the use of media to create positive imagery or positive product associations or to connect the product with desirable traits, activities or outcomes. According to several studies, internal tobacco industry documents suggest that tobacco displays are intended as such by the tobacco industry (Harper, 2006; Pollay, 2007). Studies have demonstrated that young people in particular find tobacco advertisement, including tobacco displays, attractive (MacKintosh et al., 2012, Lam et al., 1998). Displays also appear to be effective in promoting cigarette brands to young people (Spanopoulos et al., 2014).

A second mechanism is the possible normalising effect of tobacco displays on smoking. Tobacco displays are not only found in tobacco specialist stores but also in, for example, convenience

stores, supermarkets, and retail outlets that are also frequently visited by young children and adolescents. The presence of tobacco products in these stores alongside stamps, milk, and magazines may suggest that tobacco is an ordinary product and is therefore socially acceptable, thus creating a sense of familiarity (Wakefield et al., 2006). This may result in an underestimation of the health consequences of smoking and an overestimation of the prevalence of smoking, and it may suggest that tobacco is easy to access, which in turn may increase the risk of taking up smoking (Lee et al., 2004; Paynter et al., 2009; Wakefield et al., 2006).

A third suggested mechanism is that tobacco displays provide visual smoking cues that can elicit strong feelings of craving and emotional and physical reactions in smokers or those who have quit smoking (Carter and Tiffany, 1999; Carter et al., 2006; Hoek et al., 2010). These visual smoking cues may therefore complicate quit attempts and stimulate unplanned purchases of tobacco by established smokers, which in turn may increase smoking levels.

6.2 Findings of a systematic review

Characteristics of the studies

We identified 19 unique studies investigating the relationship between POS-D and one or more smoking-related indicators (see Chapter 1 for a description of the search strategy). Of these 19 studies, 10 examined the relationship between POS-D and smoking behaviour, nine examined (unplanned) purchases of tobacco and/or ease of access of tobacco, four investigated quit attempts and relapse, and two assessed smoking-related perceptions among youth.

Three studies used a prospective cohort design (Germain et al., 2010; Henriksen et al., 2010; Li et al., 2013), and ten were cross-sectional. One study combined a prospective cohort with a repeated cross-sectional design (McNeill et al., 2011), and another study used a repeated cross-sectional design (Scheffels and Lavik, 2013). Furthermore, three studies were experimental (Kim et al., 2013, 2014; Wakefield et al., 2006), and one was a qualitative study (Hoek et al., 2010). The studies were performed in the USA (N=7), Australia (N=5), Europe (N=4), and New Zealand (N=2). One study reported a multi-country cohort survey that included data from Australia, Canada, the USA and the UK. The 19 studies were almost evenly distributed among adults (N=8) and youth (N=9), with two studies focusing on both youth and adults. All studies in the adult population included smokers or ex-smokers only, while studies among youth mainly included both smokers and non-smokers.

Table 6.1: Studies evaluating the relationship between POS-D and smoking (related) indicators

Author/year	Country	Population	Design	Outcomes
Burton et al., 2011	Australia	Adult	Population-based diary survey	Exposure Smoking status Smoking frequency Tobacco purchases
Carter et al., 2009	Australia	Adult	Cross-sectional	Unplanned purchases, Brand switching Support for POS-D ban
Clattenburg et al., 2013	USA	Adult	Cross-sectional (immediate post-cigarette purchase survey)	Unplanned purchases Opinions on POS-D effects (e.g., on quit attempts)
Germain et al., 2010	Australia	Adult	Prospective cohort	Quitting Quit attempts
Henriksen et al., 2004	USA	Youth	Cross-sectional	Smoking status
Henriksen et al., 2010	USA	Youth	Prospective cohort	Smoking initiation
Hoek et al., 2010	New Zealand	Adult	Qualitative study	Perceptions on the effects of POS-D on quitting, impulse purchases, smoking initiation
Johns et al., 2013	USA	Youth	Cross-sectional	Smoking initiation
Kim et al., 2013	USA	Youth	Virtual Store Experiment	Awareness Ease of access Purchase attempts
Kim et al., 2014	USA	Adult	Virtual Store Experiment	Perceptions and awareness Urge to smoke Purchase attempts
Li et al., 2013	Australia, Canada, UK, USA	Adult	Prospective cohort	Exposure Impulse purchasing

Mackintosh et al., 2012	United Kingdom	Youth	Cross-sectional	Susceptibility to smoking
McNeill et al., 2011	Ireland	13 years and older	Prospective cohort (13-15-year-olds) Repeated cross-sectional (15 years and older)	Support POS-D ban Recall of displays Perception of effects on quit attempts Changes in prevalence
Paynter et al., 2009	New Zealand	Youth (14-15 years old)	Cross-sectional	Susceptibility Experimenting Current smoking
Scheffels & Lavik, 2013	Norway	15-54-year-olds	Repeated cross-sectional web-survey (pre-post POS-D ban)	Store compliance Perceptions of effect on smoking (related) indicators Support for the ban
Spanopoulos et al., 2014	England	Youth	Cross-sectional	Susceptibility to smoking Smoking status
Thomson et al., 2004	USA	Youth	Cross-sectional	Perceived access Purchase attempts Smoking prevalence (ever and current)
Wakefield et al., 2006	Australia	Youth	Experiment	Perceptions on ease of access, Recall of brands Smoking intentions
Wakefield et al., 2007	Australia	Adult	Cross-sectional	Impulse purchases

In the next paragraphs, we will describe the results of these studies in more detail for each of the main smoking indicators in the selected studies, including smoking behaviour (smoking status/frequency, susceptibility, initiation, quit attempts and relapse) (§6.2.1), tobacco product purchase behaviour (§6.2.2), and smoking-related attitudes and beliefs (§6.2.3). In paragraph 6.3, we will summarise the main conclusions of the studies and discuss their limitations.

6.2.1 Point-of-sale tobacco displays and smoking behaviour

Key findings of studies on smoking behaviour (excl. initiation & cessation)

- Ten studies were performed: seven in adults, two in youth and one in both youth and adult populations. The studies were performed in the USA, New Zealand, Australia, England, and Ireland.
- Eight out of ten studies had a cross-sectional design; of the remaining two, one was experimental and one was a diary study.
- The studies consistently indicate that exposure to POS-D is positively associated with smoking behaviour (increased likelihood of being a smoker (4 out of 5 studies), smoking more cigarettes (1 out of 1 study), urges to smoke (1 out of 1 study), and being susceptible to smoking (3 out of 3 studies).
- Removing POS-D does not appear to have a short term impact on smoking prevalence among youth and adults (1 out of 1 study)
- Three studies were unable to assess the unique influence of tobacco displays, as other types of advertising were also present.

Ten studies investigated the relationship between POS-D and smoking behaviour. Of these studies, seven were performed among adults, two studies were performed among youth and one study was performed among both youth and adults. Eight studies investigated the relationship between POS-D and smoking status, frequency, urges to smoke, and/or susceptibility to smoking, and two studies examined smoking initiation among youth.

Smoking status, smoking frequency, urges to smoke and smoking susceptibility

In summary, three cross-sectional school surveys (Henriksen et al., 2004; Paynter et al., 2009; Spanopoulos et al., 2014) and one population-based diary survey among adults (Burton et al., 2011) examined the associations between exposure to POS-D and smoking status. One cross-sectional household survey examined the associations between smoking status and community youth access ordinances, including a display ban (Thomson et al., 2004). All studies, except for Thomson et al. (2004), found that a higher exposure to POS-D was associated with an increased likelihood of having smoked or being a current smoker. One study (Burton et al., 2011) examined the association with smoking frequency among adult smokers and found that exposure to POS-D increased the number of cigarettes smoked. One virtual store experimental study found that, compared to open displays, enclosed displays significantly lowered current smokers' and recent quitters' urges to smoke (Kim et al., 2014). Two cross-sectional school surveys (Paynter et al., 2009; Spanopoulos et al., 2014) and one cross-sectional in-home survey (MacKintosh et al., 2012) studied the relationship between exposure to POS-D and susceptibility to smoking (defined as the absence of a firm decision not to smoke and measured in a similar way across the three studies). All three studies found that a higher exposure to POS-D was associated with an increased likelihood

of being susceptible to smoking among youth. McNeill et al. (2011) evaluated the removal of point of sale tobacco displays in Ireland and found no significant short-term effects on smoking prevalence among adults and youths.

A limitation of most studies is the cross-sectional design. Therefore, it is unclear to what extent the results reflect a causal relationship between exposure to POS-D and smoking outcomes.

Furthermore, three studies (Henriksen et al., 2004, 2010; Johns et al., 2013) were unable to assess the relative importance of tobacco pack displays and other POS advertising on smoking behaviour as, at the time of data collection, regulations in the USA allowed both tobacco pack displays and other types of POS advertising. McNeill et al. (2011) prospectively investigated the impact of a display ban on smoking prevalence, but the follow up period was short and the sample size was small, particularly in the youth survey.

Individual study results

Burton et al (2011) used a population based diary survey among 998 Australian smokers and 111 attempting quitters to assess the impact of POS-D on tobacco purchases and actual smoking behaviour. Respondents were asked to record a number of measures for each hour they were awake over a 4-day period (e.g., whether they saw cigarettes for sale, purchased cigarettes, or smoked cigarettes and if so, how many). The results showed a high pervasiveness of tobacco advertising: in 42.6% of the 4-hour time-periods spent outside their homes, respondents reported having seen cigarettes for sale. Respondents who saw cigarettes for sale were more likely to have smoked during that 4-hour interval (OR=1.45; 95% CI: 1.36-1.55) and to have smoked more cigarettes (OR=1.21; 95% CI: 1.16-1.26). In these analyses, smokers who also bought cigarettes in that 4-hour period were excluded to control for the fact that heavier smokers are more likely to buy cigarettes and, therefore, to see cigarettes for sale. As noted by the authors, this is a conservative analysis, as it excludes any increase in smoking resulting from impulse purchases (Burton et al., 2011).

Thomson et al. (2004) investigated the associations between the implementation of six community level youth access regulations in 314 Massachusetts towns and tobacco use (ever smoking and past 30-days smoking) among 3,831 adolescents. Towns differed with respect to the type and number of implemented regulations. Regulations included licenses for vendors, fines for sales to minors, a ban or restrictions on vending machines, a ban on free samples, a ban on the sale of single cigarettes and a ban on free-standing displays. The ban on free-standing displays was the least likely to be adopted (9%) and was not associated with tobacco use, nor were any of the other regulations.

Henriksen et al. (2004) investigated the association between exposure to tobacco marketing in stores and self-reported smoking status (ever smoked: yes/no) among 2125 middle school students in California. Exposure to tobacco marketing was assessed by questions about visits to 12 popular destinations in the school neighbourhood for purchasing snacks that also sold tobacco products (students were shown photographs and addresses of these destinations) and by questions on visits to any convenience, liquor, or small grocery stores in the past month. While adjusting for

several potentially confounding factors, including exposure to other types of tobacco marketing and family and peer smoking. Weekly or more frequent exposure to retail tobacco marketing was associated with a 50% increase in the odds of ever smoking (OR=1.5, 95% CI: 1.1-2.1).

A New-Zealand cross-sectional school survey among 14-15-year-olds (N=27,757) examined the association between exposure to POS-D and three smoking indicators (susceptibility to smoking, experimenting with smoking and current smoking) (Paynter et al., 2009). Restrictions on POS-D included a maximum of 100 packs per point of sale, no tobacco products within 1 m of children's products, and tobacco products not visible from outside the store. Exposure to POS-D was based on a question regarding the frequency of store visits (corner shops, petrol stations, supermarkets) and, for each store type, how often they noticed tobacco. Susceptibility to smoking was defined as absence of a firm decision not to smoke and was based on three questions about the likelihood that they would 1) be smoking at age 18, 2) smoke a cigarette during the next year, 3) smoke if a friend offered them a cigarette. Never smokers were defined as susceptible to smoking when their response to any of the items was anything other than 'definitely not'.

The results showed that a greater frequency of store visits or noticing of displayed cigarettes was associated with an increased risk of being susceptible to smoking (e.g., daily visits versus less than weekly: OR=1.8, 95% CI: 1.6-2.2) and experimenting with smoking (e.g., daily visits versus less than weekly: OR=2.7, 95% CI: 2.4-3.1). The results related to current smoking were similar, for example, those who reported noticing cigarettes every time during a store visit were much more likely to be a current smoker compared to those who never noticed cigarettes (OR=3.5, 95% CI: 2.8-4.4).

In a cross sectional in-home survey among 11-16-year-old never smokers (N=946), MacKintosh et al (2012) investigated the association between noticing and attraction to tobacco displays and susceptibility to smoking. Noticing displays was assessed by asking whether respondents had seen cigarette packs displayed, including on shelves or on the counter in the last month (yes/no). Attraction to displays was calculated as a composite score of 5 items (how often do you pay attention to POS-D; what do you think about the way cigarettes are displayed) and 4 semantic scales (attractive/unattractive, eye catching/not eye catching, colourful/not colourful, tidy/untidy). The results showed that 27% of the never-smokers were susceptible to smoking and 81% had noticed cigarette displays in shops (at least once in the last month). Furthermore, 17% of the non-smokers sometimes or (very) often paid close attention to POS-D. More than a quarter (27%) considered displays eye-catching, and 13% considered them attractive. Noticing displays and being more attracted to displays were both positively associated with susceptibility to smoking (OR=1.77, $p<.05$; OR=1.07, $p<0.001$).

Kim et al. (2014) tested the impact of banning tobacco displays and posting graphic health warning signs at the point of sale on urges to smoke (and purchase attempts, see 6.2.2). A total of 1216 adult current smokers and recent quitters were randomised to one of 6 conditions (3x2 design with 3 display conditions (open, enclosed, enclosed with pro-tobacco ads) and 2 variations of health warning signs (present or absent). All conditions had tobacco advertisements posted throughout the store. Participants were asked to complete a shopping task in the virtual store. Immediately after, they were asked to rate their urge to smoke on a scale of 1 to 100. The results showed that

when health signs were not present, the average urge to smoke was significantly lower in the enclosed-display condition (with and without ads) compared to the open-display condition. When the health sign was present, the average urge to smoke was significantly lower in the enclosed-display with ads condition versus the open-display condition. Somewhat unexpectedly, no significant differences were found for the enclosed no ads condition. The results did not show a significant main effect for warning signs or an interaction between the enclosed display and the warning sign. The authors conclude 'if virtual store experiments translate to real-world experiences, then our results suggest that policymakers should prioritise enclosing tobacco displays rather than mandating signs at the POS'.

Spanopoulos et al. (2014) conducted a cross-sectional school survey among 11-15-year-old students in England. The aim of the study was to assess the association between POS-D exposure and smoking outcomes (ever smoking and susceptibility to smoking). The data were collected in March 2011, 1 year before POS-D were prohibited in larger shops. Of the 5376 students in the survey, 18% were ever-smokers, and of the never-smokers, 27% were susceptible to smoking. The analyses showed that a higher frequency of visiting stores displaying cigarettes was associated with an increased likelihood of ever-smoking and susceptibility to smoking. The frequency of noticing displays was positively associated with susceptibility to smoking but not to ever-smoking. Additional analyses, by store type (small or large) showed that frequency of visiting was significantly associated with smoking susceptibility in small but not in large shops.

McNeill et al. (2011) evaluated the short-term effects of the removal of point of sale tobacco displays in Ireland among adults and youths. Interrupted time series analysis was used to analyse data of an omnibus telephone survey collecting data among over 1000 adults each month. A comparison of the trend data in the 84 months before legislation with data of the 12 months after legislation did not indicate that the removal of POS-D altered the level or trend in smoking prevalence (McNeill et al., 2011). The impact on youth smoking prevalence was investigated in a cohort of 180 13-15-years olds who were interviewed (face-to-face, in-home) just before (June 2009) and immediately after (August 2009) the implementation of the ban. The authors note that their findings should be viewed as preliminary, as, especially in the youth study, the follow-up period was very short and the sample size was small.

Smoking initiation

Key findings of studies on smoking initiation

- Two school surveys, one prospective and one cross-sectional, examined the relationship between exposure to retail advertising (including POS-D) and smoking initiation
- Both studies (2 out of 2) showed that a higher exposure to retail advertising was associated with an increased risk of smoking initiation among youth
- The results of the prospective study indicated that this effect was retained up to at least 30 months of follow-up.
- Both studies were unable to assess the unique influence of tobacco displays, as other types of POS advertising were also present.

Two school surveys, one prospective (Henriksen et al., 2010) and one cross-sectional (Johns et al, 2013), examined the relationship between exposure to retail advertising (including POS-D) and smoking initiation. Both studies found that a higher exposure to retail advertising was associated with an increased risk of smoking initiation among youth. The prospective study showed that this effect was retained at 12 and 30 months follow-up. A limitation of both studies was that the unique influence of product displays could not be distinguished from the influence of other types of advertising at the point of sale.

Individual study results

A longitudinal school-based survey among 1681 adolescents (11-14 years) in the USA investigated the relationship between exposure to retail tobacco advertising (including POS-D) and smoking initiation (Henriksen et al., 2010). The study used three measures of exposure to retail tobacco advertising: (1) frequency of visiting shops that typically contain the most cigarette advertising, (2) a combined measure using the frequency of shop visits near school and the quantity of advertising and shelf space for cigarettes in those stores, and (3) perceived exposure. Follow-up surveys at 12 months and 30 months after baseline showed that both weekly shopping frequency and cigarette brand impressions were associated with an increased risk of smoking initiation at 12 and 30 months (while controlling for a large number of potential confounders). For example, the odds of initiation at 12 months follow-up for those with a high shopping frequency (2 or more visits/week) were more than twice as high compared with those observed for students reporting the lowest frequency of shopping (<0.5 visits/week) (OR=2.58, 95% CI: 1.68-3.97). At 30 months, the association was less strong but still significant (OR=1.42, 95% CI: 1.19-1.69). The cigarette brand impression measure showed similar results, while the measure on perceived exposure only showed a small increase in the odds of initiation at 30 months in the highest exposure group (OR=1.11, 95% CI: 1.02-1.22). Based on their findings, the authors conclude that *perceived exposure* appears to measure a different construct than the other exposure measures. These findings

suggest that studies using perceived exposure as the only measure may have underestimated the impact of POS-D on smoking behaviour.

Johns et al. (2013) studied the relationship between exposure to tobacco retail outlets and smoking initiation in a cross-sectional school survey among New York City adolescents. Exposure to tobacco retail outlets was measured by asking students how often per week they shopped at several types of shops likely to sell tobacco products (e.g., pharmacies, delis). Smoking initiation was 12% and was defined as first time smoking in the past year. Multivariate analyses controlling for a range of confounding factors showed that the odds of initiation were significantly higher among those exposed to tobacco outlets at least twice a week compared with those exposed less (OR=1.41; 95% CI: 1.08-1.84). Those who visited outlets 7 times or more a week had a predicted 16% probability of initiating smoking versus 8% among those who generally never visit these outlets.

Quit attempts and relapse

Key findings of studies on quit attempts and relapse

- Four studies, all among adult smokers and using a variety of designs (1 prospective cohort study), investigated the relationship between POS-D and quitting
- Sensitivity to POS-D appeared to lower the likelihood of successful quit attempts in the future (1 out of 1 study)
- Exposure to POS-D seems to make it more difficult to quit smoking (3 out of 3 studies).
- The latter three studies all had a cross-sectional design and were based on self-reported perceptions on the difficulty of quitting.

Four studies examined POS-D in relation to quit attempts and relapse. All studies were performed among adult smokers. Each of these studies used a different design, including a prospective cohort study (Germain et al., 2010), an immediate post-cigarette purchase survey (Clattenburg et al., 2013), a longitudinal monthly omnibus telephone survey (McNeill et al., 2011), and a qualitative study (Hoek et al., 2010). The results from the prospective cohort study showed that a higher sensitivity to POS-D was associated with a lower likelihood of having quit smoking at follow-up (Germain et al., 2009). The other three studies concluded that exposure to POS-D makes it more difficult to quit smoking. However, these studies were all based on self-reported perceptions.

Individual study results

An Australian study (Germain et al., 2010) used a prospective cohort design to assess whether sensitivity to point of sale (POS) cigarette displays influenced quitting behaviour among smokers (81% daily smokers). POS display sensitivity was assessed retrospectively and was based on three questions on the frequency of 'noticing displays', 'impulse purchasing behaviour', and 'deciding on brand based on POS-D'. Based on their scores, smokers were categorised as either, low, medium,

or highly sensitive to POS-D. At an 18-month follow-up, 17% were no longer smokers. Compared to those with a low sensitivity to POS-D, those with a medium (OR=0.32, 95% CI: 0.14-0.74) or high sensitivity to POS-D (OR=0.27, 95% CI: 0.08-0.91) were significantly less likely to have quit at follow-up.

The results of an immediate post-cigarette purchase survey (Clattenburg et al., 2013, see also §6.2.2) showed that 31.2% of the participants agreed that advertising at the POS (including displays) makes it more difficult to quit smoking. Those who had an intention to quit within the next month (OR=13.0, 95% CI: 5.7-29.6) and those who made 3 or more quit attempts in the past year (OR=18.7, 95% CI: 8.4-42.0) were most likely to agree.

McNeill et al. (2011) studied the short-term impact of the implementation of the POS-D ban in Ireland in July 2009. Monthly telephone surveys among approximately 1000 adults showed that the recall of displays decreased significantly after the ban (49% in April-June 2009 versus 22% in Jul-Dec 2009, $p < 0.001$). The proportion of adult smokers who thought that removal of POS-D would make it easier to quit decreased slightly (from 20% pre-implementation to 14% post-implementation, $p < 0.001$).

Hoek et al. (2010) performed a qualitative study to assess whether and how retail displays affect smokers, particularly recent (attempting) quitters. In-depth interviews among 20 New Zealand adults who had attempted to quit smoking in the previous 6 months indicated that POS-D were highly noticed, stimulated a desire and elicited emotional and physical responses. Most participants were in favour of a ban on POS-D, as they found that these displays made it more difficult to quit and that a ban would protect children from taking up smoking. The authors concluded that POS-D remind (attempting) quitters of familiar behaviours and their benefits, which makes it more difficult to quit and to prevent relapse.

6.2.2 Point-of-sale tobacco displays and (unplanned) purchases of tobacco and perceived ease of access to tobacco

Key findings of studies on (unplanned) purchases and perceived ease of access to tobacco

- Nine studies investigated the relationship between POS-D and (unplanned) purchases of tobacco using a variety of designs, including two experimental studies.
- All but two studies were performed in an adult population.
- Exposure to POS-D was associated with a higher likelihood of making a tobacco purchase (attempt) (4 out of 5 studies).
- Exposure to POS-D seems to be associated with an increased likelihood of making an unplanned purchase (4 out of 4 studies).
- Younger smokers (~<30 years) seemed more susceptible to POS-D than older smokers (4 studies)
- It is unclear how exposure to POS-D influences perceived ease of access to tobacco (3 studies among youth). Two studies found that those exposed to POS-D thought it was more difficult to purchase cigarettes, and one study found the opposite.

Nine studies investigated the impact of POS-D on (unplanned) purchases of tobacco and/or perceived ease of access to tobacco products. Eight studies reported on (unplanned) purchases, and three studies (also) reported on perceived ease of access to tobacco.

(Unplanned) purchases of tobacco

The nine studies on (unplanned) purchases of tobacco used a variety of designs, including web-surveys (Scheffels and Lavik, 2013) an immediate post-cigarette purchase survey (Carter et al., 2009; Clattenburg et al., 2013), a telephone survey (Li et al., 2013; Thomson et al., 2004; Wakefield et al., 2007), a population-based diary survey (Burton et al., 2011), and an experimental study (Kim et al., 2013, 2014). Seven studies were performed on adults, and two were performed on youth populations (Thomson et al., 2004; Kim et al., 2013).

The results of the three studies indicated that exposure to POS-D increases the likelihood of making an actual tobacco purchase (Burton et al., 2011) or a purchase attempt (Kim et al., 2013, 2014). One study (Thomson et al., 2004) among youth found no indications for a relationship between tobacco displays and purchase attempts. The results of the five studies on unplanned purchases all suggested that (a higher) exposure to POS-D was associated with an increased likelihood of making an unplanned purchase. The results of four studies appear to suggest that younger smokers (~<30 years) may be more susceptible to POS-D than older smokers, i.e., they seemed more likely to make an unplanned purchase (Carter et al., 2009; Clattenburg et al., 2013), were more often tempted to buy tobacco when seeing a display (Scheffels and Lavik, 2013) and more often noticed displays (Wakefield et al., 2007). Except for Burton et al. (2011), all studies

were based on self-report data on reasons for buying cigarettes. As noted by Burton et al (2011), studies relying on this type of data may have been biased by an effect called 'self-serving attribution'. Self-serving attribution bias refers to people's tendency to attribute positive outcomes to personal factors and negative outcomes to external factors. In the case of self-reports on the role of POS-D, some smokers may have blamed the POS-D for their purchase of cigarettes, although they would have purchased them anyway.

Individual study results

A study in western Australia (Carter et al., 2009) interviewed customers who were observed to purchase cigarettes from retail outlets featuring POS cigarette displays immediately after they made their cigarette purchase. At the time of the data collection (2008), legislation permitted the display of one example of each product and a total maximum display area of 1 m² (equivalent to 150 cigarette packs), but no other POS advertising. All interviewed customers were daily smokers (N=206), 22% of whom indicated that they had not planned to purchase cigarettes before entering the store. Most (68%) made the unplanned purchase because they were reminded that they were running low on cigarettes while in the store. Unplanned purchasers appeared to be somewhat younger (31% among those 18-24 years old versus 19% among those 25+ years old), although the difference was not significant (p=0.072). A total of 40 participants (19%) reported that the cigarette pack display had encouraged them in some way to purchase cigarettes.

A similar immediate post-cigarette purchase survey was carried out in the USA in Vermont (Clattenburg et al., 2013). At the time of the data collection (2010), tobacco advertising was highly restricted, but advertisement at the point of sale was unregulated, allowing both POS advertisement and tobacco displays. Consequently, independent effects of tobacco displays cannot be assessed in this study. Of the 301 cigarette purchasers, 11% reported having made an unplanned purchase. Of those, 77% identified POS tobacco advertising or display as the precipitating factor. Young adults (18-24 years) were more likely to make an unplanned purchase compared with those aged 25 and older (OR=2.1, 95% CI: 1.0-4.4). Less than daily smokers and smokers who planned to quit in the next month were also more likely to have made an unplanned purchase (OR= 5.6, 95% CI= 1.9-16.9 and OR=3.7, 95% CI: 1.6-9.0, respectively).

In a telephone-administered population survey in Victoria, Australia, 546 cigarette smokers and 67 recent quitters (within the past 12 months) completed a 12-16-minute telephone interview to assess the influence of POS-D on their cigarette purchase behaviour (Wakefield et al., 2007). More than half the smokers (55%) reported that they often or always noticed the cigarette pack display near the cash register when they were in a POS, and 26% said they rarely or never noticed it. Older smokers (30 years and older) appeared to be somewhat less likely to notice the displays than younger smokers (18-29 years) (OR=0.97, 95% CI 0.96-0.99). When shopping for something other than cigarettes, 25% reported having decided at least sometimes to buy cigarettes as a result of seeing the POS-D. The likelihood of impulse purchases of cigarettes was higher among those who noticed a POS-D at least sometimes compared to those noticing a POS-D rarely/never (OR=1.49, 95% CI 1.29-4.80). Among the 209 smokers who had tried to quit in the past 12 months, 38% indicated that seeing a POS-D had given them an urge to buy cigarettes, and 61%

actually bought cigarettes. Of the 67 people who had quit in the past 12 months, approximately one-third (34%) reported that seeing the POS-D had given them an urge to buy cigarettes.

Using data of the International Tobacco Control Four Country Survey (ITC-4), a multi-country cohort survey of adult smokers, Li et al. (2013) studied the impact of POS-D bans in Australia and Canada in relation to the United States and the United Kingdom (no restrictions during the study period (2006-2010)). In both Australia and Canada, nationwide implementation of the display ban took place over a period of several years. In Australia, the Australian Capital Territory was the first to implement a display ban in December 2009, and by January 2012, all territories had adopted a ban. Manitoba was the first Canadian province to implement a tobacco display ban, and by January 2010, all Canadian provinces/territories had followed suit. Data were collected by means of a telephone-administered interview among a representative cohort of smokers in each country. The study used wave 5 (October 2006-February 2007, N=8242) to wave 8 (from July 2010, N=5939) survey data. Based on the implementation date, a 'display ban status' variable was computed for each respondent for all waves (coded 'yes' if a display ban was implemented on or before the interview date and 'no' if otherwise). The analyses showed that in Canada and Australia, smokers' reported exposure to tobacco marketing declined markedly following the implementation of the POS Display ban (Canada: 40% to 14%; Australia: 74% to 43%). In the United States and the United Kingdom, the percentages remained consistently high (80% or more). Compared with smokers in Canada, smokers in the United States (OR=3.26, $p<0.001$) and the United Kingdom (OR=2.49, $p<0.001$) were more likely to report unplanned cigarette purchases because of exposure to cigarette displays.

Scheffels and Lavik (2013) evaluated the ban on POS-D in Norway, which was implemented on 1 January 2010. Three web surveys were performed: one 2 months before the ban (November 2009), one immediately after (January 2010), and another in November 2010. Each survey involved approximately 900 respondents aged 15-60 years. The results of the web survey before the implementation showed that 26% of tobacco users indicated that they were often (4%) or sometimes (22%) tempted to buy tobacco when seeing POS-D. Younger users (15-24 years) replied that they were significantly more tempted than older (45-54 years) age groups (12% versus 2%). After implementation of the ban, 20% agreed with the statement "the ban has made it more difficult for me to buy a brand" and 31% with the statement "the ban has made it more difficult for me to choose a brand". Younger respondents significantly more often agreed with the statement on brand selection than older respondents (35% versus 23%).

In a population-based diary survey among 998 smokers and 111 attempting quitters, Burton et al. (2011, see also §6.2.1) assessed the impact of POS-D on tobacco purchases. The respondents were asked to record a number of measures for each hour they were awake over a 4-day period (e.g., whether they saw cigarettes for sale, purchased cigarettes, smoked cigarettes and if so, how many). The results showed a tendency for respondents who saw cigarettes for sale to be more likely to buy cigarettes in the subsequent 4-hour period (OR=1.15, marginally significant, $p=0.066$) (this 4-hour lagged analysis was performed to solve the problem of reverse causation, i.e., people who buy cigarettes will also see cigarettes for sale). As noted by the authors, this is a conservative

estimate, as it excludes all purchases made in the same 4-hour period, when the effect is expected to be the largest (Burton et al., 2011).

Kim et al. (2013) performed a virtual store experiment to examine the potential impact of a ban on tobacco displays on tobacco purchase attempts among youth. A sample of 1216 13-to-17-year-olds who were smokers or non-smokers susceptible to smoking were randomised to 1 of 6 virtual store conditions (3x2 design with 3 display conditions: open, enclosed, enclosed with ads on cabinet doors; and 2 in-store tobacco ads conditions: absent, present). Participants were given a virtual shopping task, and attempts to purchase tobacco products were recorded by the researchers. The results showed that the percentage of purchase attempts was higher in the open display condition than in the closed condition (ads in store: 24.3% (open) versus 9% (enclosed); no ads in store: 16.4% (open) versus 10.8% (enclosed)). When controlling for potentially confounding factors, all current smokers in any of the four enclosed conditions were significantly less likely to try to purchase tobacco compared to the open display + ads in store condition (OR varying between 0.27 and 0.39). Similar effects were found among non-smokers susceptible to smoking, except for the enclosed display + no ads in store condition, which did not significantly differ from the open display + ads condition. Furthermore, compared to the open display + no ads condition, current smokers in the enclosed display and no ads in store (+ads on the cabinet) conditions were significantly less likely to attempt purchasing cigarettes. Based on these findings, the authors conclude that enclosing tobacco product displays could deter youth from attempting to purchase tobacco in retail stores (Kim et al., 2013).

In a similar virtual store experiment, Kim et al. (2014) studied the influence of point of sale tobacco displays on tobacco purchase attempts among adults (see §6.2.1 for a further description of the experiment). The results showed that, compared to the open display condition, current smokers' purchase attempts were significantly lowered in the closed display condition. Based on these findings, the authors conclude that banning POS-D may reduce unplanned purchases.

Thomson et al. (2004, see also §6.2.1) examined the effects of six community-level regulations on smoking-related outcomes, including purchase attempts of tobacco. The results showed that none of the regulations, including a ban on free-standing displays, was associated with purchase attempts in the past 6 months.

Perceived ease of access to tobacco products

Summary

Three studies investigated the association between exposure to tobacco displays and perceived ease of access to tobacco products. The studies provided mixed results, with two studies indicating that those exposed to POS-D think it is less difficult to purchase cigarettes, while the third study found the opposite result.

Individual study results

Wakefield et al. (2006) used an experimental design to study the effects of POS-D on youth. A total of 605 14-15-year-old students were randomly allocated to 3 conditions in which they viewed a photograph of a typical POS that had been digitally manipulated to show (1) cigarette advertising and pack displays, (2) pack displays only, or (3) no cigarette advertising and no displays. The results showed that students in the pack display (and advertising) conditions appeared to perceive access to cigarettes as somewhat less difficult compared to those in the no advertisement and no pack display condition.

Kim et al. (2013, see also above) examined perceived ease of access to cigarettes in a virtual store experiment (6 conditions: 3x2 design with 3 display conditions (open, enclosed, enclosed with ads on cabinet doors) and 2 in-store tobacco ads conditions (absent, present)). Information on perceived ease of access to cigarettes was obtained by a self-report questionnaire. Somewhat unexpectedly, and contrary to the findings of Wakefield et al., (2006), those in the open display condition more often perceived that it would be (very) difficult to buy cigarettes from the store than those in the enclosed condition (ads in store: 52% (open) versus 48% (enclosed); no ads in store 48% (open) versus 41% (closed)). When controlling for covariates, no significant differences were found between any of the conditions among smokers. Among the non-smokers susceptible to smoking, those in the enclosed display and no ads condition were significantly less likely to perceive it to be (very) difficult to buy cigarettes than those in the open display and ads in store condition (OR=0.49; 95% CI: 0.28-0.85).

Thomson et al. (2004, see above and 6.2.1), examining the effects of six community-level regulations on smoking-related outcomes, found that banning free-standing tobacco displays was the only regulation associated with a reduction in the perceived ease of access to tobacco for people under 18 years of age (OR=0.6; 95% CI: 0.4-0.9).

6.2.3 Point-of-sale tobacco displays and smoking perceptions

Key findings of studies on smoking perceptions

- Two studies (1 prospective cohort study and 1 experimental study) investigated the impact of POS-D on smoking perceptions among adolescents.
- It is unclear how POS-D influences smoking perceptions, as relationships are found for some indicators but not for others and not consistently in both studies
- Exposure to POS-D is hypothesised to result in an overestimation of smoking prevalence by young people. However, this was found in 1 study but not in the other (experimental) study.
- More studies with a longer follow-up are needed to assess whether a ban on POS-D will influence smoking perceptions and will contribute to the de-normalisation of smoking.

Two studies investigated the impact of POS-D on smoking perceptions among adolescents, including estimations on the percentage of smokers in their age group, brand popularity, perceived

harm and approval of smoking. McNeill et al. (2011) used a prospective cohort design, and Wakefield et al. (2006) performed an experimental study. McNeill et al. (2011) found that exposure to POS-D increased the percentage of adolescents overestimating smoking prevalence in their age-group, while Wakefield et al. (2006) found no significant differences for this outcome nor for any of the other smoking perceptions that were studied (e.g., normative beliefs, perceived harm). More studies with a longer follow-up are needed to assess whether a ban on POS-D will influence smoking perceptions.

Individual study results

McNeill et al. (2011) investigated the short-term impacts of a ban on POS-D in Ireland implemented in July 2009. A cohort of 180 13-15-year-olds were interviewed (face-to-face, in-home) just before (June 2009) and shortly after (August 2009) the implementation of the ban. The results indicated that the recall of POS-D in the past month decreased from 81% pre-implementation to 22% post-implementation ($p < 0.001$). Furthermore, the proportion of adolescents thinking that more than 20% of their age group smoked (overestimation) decreased from 62% to 45% ($p < 0.001$). Based on these findings, it was concluded that the ban on POS-D was largely effective in reducing the visibility of POS-D and in de-normalising smoking, at least in the short term.

Wakefield et al., (2006, see also §6.2.2) used an experimental design to study the effects of POS-D on youth. A total of 605 14-15-year-old students were randomly assigned to 3 conditions when viewing a photograph of a typical POS that had been digitally manipulated to show (1) cigarette advertising and pack displays, (2) pack displays only, or (3) no cigarette advertising or displays. The results showed that those in the advertising and pack display condition overestimated smoking prevalence in different populations somewhat more than those in the display only condition, although the differences tended to be small. Students in the display (and advertising) conditions more often reported tobacco brands that were prominently visible as brands that students thought were most popular among adults. No effects were observed for perceived harm from smoking, except for smoking one or two cigarettes occasionally, which was considered less dangerous among respondents in the advertising and display condition compared to the display only condition. There were no significant differences between the conditions with respect to students' approval of smoking (based on several questions, such as 'Teenagers who smoke seem: cool, successful, popular'). It should be noted that effects found in this study tended to be minor. However, as the authors note, the exposure was by means of a photograph and was very brief; therefore, effects in an actual store environment are expected to be larger.

6.3 Discussion and conclusion

We will first look at the weight of the evidence and the methodological quality of the studies with regard to the core research question, i.e., the effects of restricting tobacco point of sale displays on smoking behaviour.

Research design

The aim of this systematic review was to assess the research evidence that addresses the question of whether banning the display of tobacco products at points of sale will reduce tobacco use in the population. As noted in the methods section, questions on the effect of this type of 'real world' intervention generally do not allow straightforward answers.

This systematic research showed that studies on the effects of POS-D have applied a variety of designs, including prospective cohort (4), cross-sectional (10), repeated cross-sectional (2), 'laboratory' experiment (3), and qualitative study (1). Several studies have used a cross-sectional design. However, based on the results of these types of studies alone, it is unclear whether exposure to POS-D causes a change in smoking (related) indicators or the whether the opposite is true. It is also unclear whether the relationship is bidirectional. However, four studies in this systematic review used a prospective design, and each of these studies indicated that exposure to POS-D predicts future smoking (related) behaviour. Therefore, it is likely that at least some of the associations found in cross-sectional studies reflect a causal effect of exposure to POS-D on smoking (related) behaviour. In other words, it is unlikely that the association can be fully explained by increases in smoking (related) behaviour causing an increase in exposure to point-of-sale displays. Furthermore, this conclusion is supported by the results of three 'laboratory' experiments and one qualitative study. Based on these findings, it seems very likely that *reducing* exposure to POS-D leads to a decrease in smoking; however, the evidence is inconclusive, as 'in real life', unintended consequences may occur that (partly) compensate for the intended effects.

The ultimate aim of a display ban is to reduce the prevalence of smoking in the population by decreasing the number of youth who initiate smoking, increasing the number of successful quit attempts, and de-normalising smoking. Interrupted time series analysis would be an appropriate technique for examining the effect of a display ban on prevalence rates. However, we identified only one such a study in our systematic review (McNeill et al., 2011). The results of the adult survey showed no change in the trend in smoking prevalence in the 12 months post-legislation compared to the previous 84 months (McNeill et al., 2011). The youth surveys concerned only two measurements: one in the month before the ban and a second in the month after the ban, which is insufficient for a time series analysis (Eccles et al., 2003). No significant changes in the prevalence rates were found, which was not surprising given the very short follow-up period. Display bans are hypothesised to decrease the number of young people who start smoking and to increase the number of successful quit attempts among smokers. Therefore, it is unlikely that a display will have an immediate effect on the prevalence of smoking. A gradual process is more probable, and the effects of such a process can only be expected over a longer period of time. Recently, a study protocol was published that evaluated the impact of Scottish legislation banning point of sale

advertising on young people's smoking attitudes, behaviours and prevalence. (Haw et al., 2014). This study seems to be well designed; it employs a multi-modal before and after design, mixed methods to collect data, and a longitudinal follow-up of four years in four purposively selected communities. This appears to be a promising study, and its results are likely to make an important contribution to the evidence on the impact of POS advertising bans on youth smoking.

Although studies on the effect of a display ban on prevalence rates published in peer-reviewed journals are currently scarce, we identified several research reports on this topic (e.g., Basham, 2010; Lilico, 2008, 2009; Padilla, 2010). Generally, these studies concluded that a display ban does not lower prevalence rates. However, the results do not appear to be very reliable, as several experts in the field of tobacco research have noted that these studies suffered from a number of methodological flaws (e.g., Chaloupka, 2012; Hammond, 2010; Melberg, 2012; Kvaavik, 2012). Most importantly, (1) the observation period was too short to expect a significant effect on smoking prevalence, (2) the number of observations were few, resulting in statistical problems that were not addressed, and (3) other changes (for example, price developments) or general trends that may have influenced smoking prevalence were not (sufficiently) taken into account. We did, however, identify two recent research reports that appeared to describe well-designed analyses based on well-suited comprehensive data sets (Melberg, 2012; Irvine and Nguyen, 2014). Melberg (2012) conducted an interrupted time series analysis based on Norwegian data. This analysis suggested that a display ban will most likely result in reduced smoking levels (although the tobacco indicator was not smoking prevalence but cigarette sales to the retail segment, based on figures from the Directorate of Customs and Excise) (Melberg, 2012). Irvine and Nguyen (2014) used Canadian data to conduct a population-based econometric study. This study found little support for the hypothesis that behaviours changed significantly following the bans, except for smoking intensity among youth, which was significantly reduced. However, the authors note that it is possible that the bans may contribute to a longer-term de-normalisation of tobacco use, which in turn could reduce smoking prevalence. Thus, the results of these studies are mixed, and neither study has (yet) been published in peer-reviewed journals. More well-designed studies using appropriate data sets and several years of follow up are needed to further strengthen the research base.

Reporting bias

Several studies relied on self-reporting, which is prone to several types of reporting biases, including recall bias, attentional bias, and self-serving attribution bias. Some studies collected data on smoking variables by retrospective questioning over a relatively long period, which may have resulted in recall bias (inaccuracies in the recollections of events or experiences in the past). In cross-sectional studies, attentional bias may have influenced the results. Associations between current smoking and shop visits and noticing displays may be due to smokers being more aware of displays as a result of being a smoker (Paynter et al., 2009). In a similar vein, adolescents who are susceptible to smoking may also be drawn to these displays (Paynter et al., 2009). However, as Paynter et al. (2009) noted, *'industry documents and general marketing principles indicate that displays and other type of marketing create and enhance curiosity about products, so the direction*

of the effect is highly unlikely to be solely from outcome to exposure'. Furthermore, attentional bias is not a problem in prospective cohort studies, as these studies assess predictor and outcome variables at different points in time. For example, the study by Henriksen et al. (2010) showed that exposure to tobacco advertisement at the point of sale predicted smoking initiation at 12 and 30 months follow-up.

As suggested by Burton et al (2011), studies that rely on self-reports of smokers describing reasons for buying cigarettes or smoking may have been biased by an effect called 'self-serving attribution'. Self-serving attribution bias refers to people's tendency to attribute positive outcomes to personal factors and negative outcomes to external factors. In the case of self-reports on the role of POS-D, some smokers may have blamed the POS-D for their purchase of cigarettes or for the fact that they smoked cigarettes (which they would have smoked anyway). Burton et al. (2011) accounted for this type of bias by not relying on smokers' explanations for their smoking behaviour and by analysing the associations between purchase/smoking behaviour and exposure to POS-D. Their analyses were quite conservative (e.g., excluding smokers who bought tobacco in the same period and lagged-analyses); nevertheless, significant effects on smoking were found.

Consistency

The results of the studies in this systematic review were highly consistent, with nearly all studies finding a relationship between exposure to POS-D and smoking (related) behaviours. Thomson et al. (2004) did not find a relationship between banning free standing displays and purchase attempts. Furthermore, McNeill et al. (2011) did not find significant short-term changes in youth or adult smoking prevalence following the implementation of a display ban in Ireland.

The studies were performed using a variety of designs and with diverse samples (youth, adults, smokers, non-smokers, (attempting) quitters). None of the studies were conducted in the Netherlands, several studies were performed in the USA and Australia, and relatively few were performed in western Europe (N=4).

It should be noted that countries differ with respect to restrictions on other types of advertising at the POS. For example, in the USA, tobacco marketing is allowed at the point of sale, while it is banned (e.g., New Zealand) or highly restricted (e.g., Australia) in other countries. Nevertheless, despite these differences, the results appear to be consistent across countries.

Plausibility

With increasing restrictions on other types of tobacco advertisement, tobacco displays have become one of the major channels for the tobacco industry to promote tobacco products (Quedley et al., 2008). Tobacco displays are generally accepted to be a form of advertising. However, the possibilities of tobacco promotion by means of tobacco displays seem limited compared to other types of advertising, for example, through television or the sponsoring of (sport) events. As noted by Kvaakik (2012), *'tobacco displays must be regarded as having a less powerful effect on purchasing behaviour than traditional advertising, which seeks directly to persuade consumers to*

purchase tobacco products, for example through slogans'. Furthermore, tobacco displays are always placed within shops (except for tobacco machines, which may be placed outdoors or in bars/restaurants). Due to the fact that they purchase tobacco products, established smokers are expected to have the highest exposure to tobacco displays. Nevertheless, non-smokers will also be exposed to tobacco displays, as tobacco products are also sold in non-tobacco specialist shops such as supermarkets, pharmacies, and gas stations. Thus, although there are some differences between tobacco displays and other types of tobacco advertising, tobacco displays are likely to promote smoking in a similar way, but most likely not as strongly as other types of advertising. Furthermore, it is well established that tobacco marketing promotes smoking (Lovato et al., 2011), which is also consistent with the wider marketing literature (Moodie et al., 2012). Finally, based on empirical research, several mechanisms are described in the literature to explain how tobacco displays may have an effect on smoking (related) behaviour (Lovato et al., 2011; Wakefield et al., 2006; Carter and Tiffany, 1999; Carter et al., 2006). Taken together, these findings suggest that it is plausible that tobacco displays increase smoking.

Conclusions

The highest level of evidence for an effect of banning POS-D on smoking (related) behaviour would be provided by randomised controlled trials in a 'real life' setting. Because this type of design is not feasible, we must rely on the results of observational studies (longitudinal and cross-sectional) and laboratory experiments. Each of these designs has its methodological limitations, particularly cross-sectional studies, which do not allow inferences on the direction of the relationship. Nevertheless, taken together, the results described in the current literature consistently suggest that exposure to POS-D is associated with smoking (related) behaviour. Studies suggest that a higher exposure to POS-D increases the likelihood of youth initiating smoking, increases consumption among current smokers, and lowers the likelihood of successful quit attempts. Tobacco displays were also found to be associated with precursors of smoking, i.e. smoking susceptibility among youth, (unplanned) purchases of tobacco and smoking perceptions, which in turn may lead to denormalisation of tobacco use. Studies that specifically address tobacco displays are relatively scarce. However, a large body of research has shown that tobacco advertising increases smoking. Because tobacco displays are in fact a type of advertisement, it is justified to consider findings on tobacco advertisement in general as well when determining the role of tobacco displays. However, it should be noted that tobacco displays are likely to have a less powerful effect on smoking (related) behaviour. The relationship between tobacco displays and smoking (related) behaviour is plausible from a theoretical perspective and is consistent with the wider marketing literature. In line with recent expert reports on tobacco display (bans) commissioned by Norway, we therefore conclude that banning the display of tobacco products at points of sale is likely to be an effective strategy for reducing tobacco use.

Chapter 7 Facilitators and barriers to implementing a tobacco product display ban

Various factors may facilitate or hamper the implementation of policies aimed at reducing the visibility of tobacco products at points of sale. We will address the following issues: public opinion and support for measures regulating the display of tobacco products (§7.1), unintended consequences for purchasing behaviour and the market (§7.2), expected economic consequences (§7.3), and store compliance with display regulations (§7.4).

7.1 Public opinion and support for measures regulating the display of tobacco products

Data from international studies show that public support for regulating the display of tobacco products in the general population is fairly high, both before and after implementation, although the support in the Netherlands seems to be weaker.

An evaluation study of the implementation of the point-of-sale tobacco display ban in Norway showed that the ban was well supported in the population (Scheffels and Lavik, 2013). Support was strongly related to smoking status, with 70% of non-smokers, 50% of occasional smokers, and approximately 30% of daily smokers supporting the ban. The majority of the respondents (62% of non-smokers and occasional smokers and 50% of daily smokers) thought that the ban would be effective in preventing individuals from taking up smoking. The expectations with regard to the effect of the ban on quitting smoking were somewhat lower, although a large group believed that the ban would make it easier to quit (55, 46, and 24% of non-smokers, occasional smokers, and daily smokers, respectively, felt the ban would help individuals to quit smoking).

McNeill et al. (2011), evaluating the removal of point of sale tobacco displays in Ireland in July 2009, found that support for the law increased among adults after implementation, from 58% just before the ban to 66% in the months after the ban.

Cross-sectional surveys among New York City smokers and non-smokers showed that a majority of the non-smokers (\pm 60%) and nearly half the smokers (\pm 40%) were in favour of keeping tobacco products out of customers' view and were in favour of prohibiting companies from paying retailers to display or advertise tobacco products (Farley et al., 2013).

In New Zealand on 23 July 2012, a law came into effect that required all retailers to remove tobacco products from open display. Prior to this measure, displays were allowed but restricted with respect to size, composition, and placement. Whyte et al. (2014) conducted an online survey of 364 smokers and 402 non-smokers sampled from an Internet panel to investigate public support for this measure 6 months after it came into effect. The results showed that three-quarters of the sample supported the removal of cigarette and tobacco packs from view in shops, 15% opposed it and 10% had no opinion (Whyte et al., 2014). Support differed by smoking status, with support

highest among non-smokers (87%) followed by former smokers (66%), occasional smokers (52%) and daily smokers (31%). Furthermore, 69% believed the ban on displays would make it easier for quitters to remain smoke-free, 63% believed it would reduce the likelihood that those under 18 years will start smoking, 56% believed it would make it more difficult for young people to buy tobacco, and 40% believed it would make it easier for smokers to quit (Whyte et al., 2014).

In England, surveys conducted since 2009 have consistently shown strong public support for a ban on the display of tobacco products at the point of sale. In a survey commissioned by Cancer Research UK, 1,106 adults in Britain were interviewed using an online survey between 22nd and 23rd July 2010. It found that 73% of British adults over 18 supported placing tobacco products out of sight of shops to protect children. A larger poll of adults conducted in February 2013 found that 64% supported placing tobacco products out of sight in shops (ASH, 2013). According to the English expert (see introduction), there is also significant support for a prohibition of tobacco displays from a wide range of organisations, including the Royal College of Physicians; Asthma UK; the British Heart Foundation; the British Medical Association; the Local Government Association; Marie Curie Cancer Care; the National Children's Bureau; the National Heart Forum; the Royal College of Nursing; the Royal College of Paediatrics and Child Health; and numerous local authorities and NHS bodies.

The results of the EC Special Eurobarometer study in 2012 showed that support for a ban on the display of tobacco products at the point of sale is relatively low in the Netherlands. In 2012, 46% of the population supported the ban compared to an EU average of 58%. The highest level of support was found in Ireland (88%), where a display ban has been in place since 2009. Another recent Dutch survey showed similar results, i.e., in 2014, 44% of the respondents fully agreed with a ban on the display of tobacco products (TNS NIPO, 2014). Support was highest among non-smokers (55%) and ex-smokers (51%) and was lowest (17%) among smokers. Analysis of the Dutch data of the ITC study (Nagelhout, 2014) also indicated that support for a full ban on the display of tobacco products at the point of sale was relatively low in the Netherlands. Nearly half the respondents (49%) were not in favour of the ban, a quarter (25%) were somewhat in favour, 10% were strongly in favour, and 18% did not have an opinion.

The relatively low levels of support for the display ban in the Netherlands may indicate that the Dutch population is not sufficiently aware of the fact that exposure to these displays may promote smoking. If so, it may better inform the general public on the public health reasons for implementing restrictions on the display of tobacco products at the point of sale.

7.2 Unintended consequences

A study in New Zealand (Hoek et al., 2011) conducted in-depth interviews with retailers who had voluntarily removed tobacco from open display in their stores. The aim of the study was to assess whether the experiences of the retailers confirmed arguments of tobacco companies and interest groups that were put forward to oppose to point of sale restrictions. These arguments concerned reduced store safety, increased retail crime, reduced retailer income, and higher costs (results on the latter two arguments are discussed below (§7.3)). The interviews revealed that an important reason for retailers to remove the displays was to improve store security. The retailers felt that

high visibility of tobacco products increased the risk of robberies and break-ins and made it tempting to steal cigarettes or other items. Several retailers commented that crime had reduced since they had removed tobacco displays, and none of the retailers reported reduced in-store security following removal of the tobacco display. Thus, the results of this study do not confirm the arguments of those opposing display regulations.

Tobacco displays are a means of communicating information to consumers about alternative brands of cigarettes. It could be argued that removal of the display will make it more complicated for smokers to select a brand. However, the results of an Australian study showed that a large majority (90%) of the established smokers stated they never decided on the brand at the point-of-sale (Wakefield and Germain, 2006). Furthermore, all countries that have restricted tobacco displays at POS allow other aids to inform the customer on the available brands at the POS (e.g., price list, limited size display that may be shown on request to a person 18 years or older).

7.3 Expected economic consequences

Financial Impact on Retailers

In response to claims from Irish retailers regarding major declines in cigarette sales as a result of the ban on POS-D, Quinn et al. (2011) evaluated the short-term economic impact of the ban implemented in July 2009. The authors used time-series regression techniques while controlling for a number of variables, including seasonality, trading day, and general trends. The results indicated that the ban on POS-D had no short-term (1 year post ban) impact on cigarette sales. This is not unexpected, as effects of a display ban on tobacco sales and smoking prevalence seem only likely over a longer period. This will give retailers the necessary time to adapt to the new situation (Quinn et al., 2011).

Hoek et al. (2011) interviewed New Zealand retailers who had removed tobacco displays voluntarily. These retailers reported that they did not find removing displays costly. Furthermore, most of the retailers reported that removing the display had little effect on their sales.

When passing the Health Act in England, there was much debate on the costs to the retailer of complying with the regulations. In the Impact Assessment (Department of Health, 2010), the costs for a complete prohibition of displays were estimated at £4,965 (\approx 6,098 euro) for a small store and £7,500 (\approx 9,211 euro) for a large store (>280 square metres) (i.e., based on a removal of displays and replacement by under the counter or overhead storage). An impact assessment on the final regulations, which allowed the points-of-sale to cover the display, estimated the costs for a retailer to comply with the new regulations by means of a magnetic cover at £450 (\approx 553 euro) for a small store and £850 (\approx 1,044 euro) for a large store (>280 square metres) (Department of Health, 2011).

7.4 Store compliance with the display regulations

Studies indicate that retailer compliance is high ($\geq 97\%$) in countries that have implemented a full display ban (all tobacco products out of view of customers). However, partial limits to the display of tobacco products may be associated with relatively high levels of noncompliance.

Retailers' compliance with a POS-D ban has been evaluated in several countries, including Norway (Scheffels and Lavik, 2013), New Zealand (Quedley et al., 2008), Ireland (McNeill et al., 2011), and Canada (Cohen et al., 2011). In Norway and Ireland, compliance immediately following implementation was very high (97%) (McNeill et al., 2011; Scheffels and Lavik, 2013). In both countries, the legislation mandated that all tobacco products (including related equipment) must be stored out of view of customers. In Canada (Ontario), compliance one year following a display ban was also very high, with 99.8% of stores completely hiding their cigarettes, usually behind cabinets with flaps (Cohen et al., 2011).

Quedly et al. (2008) investigated retailer compliance with legislation on limiting retail tobacco displays in New Zealand. At the time of the study, New Zealand had not implemented a complete ban on displays but had imposed several regulations. For example, the display is limited to a maximum of 100 packages, the display must not be visible from the street, and tobacco products may not be at display within 1 m of 'children's products' (see table 5.1 for the current situation). The results showed that 64% of the stores had at least one breach of the point-of-sale regulations. Stores situated in areas with the highest quartile of children (aged <19 years) in the population were much more likely to have high levels of noncompliance. The authors conclude that legislation to partly limit retail of displays can be difficult. Given their results, the authors recommend a complete ban of all retail tobacco product displays.

Other authors have given similar recommendations, as the tobacco industry appears very creative in circumventing restrictions (Carter, 2003; Dewhirst, 2004; Nagler and Viswanath, 2013). For example, Carter (2003) investigated the role of the retail environment in cigarette marketing in Australia. Based on an analysis of tobacco industry documents and articles and advertisements in retail trade journals, the author concluded that 'given the industry's creativity and risk taking, the only way of preventing promotion of products at retail would be to require all products to be placed under the counter'. Carter (2003) suggests that product listings could be used for consumers to make purchases. These product listings should be defined by law and should have a standardised format, allowing only product names and other differentiating information if needed (Carter, 2003). A store audit in Victoria, Australia following the ban on point-of-sale tobacco displays in January 2011 suggested that price boards are being used by tobacco companies to target tobacco brands to consumers (Wakefield et al., 2012). Based on these findings, the authors recommend that a ban on the display of price boards should be included in tobacco product display bans (Wakefield et al., 2012). To inform the customers, 'prices might instead be itemised in alphabetical order on a list only viewable upon customer request' (Wakefield et al., 2012).

PART 4 INTEGRATION OF FINDINGS

Chapter 8 Conclusions and summary of findings

8.1 Introduction

The aim of this review study was to synthesise the knowledge on the potential impact of two tobacco control measures:

- Reducing the number (type, density, proximity) of points of sale for tobacco products (Part II)
- Restricting or banning the display of tobacco products at points of sale (Part III)

More specifically, the following questions were addressed:

- What are the current and planned policies in other countries regarding these measures?
- Is there a relationship between the number (or density) of points of sale for tobacco products and (determinants of) smoking behaviour? What effects can be expected from a restriction in density (in general and specifically for vending machines)?
- What is known about the effects of (restricting) the display of tobacco products at points of sale for tobacco products?
- What is known about subgroup differences in impact (youth and adults, socioeconomic groups, daily/nondaily smokers)?
- What is known about potential barriers or facilitators to implementing these measures (public support, economic consequences, shift to other points of sale, cross-border purchasing)?

This chapter will individually discuss the findings on both tobacco control measures covered in this review, will consider the strengths and limitations of the research literature, and will end with a conclusion on the main research questions of this report.

8.2 Density and proximity of tobacco points of sale and their impact on smoking behaviour

The first aim of this study was to assess the research evidence on the question whether reducing the number (type, density, proximity) of points of sale for tobacco products will reduce tobacco use in the population. In this paragraph, we will summarise the answers to the research questions that were formulated in §1.2

What are current and planned policies in other countries relating to these measures?

Unlike alcohol, regulating or restricting the density of retail outlets for tobacco has not been explicitly promoted in international treaties or guidelines. An exception is the ban on vending

machines. Currently within the EU, tobacco vending machines are banned or have never been allowed in 13 Member States (Bulgaria, Croatia, Cyprus, Estonia, France, Greece, Hungary, the United Kingdom, Latvia, Lithuania, Poland, Romania and Slovenia).

Nonetheless, regulating and restricting the number and locations of tobacco retail outlets has been advocated by a range of health authorities and non-governmental organisations. Similarly to alcohol policies, it is expected that decreased availability of tobacco will contribute to a reduction of smoking in the population.

Licensing

Licensing schemes or systems are one way of achieving a reduction in the number of POS and have been increasingly advocated. So far, however, only Hungary has explicitly used retailer licensing as a tool to reduce the number of points of sale. As of 2013, Hungary allows only state-governed tobacco stores, which has resulted in a reduction from approximately 40,000 to 6,500 tobacco retail outlets. Reductions may also occur after the introduction of licensing for other reasons (as in Finland).

Licensing of tobacco retailers is in place in five Australian states, in Singapore, Canada and 39 states of the United States. In Europe, licensing has been implemented in France, Finland and Hungary and has been proposed (but not yet implemented) in Norway. In England, Wales and Northern Ireland, retailers do not need a license, but when they break the law by selling tobacco to someone under 18 years of age, and if they do so on a number of occasions, they may lose their right to sell tobacco for up to one year (*negative licensing*).

There are some indications that the introduction of a licensing fee may result in a decrease of the number of points of sale. However, a fee appears to affect mainly those retailers with a low sales volume of cigarettes, so the impact on overall smoking levels is expected to be low.

Several countries have opted for a *registration* scheme (e.g., Scotland and Ireland), which is assumed to be less costly and to create less administrative burden. However, due to the generally low licensing fees, this system may not be a sufficient motivation for stopping sales.

Other measures

Several countries have implemented legal restrictions with regard to specific locations for the sale of tobacco products (e.g., not in government buildings, pharmacies, or in the proximity of schools). These regulations were not primarily intended as a measure to reduce the number of points of sale. Nevertheless, if excluded locations represent a large volume of cigarette sales, such measures may be effective in reducing smoking, but they are likely to result in widespread opposition by the retailers they affect.

Reductions in points of sale of tobacco may also occur in the slipstream of other tobacco control measures, such as increases in the legal age for tobacco sale, bans and restrictions on smoking in public or work places, or tax increases. For example, a policy analysis in Germany showed that the major reduction in vending machines could be largely attributed to the implementation of an electronic age verification system. Several other measures have been suggested, including a reward for stopping the sale of tobacco products, a gradual reduction of the quota for legal import

and sales of tobacco products (such as fish or CO₂ quotas in other domains), or legislating a smoker's license rather than a retailer's license. To our knowledge, none of these measures has been implemented, so it is unclear what the intended and unintended effects are.

Is there a relationship between the number (or density) of points of sale for tobacco products and (determinants of) smoking behaviour? What effects can be expected from a restriction in density (in general and specifically for vending machines)?

The results of the systematic review indicate that the current empirical evidence alone does not presently allow for a straightforward answer to the question of whether reducing the density or increasing the proximity of tobacco points of sale will affect smoking behaviour. In part, this is due to the limited number of studies available, especially among adults. However, of greater importance is the lack of design quality of these available studies. No studies have been published that directly evaluate effects of changes (whether an increase or a reduction) in tobacco outlet density in association with smoking behaviour. The majority of studies available at present used a cross-sectional design (especially among youth), which makes causal inferences difficult if not impossible.

Therefore, after consideration of different relevant sources of evidence, we conclude that at this point in time, the evidence on the influence of the density and proximity of tobacco points of sale on smoking behaviour of youth and adults is limited. However, when also referring to the literature on the density and proximity of alcohol points of sale, we expect it is likely that the density and/or proximity of tobacco POS will contribute to a reduction of tobacco use in the population, although the effects may not be large and may be limited to certain groups. More specifically, this conclusion is based on the following evidence:

- There are fairly consistent positive results on the relationship between the density (but not proximity) of POS around schools and smoking behaviour among youth. More specifically, several studies have found a positive association with initiation of smoking among youth.
- Three in four studies among adult smokers suggesting that the proximity (and, to a lesser extent, density) of tobacco retailers is associated with outcomes related to smoking cessation, although the association was sometimes only found for subgroups.
- The available literature on the density and proximity of alcohol points of sale is more developed, especially regarding the use of prospective studies. These studies found
 - a positive association between outlet density and alcohol consumption (i.e., a higher density is related to higher consumption) and with changes in outlet density over time.
 - an effect of licensing changes, indicating that permissive licensing increased the number of outlets, which in turn increased alcohol consumption.
 - for alcohol, the number of studies available investigating the effects of a reduction in outlet density is similarly limited.

To create a stronger evidence base for changes in policies regarding the density and/or proximity of points of sale, more studies are required, preferably those that link changes in outlet density to changes in smoking behaviour. We refer especially to studies using an interrupted time series design (or experiments), which may establish the effects of changes in outlet density and proximity on smoking behaviour, thereby clarifying the temporal relationship between the density and/or proximity of points of sale. However, these studies may be difficult to realise.

What is known about subgroup differences in impact (youth and adults, socioeconomic groups, daily/nondaily smokers)?

The results of the systematic review indicate some subgroup differences with respect to youth and adults and smoking status, but direct comparisons are limited.

- Young people appear to be more vulnerable under a higher *density* of tobacco POS (around the school), while for adults, smoking indicators appear to be associated with both the density and proximity of retailers.
- Young and adult groups are in different stages with respect to smoking. Therefore, evidence that exposure to tobacco POS is associated with smoking initiation has only been studied and demonstrated among young people. Evidence that exposure to tobacco POS is associated with quit (attempts) has only been studied and demonstrated among adults.
- Various studies (predominantly conducted in the US) show that points of sale seem to be concentrated more in socioeconomically disadvantaged areas. There may also be different effects among socioeconomic groups, as one study among adults found that high SES people had a lower individual smoking level in neighbourhoods with low density, while no SES differences were found in neighbourhoods with high density. However, to draw conclusions, more studies that corroborate this finding are needed.

What is known about potential barriers or facilitators to implementing these measures (public support, economic consequences, shift to other points of sale, cross-border purchasing)?

Public opinion and support

Studies abroad and in the Netherlands show that there is (increasing) public support for restricting sales of tobacco, although there are major differences according to the type of location and smoking status. In the Netherlands, most support is found for a ban on the sale of tobacco at sports locations and drugs stores, and the proportions of adults in favour of these measures is increasing. Nearly half the population would support a ban on selling tobacco products within 250 metres of a school, and a ban on tobacco vending machines is supported by approximately one-third of respondents, and this proportion has increased.

Retailers and the tobacco industry

Reducing the availability of tobacco products through restrictions of points of sale may incur opposition from the tobacco industry and retailers.

- A Dutch qualitative study suggests that if legislation would restrict tobacco sales to specialised shops only, retailers are generally inclined to respect the law; however, they do not feel motivated to stop selling tobacco, and some vendors strongly object to this measure. Missed revenue is the main reason for these objections.
- The city of Buffalo (New York) intended to introduce a licensing system to decrease the number of POS. Rather than charging retailers for obtaining a license, tobacco manufacturers would be required to pay a substantial fee for each brand that was sold in the city. This might have reduced opposition from retailers and increased public support.

Unintended consequences: possible shift in purchasing behaviour and the market

A (gradual) reduction in retail outlets may not reduce availability, but it may enhance the concentration of sales at the remaining outlets.

- An Australian survey among current smokers suggested that if density or proximity decreased, a large number of smokers would change their purchasing behaviour (shopping patterns), but no changes were expected in their smoking behaviour. A German study suggested that a reduction in the number of tobacco vending machines may, in the short term, cause a shift towards obtaining tobacco products from other sources.
- Thus far, no studies have examined reductions in outlet density along with smoking and purchasing behaviour to investigate whether major shifts in the market occur.

8.3 Display of tobacco products at the point of sale

The second aim of this study was to assess the research evidence on the question of whether banning the display of tobacco products at points of sale will reduce tobacco use in the population. In this chapter, we will summarise the answers to the research questions that were formulated in §1.2

What is known about the effects of (restricting) the display of tobacco products at points of sale for tobacco products on smoking behaviour?

The results of the systematic review and of several expert reports indicate that the current empirical evidence alone does not allow a straightforward answer to the question of whether regulations on POS-D will affect smoking behaviour. This problem does not represent a gap in research quality but is inherent in investigating 'real life' interventions, where many measures are often implemented at the same time and control over confounding factors is limited. Therefore, as also noted by other experts, and in line with general procedures in policy research, it was deemed important to look beyond the results of the systematic review and also take into consideration other relevant sources of evidence. When taking such a comprehensive approach, we conclude that it is probable that restrictions or a ban on tobacco product displays at points of sale will contribute to a reduction of tobacco use in the population, although the effects may not be major and will most likely manifest over a longer period of time. More specifically, this conclusion is based on the following evidence:

- The results of the systematic review, which showed consistent results for a variety of smoking indicators.

Exposure to tobacco displays was found to be associated with:

- the risk of smoking initiation among youth
- difficulty quitting smoking
- a higher level of consumption among current users

Tobacco displays were also found to be associated with precursors of smoking:

- smoking susceptibility among youth
- (unplanned) purchases of tobacco
- smoking perceptions (e.g., overestimation of smoking prevalence, ease of access to tobacco products)

- Several prospective studies demonstrated that a change in exposure to tobacco displays preceded a change in smoking behaviour (e.g., an increased exposure predicted a greater likelihood of initiating smoking). These findings considerably strengthen the evidence for causality.
- In a highly controlled environment, experimental studies showed that exposure to displays influences subsequent smoking (related) behaviours.
- The findings were consistent across different populations and cultures.
- The presence of mechanisms derived from psychological and marketing theories makes it plausible that a causal relationship between exposure to displays and smoking (related) behaviour exists.
- There is ample research evidence on the effects of tobacco advertisement in general on consumer behaviour. These findings are relevant, as tobacco displays are generally considered as a form of advertisement, although the effects are likely to be less strong than other types of traditional advertising.

The most important limitation of the current research evidence is that there is only one peer-reviewed study available that directly assesses the impact of reducing the visibility of tobacco products at points-of-sale on the prevalence of smoking in the population (McNeil et al., 2011). This study found no significant impact on smoking prevalence among both adults and youth, but the follow-up was short (1 month among youth and 1 year among adults). There are several research reports, but these are generally characterised by a number of methodological shortcomings. We did, however, identify two recent research reports that appeared to describe well-designed analyses based on suitable comprehensive data sets (Melberg, 2012; Irvine and Nguyen, 2014). However, these studies provided mixed results. Therefore, more well-designed studies using appropriate data sets with several years of follow-up that are published in peer-reviewed journals are needed to strengthen the research base.

What is known about subgroup differences in impact (youth and adults, socioeconomic groups, daily/nondaily smokers)?

The results of the systematic review indicate some subgroup differences with respect to youth and adults and smoking status, but data from direct comparisons are scarce. No studies have examined differential effects among socioeconomic groups.

- Young people appear to be somewhat more susceptible to POS-D than adults.
- Youth and adults are in different stages with respect to smoking. Therefore, only evidence that exposure to POS-D is associated with smoking initiation has been studied and demonstrated among young people. Only evidence that exposure to POS-D is associated with quitting (attempts) has been studied and demonstrated among adults.
- Non-smokers more often support policies restricting the visibility of tobacco displays than (daily) smokers.

What are current and planned policies in other countries relating to these measures?

To date, only five countries in the EU have implemented restrictions on the display of tobacco products at the point of sale (Finland, Hungary, Ireland, Croatia, the United Kingdom) and two European non-EU countries (Iceland and Norway). Outside Europe, regulations are in place in Canada, New Zealand, Australia, and Thailand. Regulations differ across countries. For example, in some countries, the tobacco products must be kept in a closed container or dispenser (e.g., Ireland), while in other countries (e.g., the United Kingdom), retailers are also allowed to cover the existing display. In several countries, (e.g., Norway, the United Kingdom) tobacconist specialist shops are exempt from the display ban, although there are other restrictions (e.g., the display should not be visible from outside the shop).

What is known about potential barriers or facilitators to implementing these measures (public support, economic consequences, shift to other points of sale)?

Economic consequences

Opponents have argued that regulations on the display of tobacco products will have several negative consequences, particularly for the retailer (high costs incurred by store adaptations, loss of income, reduced store safety, increased retail crime). However, the results of several studies, including a detailed impact study from the UK, did not indicate a risk of any substantial negative effects.

Public support

Public support for regulating the display of tobacco products in the general population is high, particularly among non-smokers, both before and after implementation. In the Netherlands, support seems somewhat lower than in other countries.

Resistance from the tobacco industry and other groups

In several countries (e.g., Norway, Scotland, Canada), the tobacco industry has filed lawsuits to prevent the implementation of government intended restrictions on the display of tobacco products. So far, these lawsuits have been lost by the tobacco industry. For example, the Oslo District Court concluded that the prohibition against the visible display of tobacco products is suitable and necessary to ensure the protection of public health. Research evidence seemed to play an important role in the decision. For example, with respect to the de-normalising effect of a display ban, the Oslo District Court referred to the evaluation study of the removal of point of sale tobacco displays in Ireland (McNeill et al., 2010) and the reports by Lund and Rise (2008) and Chaloupka (2012).

Shift to other points of sale

No studies have investigated a shift to other points of sale (e.g., Internet or cross-border sales) following restrictions on the display of tobacco products. Such a shift does not seem especially logical. The most likely reason for turning to other points of sale would be that the ban has made access to tobacco products more difficult. However, such an effect seems unlikely in the case of established smokers, as they virtually never make use of the display in deciding which brands to purchase (Wakefield and Germain, 2006).

Lessons learned

Based on the experiences in other countries with implementation of a display ban, the following suggestions can be offered:

- Controls must be comprehensive and tightly defined to prevent circumvention of the regulations. This not only concerns the display of cigarettes but also the price boards, product labelling, signs on the covered display or closed cases/cupboards, and signs on the exterior of the shop (e.g., colour and size of the lettering, size of the price board, ordering of the products on the price board). Furthermore, clear regulations regarding the display and advertisement of other tobacco products (e.g., matches, lighters) in the shops is also important.
- In several countries (England, Scotland, Ireland, Finland), specialist tobacconist shops are exempt from regulations of a ban on the display of tobacco products. It should be noted that the number of these shops in these countries is generally very low.
- If tobacco specialist shops are exempt from a ban on tobacco displays, it is important to ensure that tobacco displays in these shops are not visible from outside the shop (to prevent exposure to non-smoking youth and (recent) quitters).
- A full display ban (all tobacco products out of view of customers) seems to be associated with much higher levels of retailer compliance than partial limits to the display of tobacco products.
- A licensing or registration system of tobacco points-of-sale will facilitate checks and enforcement of compliance.
- To be able to evaluate the effects of the implementation of display regulations on the prevalence of smoking (related) indicators, it is vital to have sufficient baseline and follow-up

information (several assessments over a longer period of time both pre- and post-implementation).

8.4 Final conclusions

The results of this research report suggest that the evidence base for the effects of a reduction in density/proximity of POS on smoking behaviours is fairly weak, although the available data are indicative of such an effect. The lack of a strong evidence base seems to be partially related to the fact that reductions in density and proximity are difficult to manipulate and technically more complicated to study. Furthermore, such research would require a significant and immediate reduction in the number of POS, which has so far only occurred in Hungary.

The evidence supporting a ban on the display of tobacco products at the point of sale is stronger, and this tobacco control measure is likely to contribute to a gradual reduction of smoking. However, the magnitude of the effects is unknown.

These conclusions are based on a comprehensive approach regarding the research evidence, i.e., we not only took into account the results of the systematic review but also other relevant sources of evidence (e.g., by drawing a parallel with alcohol or other domains, plausibility, and consistency).

The experiences of other countries have indicated that the implementation of restrictions on the display of tobacco products at POS is feasible and largely supported by the general population. Experiences of countries with explicit policies to reduce the density/proximity of POS are not (yet) available.

Finally, the introduction of a licensing or registration system seems to be an important first step for both tobacco control measures. Moreover, this will facilitate scientific research on the effects of tobacco policy changes.

Appendix 1. Contextual information on smoking and tobacco control in the Netherlands

Prevalence of smoking

- In 2013, a quarter (25%) of the population aged 15 years or older were smokers (19% daily and 6% non-daily), which is similar to the proportion in 2012. Smoking prevalence decreased significantly from the sixties until the early nineties, but this trend has leveled off since then, and only minor reductions have been found over the last few years.
- Socioeconomic inequalities remain, with the highest proportions of daily smokers found among less educated and middle educated people (24% and 21%) compared to highly educated people (11%).
- In the past decade, smoking prevalence among youth showed a decreasing trend, from 46% among ever smokers 10-19 years old to 31% in 2013. Daily smoking was progressively reduced from 15% to 9% in this period.

Some key events in Dutch tobacco control

- In 2008, a smoking ban was implemented in the hospitality industry, public transportation, workplaces, and sport canteens, with the exception of enclosed smoking rooms, and taxes were increased (50 eurocent tax on cigarettes and rolling tobacco).
- As of November 2010, the smoking ban in small bars and cafes (< 70 sq. m or 750 sq. feet) has no longer been enforced.
- In January 2011, smoking cessation aids (pharmacotherapy and behavioral treatment) were fully reimbursed; this measure was withdrawn in 2012 (no pharmacotherapy) and introduced again in 2013.
- March 2011: 40 eurocent tax on cigarettes.
- June 2011: funding has been cut for mass media campaigns
- In July 2011, the reversal of the ban in small bars and cafés was included in the Tobacco law.
- January 2013: taxes increased (€0.35 on cigarettes; €0.60 tax on rolling tobacco)
- In November 2013, the mass media campaign "Nix18" (no alcohol and tobacco use below age 18) was launched to promote the denormalisation of underage smoking and drinking.
- In January 2014, the legal age for buying tobacco products increased from 16 to 18 years.
- In October 2014, the smoking ban in small pubs and bars will be enforced again.
- The Netherlands holds the 13th position on the Tobacco Control Scale (Joossens & Raw, 2014)

Sources: ITC project.org (update August 2013); Joossens & Raw, 2014; Verdurmen et al., 2014a, 2014b.

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