Seeing through the Smoke: Tobacco monitoring in New Zealand

Public Health Intelligence
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Foreword

Tobacco is a major cause of health loss for New Zealanders, contributing to approximately 18 percent of all deaths in the early 2000s. It is also a major cause of health inequality, accounting for substantial proportions of the difference in life expectancy between ethnic and socioeconomic groups.

Yet were it not for New Zealand’s tobacco control programme (TCP), the toll would be higher still. The TCP has contributed to a halving in tobacco consumption and a reduction in adult smoking prevalence by one quarter (from 32 percent to 24 percent) over the past quarter century.

An important component of the TCP is the ongoing monitoring of tobacco control interventions, tobacco industry activities and tobacco products and their use. Such monitoring forms part of the wider mandate of the Ministry of Health to monitor and report on the health of New Zealanders and the risks to health to which we are exposed. Public Health Intelligence (PHI), the branch of the Ministry charged with this responsibility, intends to publish a series of reports over the next few years reviewing the state of health risk monitoring in New Zealand. The first report, *Food and Nutrition Monitoring in New Zealand*, was published in October 2003 and was well received (Ministry of Health 2003a). The current (second) report, *Seeing through the Smoke: Tobacco Monitoring in New Zealand*, fulfils a similar purpose for the tobacco control community.

The authors of this report have carried out a comprehensive review of the history and current state of tobacco monitoring in New Zealand. In brief, they find that while good use is being made of most existing data sources, some are still underexploited. Furthermore, monitoring lacks co-ordination and still has deficiencies and duplications in some areas. Ways of addressing these remaining information needs and inefficiencies are suggested and prioritised. These recommendations are addressed to both Public Health Intelligence itself and the wider tobacco control community. A concerted effort by all health sector stakeholders to implement these recommendations could lead to significant improvement in the monitoring of the supply, consumption, use and health impact of tobacco over the next two to three years.

Tobacco monitoring is not an end in itself. By informing the further development and continuous improvement of the TCP, monitoring contributes to attainment of several key objectives of the New Zealand Health Strategy, and ultimately to attainment of the Ministry’s – and the health sector’s – overarching goals of better health and reduced inequalities for all New Zealanders.

Comments on this report are welcomed and should be sent to Public Health Intelligence, Ministry of Health, PO Box 5013, Wellington.

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Deputy Director-General, Public Health
Acknowledgements

The authors of this report were Martin Tobias, Ben Macrae and Martin Bonne (Public Health Intelligence).

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Disclaimer

Views expressed in this report are those of the authors and do not necessarily reflect those of the peer reviewers or the Ministry of Health.
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Executive Summary

This report extends the brief section on monitoring included in *Clearing the Smoke*, the Ministry of Health’s five-year strategic plan for tobacco control (2004–2009) (Ministry of Health 2004b), and provides a more detailed overview of the current state of tobacco monitoring in New Zealand.

The report presents a conceptual framework for tobacco monitoring, identifies and prioritises gaps in coverage and specifies ways in which those gaps could be closed or where more research is needed to identify the best data sources and instruments to collect the necessary data.

The conceptual framework developed in this report, identifying the key information domains relevant to tobacco control and their inter-relationships, is shown below (Figure E1).

**Figure E1:** Tobacco monitoring domains

Notes:
1. Health impacts include effects on distribution (inequalities) as well as level of health.
2. Only major relationships are shown.
An alternative view of the key tobacco monitoring domains, one that provides a more detailed perspective on tobacco control strategies in relation to tobacco use, is shown below (Figure E2).

**Figure E2:** Alternative view of key tobacco monitoring domains

![Diagram showing key tobacco monitoring domains]

NPD classification of interventions:
* Supply control
** Demand reduction
*** Problem limitation

The major information gaps identified in the report, and suggested solutions (in priority order with highest listed first), are summarised below.

<table>
<thead>
<tr>
<th>Indicator or data source</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tobacco use</strong></td>
<td></td>
</tr>
<tr>
<td>New Zealand Tobacco Use Survey</td>
<td>Implement survey currently under development, with annual waves and oversampling of Māori. Collect detailed data on smoking intensity, including number of puffs per cigarette and extent of inhalation. Include assessment of nicotine addiction/tobacco dependence. Critical issue is to be able to monitor not only prevalences, but also quitting and relapse rates.</td>
</tr>
<tr>
<td>Smoking in pregnancy and around baby</td>
<td>Fully utilise Plunket database. Further develop Public Health Intelligence’s Birth Linkage Study. Investigate practicality of cotinine testing of leftover antenatal blood samples as part of an ongoing, nationwide monitoring system (eg, based on a random sample of antenatal clinics).</td>
</tr>
<tr>
<td>Indicator or data source</td>
<td>Actions</td>
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</tr>
<tr>
<td><strong>Youth smoking</strong></td>
<td>Improve quality of ASH Year 10 Smoking Survey (frame, non-response, probability sampling) and ensure co-ordination with the YLS. Advocate for funding of Youth2006 survey and its repetition every census year. Investigate building a longitudinal component onto the Pre-Teen and YLS (or ASH) surveys to monitor predictors of youth smoking (possibly including a nicotine addiction scale such as the Hooked On Nicotine Checklist).</td>
</tr>
<tr>
<td><strong>Census 2006 and New Zealand Census–Mortality Study</strong></td>
<td>Advocate for inclusion of the smoking questions in censuses beyond 2006. If successful, use New Zealand Census–Mortality Study to monitor hazards of active and passive smoking (mortality and cancer), and inequalities in these hazards.</td>
</tr>
<tr>
<td><strong>Inequalities</strong></td>
<td>Explore ways to achieve adequate statistical power in all surveys to permit full analysis of inequalities (including innovative survey designs and small population estimation techniques).</td>
</tr>
<tr>
<td><strong>Smoking cessation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Quitline</strong></td>
<td>Fully utilise Quitline database as a monitoring tool for smoker behaviour and its psychosocial correlates, including responses to interventions such as new legislation, price rises and media campaigns. Carry out a second longitudinal study of callers, unless a population-based Longitudinal Survey of Smokers is implemented.</td>
</tr>
<tr>
<td><strong>Longitudinal Survey of Smokers</strong></td>
<td>Investigate costs and benefits of implementing such a survey, including international benchmarking.</td>
</tr>
<tr>
<td><strong>NRT use</strong></td>
<td>Utilise available data on sale of nicotine replacement therapy (Pharmac) and redemption of nicotine replacement therapy cards (HealthPac) as an additional means of monitoring smoking cessation.</td>
</tr>
<tr>
<td><strong>Nicotine addiction/tobacco dependence</strong></td>
<td>Investigate possible instruments (eg, Hooked On Nicotine Checklist) and vehicles for monitoring nicotine addiction/tobacco dependence (especially, but not exclusively, in adolescents – see above regarding Youth2006 survey).</td>
</tr>
<tr>
<td><strong>Second-hand smoke exposure</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Workplace settings</strong></td>
<td>Implement the National Research Bureau survey on a regular basis (at least five-yearly). Investigate use of other data sources (ie, most of the tobacco use surveys) to complement this survey.</td>
</tr>
<tr>
<td><strong>Hospitality venues</strong></td>
<td>Implement a regular survey, or extend the existing National Research Bureau or other tobacco use surveys, to include monitoring of exposure (and attitudes etc) in hospitality venues.</td>
</tr>
<tr>
<td><strong>Home settings</strong></td>
<td>Investigate best use of existing sources (including Plunket database and most tobacco use surveys, for example, the ASH Year 10 Smoking Survey) to monitor exposure in the home, and relate this to five-yearly census estimates (if smoking questions retained).</td>
</tr>
<tr>
<td><strong>Tobacco demand</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Index of cigarette price</strong></td>
<td>Monitor real rather than nominal indexes of cigarette and tobacco prices, and their decomposition (trade, tax, Consumer Price Index adjustment).</td>
</tr>
<tr>
<td><strong>Index of cigarette affordability</strong></td>
<td>Monitor both ‘minutes to earn’ and ‘proportion of per capita GDP’ based indexes.</td>
</tr>
<tr>
<td>Indicator or data source</td>
<td>Actions</td>
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</tr>
<tr>
<td>Price elasticity of demand</td>
<td>Use precisely timed data on price and consumption (the latter estimated using weekly supermarket sales data together with homescanning data) to regularly monitor price elasticity, overall and by demographic subgroup.</td>
</tr>
<tr>
<td>Tobacco supply</td>
<td></td>
</tr>
<tr>
<td>Annual tobacco returns by month of sale and district of sale</td>
<td>Investigate added value of seeking disaggregated monthly sales data in the annual tobacco returns (as a complement to weekly supermarket sales data). Investigate disaggregation by geographic region of retailer (and retailer type) to better inform local control activities.</td>
</tr>
<tr>
<td>Weekly supermarket sales data</td>
<td>Regularly purchase weekly supermarket sales data (1) as an input into monitoring price elasticity and (2) to relate to other ‘shocks’, for example, introduction of new legislation, media campaigns, etc.</td>
</tr>
<tr>
<td>Homescan</td>
<td>Investigate purchase of Homescan data to enable demographic subgroup monitoring of trends in consumption (for use alongside weekly supermarket sales data, or possibly as a substitute for this).</td>
</tr>
<tr>
<td>Tobacco products</td>
<td></td>
</tr>
<tr>
<td>Tobacco weight</td>
<td>Investigate cost-effective methods of monitoring tobacco weight in roll your own cigarettes accurately and precisely. Investigate regulating to require all tobacco manufacturers and importers to report weight of tobacco (by brand and brand type).</td>
</tr>
<tr>
<td>Unburnt tobacco constituents (ingredients and additives)</td>
<td>Investigate costs and benefits of regular laboratory testing of key toxic or otherwise harmful constituents (including additives) that can be measured in unburnt tobacco, such as nitrosamines and heavy metals (see Ministry of Health 2004f).</td>
</tr>
<tr>
<td>Cigarette smoke constituents (emissions)</td>
<td>Investigate costs and benefits of testing a wider range of smoke constituents (emissions) than is currently done (by brand and brand variant if possible), using appropriate methods (eg, to adjust for compensatory smoking) (see Fowles and Bates 2000, Ministry of Health 2004f).</td>
</tr>
<tr>
<td>Health and economic impacts of tobacco</td>
<td></td>
</tr>
<tr>
<td>Societal and government cost</td>
<td>Use available data to monitor economic effects of tobacco routinely, as is done for health impact.</td>
</tr>
<tr>
<td>Household spending on tobacco</td>
<td>Investigate ways to reduce under-reporting of tobacco expenditure in the Household Economic Survey, or identify other data sources to monitor proportion of household income spent on tobacco, by household type and socioeconomic position.</td>
</tr>
<tr>
<td>Health impacts, including by type and small area</td>
<td>Investigate ways to improve monitoring of attributable mortality, including by small population and small area. Investigate ways to improve monitoring of attributable morbidity and disability. Regularly update estimates of health impact of passive smoking, using New Zealand Census–Mortality Study and/or other data sources. Investigate ways to improve estimation of tobacco’s contribution to health inequalities (and of inequalities in tobacco use, consumption and exposure to second-hand smoke). Investigate ways to improve the modelling and projection of tobacco use, consumption, second-hand smoke exposure and health impacts (level and distribution).</td>
</tr>
<tr>
<td>Indicator or data source</td>
<td>Actions</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Tobacco industry activities</strong></td>
<td>Implement regular monitoring of tobacco imagery on television, movies and imported magazines.</td>
</tr>
<tr>
<td>Tobacco imagery</td>
<td>Implement regular monitoring of tobacco imagery on television, movies and imported magazines.</td>
</tr>
<tr>
<td>Disclosure</td>
<td>Fully utilise tobacco industry data on products, sales and marketing available under the smoke-free environments regulations, or published on company websites.</td>
</tr>
<tr>
<td>Tobacco exports</td>
<td>Utilise data routinely available from Statistics New Zealand to monitor trends in export of finished tobacco products from New Zealand, especially to our Pacific neighbours.</td>
</tr>
<tr>
<td><strong>Tobacco control activities (NEC)</strong></td>
<td></td>
</tr>
<tr>
<td>Aggregate tobacco control programme funding</td>
<td>Utilise data available from the Ministry of Health and NGOs to monitor the level and distribution of expenditure on tobacco control activities and their evaluation, and benchmark nationally and internationally.</td>
</tr>
<tr>
<td>Media advocacy</td>
<td>Investigate ways to monitor content, frequency, reach and impact of unpaid media reports and articles on tobacco control.</td>
</tr>
<tr>
<td>Enforcement activity</td>
<td>Although this is more evaluation than monitoring, various aspects of enforcement activity can be monitored, for example, youth access restrictions, underage sales, smokefree environments. Perhaps of most importance is to monitor the numbers of controlled purchase operations carried out (by district) and resultant prosecutions and convictions.</td>
</tr>
<tr>
<td>Monitoring activity</td>
<td>Improve co-ordination of monitoring activities (especially surveys) through regular networking (including an annual monitoring review meeting) and encouraging agencies to share their monitoring and survey plans. Ensure consistency of data definitions and data collection instruments and methods used by all New Zealand tobacco monitoring agencies. Investigate harmonisation of tobacco monitoring with Australia and with the WHO’s emerging Global Tobacco Surveillance System (see Box 3, page 36). Update this report in 3 to 5 years’ time.</td>
</tr>
</tbody>
</table>

The suggested enhancements to tobacco monitoring in New Zealand listed above are intended to serve as a basis for further discussion within the tobacco control community, including both users of monitoring information and agencies involved in monitoring activities. Such discussions should lead to a more comprehensive and better co-ordinated national tobacco monitoring system over the next two to three years. Regular (eg, three- to five-yearly) updates of this report will then serve as a means of evaluating progress in tobacco monitoring overall and so will help to maximise the contribution of monitoring to the continuous improvement of New Zealand’s tobacco control programme.
Introduction

Background

Tobacco consumption is responsible for approximately 18–20 percent of all deaths in New Zealand today (Ministry of Health 2004e) and the health impact of passive smoking in New Zealand has now been quantified (Woodward and Laugesen 2001a, 2001b, Hill 2004). Furthermore, in New Zealand as elsewhere, tobacco is not an equal opportunity killer but has a disproportionate impact on the health of disadvantaged and marginalised groups (Ministry of Health 2002).

Yet tobacco consumption can be reduced, and New Zealand’s tobacco control programme (TCP) has succeeded in changing social norms regarding tobacco use and limiting demand for tobacco products over the past quarter century (Laugesen et al 2003). However, approximately one in four adults (one in two Māori adults) are current smokers, and smoking in youth is of great concern despite recent signs of abating following an earlier surge in the mid 1990s (Ministry of Health 2003). Much remains to be done.

New Zealand-specific information about tobacco control activities, industry activities, products and their constituents and emissions, supply, access, demand, affordability, addiction and dependence, consumption, pattern of use, exposure to ‘second-hand’ smoke, intake of constituents (passive or active) and health and economic impacts is collected through monitoring, evaluation and research. Such information is critical to the continuous improvement of the TCP (both in terms of effectiveness and efficiency). Furthermore, recent developments in international and national legislation have created new challenges and opportunities for tobacco monitoring.

In January 2004, New Zealand ratified the World Health Organization’s (WHO’s) Framework Convention on Tobacco Control (FCTC) (Shibuya et al 2003). Among other requirements, countries that ratify the FCTC will be obligated to meet high standards for tobacco monitoring and will be expected to supply comprehensive and comparable tobacco statistics to the WHO to permit monitoring of the tobacco epidemic on a global scale.

Domestically, passage of the Smoke-free Environments Amendment Act 2003 introduces new tobacco control policies that will need to be evaluated and also creates regulatory powers (section 39) that could be used to require greater disclosure by the tobacco industry of information relevant to tobacco control (any such regulation would be subject to consultation and analysis).

1 Specification of requirements for country contributions to the Global Tobacco Surveillance System are yet to be negotiated by member states.
Objectives

The objective of this report is to contribute to improvement of the TCP through better monitoring.

Accordingly, the report:
- identifies the information domains relevant to tobacco control
- reviews the extent to which these identified information needs are currently being met
- prioritises gaps in monitoring
- proposes cost-effective mechanisms whereby these gaps can be closed.

Methods

A stocktake of current tobacco monitoring activities was undertaken by reviewing key documents and interviewing tobacco control experts within government and NGOs.

This was then mapped against a theoretically optimal tobacco information system designed in consultation with key tobacco policy advisors and front line tobacco control workers, drawing on earlier Canadian work (Ferrence and Stephens 2000).

Identified gaps were then prioritised based on (1) the salience of the information as judged by experienced tobacco control workers in New Zealand and (2) a literature review of cost-effective methods of collecting such data.

The report is not intended to be exhaustive. Rather the actions identified and prioritised have been further restricted to those that can realistically be implemented through better use of existing data sources, or through relatively minimal collection of additional data.

Relationship to other documents

This report expands on Objective 4 of the Ministry’s five-year plan for tobacco control in New Zealand (2004–2009), published as *Clearing the Smoke* (Ministry of Health 2004b). However, its coverage is restricted to monitoring, as opposed to research or evaluation (see Box 1, page 3).

The report builds on previous reviews of the monitoring component of the TCP, in particular a report prepared for the Health Funding Authority in 2000 (Laugesen and McClellan 2000).

Report structure

An overview of tobacco monitoring is presented first, including identification of the key information domains.

Each domain is then reviewed in turn, including an assessment of the coverage and quality of existing data sources relating to that domain.

Finally, proposals for remedying identified gaps in all domains are outlined and prioritised.
Box 1: Monitoring, research and evaluation: how do they differ?

**Tobacco monitoring** involves the regular and ongoing collection, analysis and reporting of information relating to all aspects of tobacco and tobacco control. The term is considered to be synonymous with (and preferred to) ‘surveillance’.

Monitoring is essentially descriptive, answering the ‘what?’ question. Insights are typically derived from comparing observed with expected or target levels of variables of interest, contrasts between population groups or geographic areas, or time trends. The usual data collection designs are serial cross-sectional surveys, cohort (longitudinal) studies or record linkage studies (often involving administrative databases). Monitoring is the subject of this report.

**Tobacco research** involves the generation of new knowledge concerning tobacco (eg, mechanisms of addiction, identification of harmful constituents, mechanisms of harm), tobacco use (eg, identification of predictors of adolescent smoking initiation, influence of parents and peers on youth smoking behaviours) and tobacco control (eg, feasibility of alternative nicotine delivery systems, pharmacokinetics of nicotine replacement therapy).

Research is essentially analytical, answering the ‘why?’ question. Study designs include experimental (eg, randomised controlled trials, most laboratory-based research) and observational (eg, cohort or case control studies) designs. While ‘basic’ research is easily distinguishable from monitoring and evaluation, much ‘applied’ research could be considered monitoring or (more commonly) evaluation, as these terms are used here.

The tobacco research community in New Zealand has established a network to assist in the co-ordination of research. The network has proposed a research strategy (Tobacco Control Research Strategy Steering Group 2003), co-ordinated with a Māori tobacco control research strategy that has been developed simultaneously by Aparangi Tautoko Auahi Kore.

**Tobacco control evaluation** involves assessing the effectiveness, cost-effectiveness, acceptability and impact of specified tobacco control interventions, policies and the TCP as a whole. It answers the ‘what works?’ question.

Evaluation uses a range of study designs and methods, often including qualitative techniques (especially for formative and process evaluation) as well as quantitative techniques (especially for outcome evaluation). Study designs range from randomised controlled trials to clinical audits to focus group discussions. Evaluation studies are time limited (although they may be repeated at intervals, thus acquiring some of the characteristics of monitoring).

Evaluation is often built in to the design and funding of new policies or interventions. For example, the Ministry of Health commissioned a major evaluation of Quitline that included methods ranging from statistical analysis of logged calls to structured interviews with staff. Another example is the evaluation of the Smoke-free Environments Amendment Act 2003 (currently being planned). This may include assessment of the impact of the new legislation on turnover at licensed premises, on tobacco sales, on second-hand smoke exposure in hospitality venues (measured by collecting samples from patrons for cotinine testing), on quit rates and on smoking-attributable hospital admissions.

Despite overlaps, both research and evaluation are considered to be outside the scope of this report, allowing a clear focus on monitoring per se.
Overview of Tobacco Monitoring in New Zealand

Information domains

Tobacco monitoring (as opposed to research or evaluation) involves the regular and ongoing collection, analysis and reporting of information relating to all aspects of tobacco control, including (in no particular order):

- tobacco products (including ingredients, additives and emissions)
- tobacco industry activities
- tobacco control activities
- tobacco supply
- access to tobacco products (including by children and youth)
- tobacco demand (including pricing and affordability)
- tobacco use patterns (including initiation, prevalence and smoking intensity, quitting, abstinence and relapse, and the psychosocial correlates of these behaviours)
- nicotine addiction (tobacco dependence)
- smoking cessation (including use of nicotine replacement therapy and other pharmacotherapy)
- passive smoking (exposure to ‘second-hand’ smoke)
- tobacco consumption (including intakes of constituents)
- tobacco harm (health, social and economic impacts of tobacco use and passive exposure)
- inequalities in tobacco use, consumption and burden
- meta data relating to tobacco control (including monitoring, research and evaluation).

Figure 1 provides a framework that attempts to capture key inter-relationships among these information domains, from a ‘systems’ perspective.

Figure 2 provides a more detailed look at tobacco control strategies in relation to tobacco use.

The two figures together are intended to provide a structured way of thinking about tobacco, tobacco control and tobacco monitoring and could serve as the conceptual level of a system dynamics model of the ‘tobacco system’.
Figure 1: Tobacco monitoring domains

Notes:
1 Health impacts include effects on distribution (inequalities) as well as level of health.
2 Only major relationships are shown.

Figure 2: Alternative view of key tobacco monitoring domains

NDP classification of interventions:
* Supply control
** Demand reduction
*** Problem limitation

Notes: NDP = National Drug Policy.
Why monitor tobacco?

Together with research and evaluation, monitoring provides the evidence base for the TCP. Monitoring may lead to policy action (eg, demonstration of a rising trend in youth smoking may stimulate enhancement of school-based health promotion programmes, delivery of a media campaign aimed at youth and stricter enforcement of youth access restrictions). Equally, policy may require monitoring (eg, introduction of regulation of cigarette constituents or emissions may lead to monitoring of the composition of samples of cigarettes or their combustion products).

Table 1 summarises the key users and uses of tobacco monitoring information.

Table 1: Major users and uses of tobacco monitoring information

<table>
<thead>
<tr>
<th>Major user</th>
<th>Major use</th>
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<tbody>
<tr>
<td>Government (Minister of Health)</td>
<td>Effectiveness and cost-effectiveness of tobacco control policies</td>
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<tr>
<td></td>
<td>Health, health inequality and economic impacts of tobacco consumption</td>
</tr>
<tr>
<td>Treasury, other central government agencies</td>
<td>Tobacco taxation revenue estimates</td>
</tr>
<tr>
<td></td>
<td>Economic effects</td>
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<td></td>
<td>Export earnings</td>
</tr>
<tr>
<td></td>
<td>Social effects on particular populations</td>
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<tr>
<td>Ministry of Health</td>
<td>Advice to government concerning tobacco legislation and regulation,</td>
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<tr>
<td></td>
<td>taxation, health promotion, youth access restriction and smokefree</td>
</tr>
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<td></td>
<td>environments</td>
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<tr>
<td></td>
<td>Funding public health services</td>
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<td></td>
<td>Tobacco control toolkits for DHBs</td>
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<tr>
<td></td>
<td>Statistics for international benchmarking (WHO FCTC, OECD)</td>
</tr>
<tr>
<td>NGOs and quangos (Health Sponsorship Council,</td>
<td>Effectiveness of media campaigns, smoking cessation services (eg,</td>
</tr>
<tr>
<td>ASH, Quit Group)</td>
<td>Quitline), other health promotion activities</td>
</tr>
<tr>
<td></td>
<td>Statistics (evidence) for advocacy</td>
</tr>
<tr>
<td>Public health services, DHBs, PHOs</td>
<td>Support of smokefree officers and health promoters, effectiveness of</td>
</tr>
<tr>
<td></td>
<td>local control activities</td>
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<tr>
<td></td>
<td>Regional differences in determinants of initiation, harm and cessation,</td>
</tr>
<tr>
<td></td>
<td>and second-hand smoke exposure</td>
</tr>
<tr>
<td>Researchers</td>
<td>Data for research</td>
</tr>
<tr>
<td>Journalists, public</td>
<td>Statistical information</td>
</tr>
</tbody>
</table>
Spatial and temporal dimensions of tobacco monitoring

The Ministry of Health tends to focus on national (rather than regional or local) contrasts and on annual (rather than monthly or weekly) trends. The reason of course is that tobacco control policy is fairly uniform across the country, and the outcomes of interest (eg, trends in adult smoking rates) change only gradually.²

Other users, however, may need more precisely timed or located monitoring information.

- DHBs are interested in local tobacco control activities and the burden of tobacco on local communities.
- Tobacco control agencies such as the Quit Group may need (for example) to monitor the response of a narrowly defined market segment to a specific media campaign on a weekly or even a daily basis.
- The Treasury requires precisely timed information on cigarette price and consumption to monitor trends in elasticity (eg, weekly sales figures for the months immediately preceding and following a tax rise).

² The Ministry of Health is also concerned with subnational interventions and outcomes, including at DHB and PHO levels.
Data Sources

Ideally, current and potential sources of data for the indicators within each of the information domains identified in Figures 1 and 2 (see page 5) would be discussed in turn. However, the same data source (e.g., survey) often captures data across several domains. To avoid excessive repetition, therefore, some domains have been combined for ease of presentation. The order of presentation differs for the same reason.

Tobacco supply

There are currently three sources of data relating to the supply of tobacco products to the New Zealand market:

- tobacco products released (Statistics New Zealand)
- annual tobacco returns (Ministry of Health)
- weekly supermarket sales (AC Nielsen).

Tobacco products released

Statistics New Zealand collects data on raw tobacco and finished tobacco products imported into New Zealand. The data are sourced from the Customs Service, who clear tobacco products on which duty has been paid (for finished tobacco products, excise is paid on importation; for raw tobacco processed within the country, excise is paid when the finished product leaves the manufacturer’s premises).

Through its External Trade Statistics, Statistics New Zealand monitors the export of finished tobacco products manufactured within New Zealand (by country of destination and quantity of product exported).

The difference between tobacco imported (whether further processed within New Zealand or not) and exported equals tobacco released for consumption on the domestic market. This includes product supplied to international visitors within New Zealand but excludes product imported duty-free by international travellers as well as internet purchases and smuggled product.

‘Tobacco products released’ estimates are reported monthly, quarterly and annually by Statistics New Zealand. However, there is a variable lag between clearance and consumption as products undergo storage by wholesalers between payment of excise and eventual sale to retailers. Distortion by forward buying patterns means that ‘tobacco products released’ cannot be used to accurately monitor responsiveness of consumption to policy interventions such as increases in the excise tax rate, even using the monthly or quarterly reports. However, the annual data can provide an estimate of trends.

Another limitation of this data source for monitoring the tobacco supply is the failure of the ‘number of manufactured cigarettes’ component to take account of the gradual reduction that has occurred in the weight of each cigarette when converted into weight of tobacco.
‘Tobacco products released’ data are of course only available for New Zealand as a whole (rather than regionally) and cannot be related to the characteristics of the population consuming the products (eg, age, gender, ethnic or class breakdowns).

**Annual tobacco returns**

Importers and manufacturers of tobacco/tobacco products are required under the Smoke-free Environments Act 1990 to report annually to the Director-General of Health on tobacco products sold to retailers during the previous year. Data include number of manufactured cigarettes and weight of roll your own cigarette tobacco sold. The annual tobacco returns also separately identify cigar and pipe tobacco sales, information not otherwise available. Importantly, weight of tobacco per manufactured cigarette can also be extracted from the returns. The returns also include recommended retail price of cigarettes by brand.

The Smoke-free Environments Amendment Act 2003 (section 35) may enable additional data to be included in the returns, such as a breakdown of sales by calendar month or by geographic location of retailer. Such data enhancements, if they could be achieved through the linked regulation-making powers under section 39 of the Act, would further increase the monitoring value of this data source. However, further policy analysis and consultation with affected parties would be required before any such regulations could be considered.

**Weekly supermarket sales**

Sales of tobacco products from selected retail outlets are available by week from Scantrack, a proprietary service operated by a market research company (AC Nielsen NZ Ltd). Weekly sales by volume and dollar value (for bar coded items) are collected from all supermarkets and from some Four Square stores, dairies, service stations and traditional liquor chains.

The data are reported monthly and can be disaggregated by geographic region and by retailer type. The tobacco products data are disaggregated into cigarettes, loose cigarette tobacco, cigars and pipe tobacco. Of course, the data cannot be disaggregated by the demographic characteristics of the purchaser or eventual consumer of the product as such data are generally not collected by the retailer at the point of sale.

Although limited in comprehensiveness (as not all tobacco retail outlets are included), Scantrack can still accurately monitor short-term trends in tobacco supply. This high degree of temporal resolution is valuable for monitoring the price elasticity of tobacco consumption in response to tobacco price increases. It is also useful for monitoring the impact of media campaigns or other interventions with a precisely defined and relatively short-term temporal dimension (Laugesen and Meads 1991).

Scantrack provides timely, inexpensive and reliable data. Its main limitations are lack of comprehensiveness of coverage of outlets and an inability to analyse the data by demographic characteristics of the consumer.
Home scanning of tobacco product purchases

A potentially more useful AC Nielsen retail measurement service is Homescan, which electronically captures actual consumer purchase information (including tobacco products) from 1500 demographically representative households across New Zealand.

After each shopping trip, households scan the barcodes of every product purchased into the data collection device provided and enter information relating to quantity of product purchased and price paid. Data relating to the demographic characteristics of the household are also collected (once).

This service has two major advantages over Scantrack: all retail outlets, not just supermarkets and selected other outlets, are included and purchase (equivalent to consumption) data can be analysed in conjunction with demographic information about the household (although exactly who within the household consumes exactly what proportion of each product may not be known). Nevertheless, even limited demographic information is valuable as it enables estimation of the price elasticity of demand for tobacco products by demographic subgroup.

Tobacco demand: cigarette price and affordability

The demand for tobacco products is determined by many factors, prominent among which is the price and affordability of these products (Jha and Chaloupka 1999). Other factors influencing demand, such as nicotine addiction, industry marketing activities, and TCP health promotion activities are discussed in other sections of this report.

Affordability of tobacco products influences both smoking intensity and quit rates of established users and initiation of smoking by children and young people. Young people and people on low incomes are (unsurprisingly) particularly price sensitive. So taxation of tobacco products is a major instrument in tobacco control, with powerful and consistent impacts on initiation, smoking intensity, quitting and on inequalities in tobacco consumption. However, use of taxation as a public health tool needs to be well supported by accurate and timely information on price, affordability and elasticity.

Cigarette price increases arise from increases in price initiated by tobacco manufacturers and importers, Budget increases in the tobacco excise tax rate, or from a combination of the two if tobacco companies respond to a tax increase by also raising profit margins. In addition, an annual inflation (CPI) adjustment to tobacco excise tax is made on 1 December each year; real price increases refer to an increase in price after adjustment for inflation as measured by the CPI.

Statistics New Zealand produces cigarette and tobacco price indexes, published quarterly as part of its CPI series. Currently, these are nominal indexes, but they could be expressed more usefully as real indexes by dividing the nominal index by the CPI all goods index.

Provided the timing of company-initiated price increases and tax increases is known, changes in the index can be decomposed into the proportions contributed by trade, CPI indexation or tax.
Affordability relates real cigarette price to income, with the latter generally being estimated from movements in wages and salaries, adjusted for inflation. The method used in New Zealand to construct an index of cigarette affordability has conventionally been based on estimating the minutes needed to earn 20 cigarettes. This requires estimating brand-weighted average cigarette retail price and average hourly wage rates, both available from Statistics New Zealand.

For international comparisons, however, the WHO is now using an affordability index based on the proportion of GDP per capita required to provide a smoker with 20 cigarettes per day. Data necessary to construct this index are again available from Statistics New Zealand.

Price elasticity of demand can be estimated from changes in consumption following a price increase (adjusting for other relevant variables). Information is required on both long-term and short-term elasticity and on variation and trends in elasticity by population group (eg, young people, low income people). As already stated, monitoring of short-term variations in price elasticity requires precisely timed consumption and price data.

**Tobacco use and consumption**

Data about tobacco use, and the psychosocial correlates of use, are available from a number of (sometimes overlapping) surveys. Provided data on smoking intensity are collected as well as prevalence, these surveys can be used to provide direct estimates of consumption (see Box 2, page 12). Unlike indirect estimates based on sales data, such direct estimates can be decomposed demographically, often in a very detailed way.

Nevertheless, all surveys struggle to achieve sufficient statistical power to provide precise estimates for consumption, prevalence, initiation, cessation and relapse rates for relatively small demographic subgroups (eg, young Māori women). Innovative survey designs and small population modelling techniques need to be considered for each of the surveys listed below, to address regional, ethnic and socioeconomic inequalities in tobacco use. Such methods are not considered further in this report.
Box 2: Patterns of tobacco use

Key variables in modelling exposure to harmful constituents of tobacco smoke include age at initiation, intensity of smoking, duration, time since cessation (if any), other dimensions of smoking history (eg, periods of quitting followed by relapse), type of products smoked (eg, roll your owns versus tailor-made cigarettes), cigarette design (eg, type of tobacco, additives, ingredients, emissions, density of packing of tobacco, filtration, ventilation) and smoking pattern (eg, puff number and volume, depth of inhalation, smoking down to butt, blocking of ventilation holes). ‘Compensatory’ smoking following changes in product content or design is a particular concern in relation to tobacco product modification – smokers are able to closely (and unconsciously) regulate their nicotine dose by changing the way they smoke.

As a minimum, intensity and duration of smoking should be measured (along with initiation, prevalence, quitting and relapse rates). Intensity and duration are typically combined into a measure of cumulative exposure in pack years. However, keeping intensity and duration as separate variables may lead to a better model fit (Leffondre et al 2002).

Smoking intensity can simply be measured as the average number of cigarettes smoked per day, allowing tobacco consumption to be estimated as the annual number of cigarettes consumed by the population (or cigarette equivalents, adjusting for differences in tobacco weight between roll your owns and manufactured cigarettes or between brands). Consumption can also be expressed as cigarette equivalents per capita or (preferably) per smoker.

Estimates of the prevalence of smoking, average duration of smoking (derived from current age minus age at initiation), prevalence of ex-smokers (by years since cessation) and average number of cigarettes consumed per smoker per day are the ‘core’ requirements for tobacco monitoring. In particular, these variables allow estimation from cross-sectional data of lifetime exposure in pack years, which is the dimension of exposure that correlates most closely with risk (Doll et al 1994).

Census of population and dwellings

Questions regarding cigarette smoking were included in the 1976, 1981 and 1996 censuses, and Statistics New Zealand advises that these questions will be included again in the 2006 Census but may be permanently discontinued thereafter.

It is not possible to collect more than basic prevalence of smoking through the census, given tight constraints on respondent burden. For example, the 1996 Census included only two smoking-related questions (for respondents aged 12 years or older):

- Do you smoke cigarettes regularly (that is, one or more per day)? Count only tobacco cigarettes, don’t count pipes, cigars or cigarillos.
- Have you ever been a regular smoker of one or more cigarettes per day?
These two items allow respondents to be classified as current, ex-, ever and never smokers and the quit ratio to be calculated. Importantly, prevalences and quit ratios can be estimated for ‘special’ populations far too small to be sampled in any survey. For example, census data has been used to contrast and monitor trends in smoking prevalences and quit ratios for key occupational groups (eg, doctors, nurses, teachers), for ethnic minorities and for small geographical areas such as health subdistricts and electorates (eg, Hay 1998, Borman et al 1999).

The census is in fact the only data source capable of providing empirical (as opposed to modelled) estimates of key prevalences and quit ratios for small population groups or areas – information that may be vital for improving local or population group-specific control efforts.

**New Zealand Census–Mortality Study**

The usefulness of the census smoking questions has recently been further amplified through linkage (anonymously and probabilistically) of the 1981 and 1996 Census questionnaires to mortality records for the three years following each of these censuses. This has created two cohort studies in which the entire New Zealand population is enrolled and followed up for mortality (all cause and by cause), in relation to smoking behaviour and extensive information on socioeconomic and demographic covariates.

Furthermore, through the ability of the census to provide information at the household as well as at the individual level, exposure to second-hand smoke in the home can also be estimated.

These capabilities have been used to estimate New Zealand-specific (including ethnic-specific) mortality risks and burdens associated with both active and passive smoking (Hunt et al 2004, Hill et al 2004).

The record linkage has also been used to quantify the socioeconomic gradient in smoking at the individual level, and to estimate the contribution of smoking to the socioeconomic gradient in all cause and cause-specific mortality (Blakely and Wilson 2005). Monitoring trends in these risks and burdens (both level and distribution) is an important dimension of monitoring tobacco-related harm and tobacco-related health inequality, as will be discussed later.

The 1996 Census data have also been used to relate individual smoking behaviour to the ‘smoking norms’ of the neighbourhood in which the individual lives, using multi-level analysis (Crampton et al 2000). More generally, the census allows community-level and national-level social, cultural and economic influences on an individual’s smoking behaviour to be quantified, contrasted and monitored.

**Adult health or smoking surveys**

A number of surveys provide time series data on adult tobacco use, focusing on prevalence of smoking, duration, smoking intensity, quitting behaviour, abstinence and relapse, and psychosocial correlates of use. While there is as yet no internationally recognised survey instrument for adult tobacco use, the New Zealand surveys have largely used the WHO instrument (WHO 1998) or modifications of this instrument, at least in recent years. Very similar instruments are used in the Australian National Drug Strategy Household Survey, the Canadian Tobacco Use Monitoring Survey (CTUMS) and the harmonised European Union surveys (EURO-HIS).
**New Zealand Tobacco Use Survey (NZTUS)**

This new survey (previously the tobacco module of the Health Behaviour Survey) is modelled largely on CTUMS. It is designed to be delivered by computer-assisted telephone or face-to-face interview (CATI or CAPI), with a sample size of about 4000 - 6000 and a three-month data collection period, and to be fielded every year. It has been designed for a wide age range, from 16 to 64 years, so providing information on (older) adolescent as well as adult tobacco use. The core instrument consists of approximately 120 items, including detailed questions on initiation (for younger age groups), maintenance, intensity, addiction/dependence, quitting, abstinence and relapse (mainly for older age groups). Questions on psychosocial correlates of use are also included, covering knowledge, attitudes, beliefs, self-efficacy, stage of change, smoking behaviours of significant others (family, peers, role models), cultural norms, experience of cessation interventions and much else.

This survey is intended to provide detailed information on adult (and to a lesser extent older adolescent) tobacco use and smoking behaviours every year (or less frequently for subgroups). It replaces the tobacco component of the National Drug Surveys, which were similar CATI surveys carried out by the Alcohol and Public Health Research Unit in 1998 and 2001 with a sample size of about 5500 people aged 15 to 45 years. The new survey is intended to cover a wider age range, collect more detailed and standardised tobacco use data and be iterated more frequently than the National Drug Surveys (annually versus four-yearly).

While the first wave of the new survey was originally intended to go into the field in 2004, this has been postponed to 2005 because of delays in finalising survey objectives and instruments.

**New Zealand Health Survey (NZHS)**

The NZHS is a face to face survey of approximately 12,000 people aged 15 years and over, currently fielded over 12 months every three years. The survey is designed to oversample Māori, Pacific and Asian people. The survey includes a 13-item tobacco use questionnaire based closely on the WHO instrument. As well as prevalence and intensity of daily smoking, it includes brief items on quitting behaviour (quit attempts in past 12 months, use of Quitline and nicotine replacement therapy), past smoking history and exposure to second-hand smoke at home and at work.

While not as detailed or as frequent as the NZTUS, the NZHS provides rich data on other health-related behaviours, sociocultural determinants and health outcomes – all of which can be linked to respondents' tobacco use. The two surveys – both components of the New Zealand Health Monitor (NZHM)³ – together provide a valuable data collection system for monitoring relatively stable adult smoking behaviours, with sufficient statistical power to permit considerable inequality analysis (by gender, age, ethnicity, socioeconomic position and – using small area estimation techniques – geographic region such as health district).

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³ The New Zealand Health Monitor (NZHM) is the integrated set of population-based surveys and record linkage studies funded and managed by the Ministry of Health on a 10-year rolling cycle.
AC Nielsen Quarterly Consumer Omnibus Survey

This omnibus ‘doorstep’ survey of approximately 10,000 persons per year aged 15 years and older has provided a time series of smoking prevalence since 1983. However, the survey typically achieves low participation rates (< 50 percent) and includes only two smoking-related questions (smoking prevalence and number of cigarettes smoked). Once the NZTUS and NZHS are firmly established, there may not be a continuing need for this data source.

Smokefree Auahi Kore Monitor

The Smokefree Auahi Kore Monitor is currently a biennial survey of 1500 general adult population respondents and 900 Māori adults (18 years and older). It commenced in 1999 with sample sizes of 500 in each sub-survey. Questions on smoking prevalence and intensity, quitting and exposure to second-hand smoke are included.

The survey is funded and managed by the Health Sponsorship Council and is intended mainly to guide and evaluate countermarketing activities of the council, including the council’s Māori targeted strategies. At the same time, it provides additional data on adult tobacco use (by Māori and non-Māori ethnicity), complementing that available through the NZHM.

Longitudinal Survey of Smokers

Several countries including the United States, the United Kingdom, Canada and Australia (but not New Zealand) have recently set up cohort studies of adult smokers drawn from the general population, aimed at evaluating the overall effect of tobacco control policies and programmes with regard to smoking intensity (ie, cutting down) and quitting (ie, quit attempts, maintenance of abstinence, relapse, nicotine addiction/tobacco dependence). For example, the Australian cohort consists of 2000 adult smokers followed for three years through six-monthly telephone interviews.

Such longitudinal studies are intended to provide evaluative data on the combined impact of multiple simultaneous interventions on smokers’ behaviour, while still allowing any behavioural changes to be attributed to specific interventions or interactions between specific interventions. Cross-country comparisons should also permit analysis of the links between national policies and changes in adult tobacco use, provided the surveys are consistent in design and implementation across participating countries.

General cohort studies, such as the Dunedin and Christchurch longitudinal studies, include smokers and have generated useful research information relating to tobacco (eg, Hancox et al 2004) but are less useful for ongoing monitoring purposes.

Quitline Longitudinal Study

While New Zealand does not yet have a population-based smoker cohort study, the Quit Group recently (2002/03) undertook a longitudinal study of smokers with Quitline contact to determine short- and longer-term quit (and relapse) rates. Estimates of quit rates are useful not only to evaluate smoking cessation interventions per se but also to provide inputs for modelling and projecting smoking behaviours, including future adult smoking prevalence rates.
However, this study suffers from severe selection bias in terms of such wider use of the information gained, because of its restriction to recruitment of smokers for the study through their contact with Quitline, making them non-representative of the general smoker population. While valuable in itself, the Quitline Longitudinal Study – even were it to be repeated at regular intervals – arguably does not substitute for a population-based smoker cohort study and cannot be compared to the overseas cohort studies listed above.

**Youth health or smoking surveys**

Surveys of tobacco use by adolescents differ from adult smoking surveys in content and design (especially sampling frame). For youth, the survey instrument needs to focus on initiation (including experimentation, parent and peer influences and other psychosocial correlates of initiation). Addiction is an even more important consideration for youth than for adults. While quitting behaviour is perhaps less important than for adults, it is still necessary to collect data on quitting intentions and quit attempts among adolescents. Unlike adult surveys, youth surveys generally also include questions on access to tobacco products (including sources of supply and barriers and facilitators such as pocket money) (Reeder et al 2000).

Self-reported tobacco use correlates well with biochemical tests (cotinine in saliva, blood or urine) among adults (generally to within 2 to 5 percentage points), yet under-reporting is typically much more severe among adolescents. Recent studies have shown that this is partly attributable to concerns about privacy (being overheard by parents in interviews carried out in the home setting) (Stanton et al 1996). For this and also for cost-effectiveness reasons, school-based sampling frames are preferred for youth.

The age group to be included in ‘youth’ surveys should ideally be 10 to 19 years. However, a substantial proportion of older adolescents (17 to 19 years) will already have left school and so cannot be accessed through school-based sampling frames. Other problems with school-based frames include failure of some schools to agree to participate at all (due to pressures on schools from multiple sources) and the need to revisit at least once as generally 10 percent or more of students who have consented to participate will not be successfully located on any one school day.

**Youth2000**

While New Zealand has no institutionalised youth health survey, in 2001 a national survey of approximately 13,000 randomly selected secondary school students aged 13 to 17 years, the Youth2000 survey, was carried out by the University of Auckland. This survey, which employed a novel, multimedia, computer-assisted, self-interview approach that proved highly acceptable to participants, collected detailed data on students’ tobacco use. Moreover, it allowed tobacco use behaviour to be analysed in relation to a wide variety of other variables, including other drug use, other risky behaviours, home life (including relationship with parent(s), parental smoking and attitudes to smoking), school performance, peer relations and peer smoking, involvement in part-time work and access to money and a wide range of other psychosocial correlates of tobacco access and use.
At present, it is planned to repeat the survey at five-yearly intervals, coinciding with each census, and design work on Youth2006 has begun. However, funding is uncertain at the time of writing, and it is currently unclear whether this survey will be institutionalised as a major vehicle for monitoring adolescent behaviour, health, wellbeing – and tobacco use.

**New Zealand Health Monitor (NZHM)**

Youth2000 and Youth2006 are linked to, but not a core part of, the NZHM. However, both the New Zealand Tobacco Use Monitoring Survey and the New Zealand Health Survey (which are core components of the NZHM) – while not specifically orientated towards adolescents and their concerns – do include samples of young people (16 to 19 years of age). Use of CATI and/or CAPI techniques in these surveys enables a reasonable level of privacy to be achieved despite being home-based. These surveys may be particularly useful in monitoring tobacco use patterns (and their psychosocial correlates) among older adolescents, for whom the school-based frames do not provide good coverage.

**Year 10 Smoking Survey (ASH)**

Surveys of Year 10 (fourth form, ages 14 to 15 years) students have been undertaken annually by ASH since 1997 (funded by the Ministry of Health since 2003 and the Health Funding Authority prior to that), following an earlier similar survey in 1992. Since 1999, around three-quarters of all secondary schools have participated each year, with approximately 30 000 students in each survey. The most recent survey has included Year 12 students as well, and has been linked to the Youth Lifestyle Study (see below) to ease the administrative burden on schools.

Survey forms with instructions are mailed to all secondary schools, and teachers supervise completion of the questionnaires by the students. Because of this design, it is not always clear how the sample has been selected and how consistently the survey has been administered. Strictly, the sample is not based on a known probability of selection and conventional statistical analysis may not be fully appropriate. On the other hand, the large sample size and annual frequency make this survey a useful vehicle for monitoring trends and contrasts between demographic groups in tobacco use at this critical age for initiation (Laugesen and Scrugg 1999). Data on second-hand smoke exposure in the home, and parental smoking (inside or outdoors), is also collected. Each school gets back its own survey results, providing teachers with an opportunity to generate discussion about tobacco in the classroom, so serving a direct health promotion function.

**Youth Lifestyle Study (YLS)**

The Youth Lifestyle Study (YLS) is a biennial survey of approximately 3500 secondary school students (years 10 and 12), probability sampled using a school-based sampling frame. It is administered in the classroom by a researcher to ensure accuracy in sampling and reporting. The questionnaire includes items on general topics of concern to youth as well as a more detailed section related to smoking. The latter includes some items on initiation, addiction/dependence, access, brand preference, smoking context, intention to quit, quit attempts and self-efficacy, beliefs about tobacco-related harms, attitudes to smoking and smokers, and awareness of social marketing and other tobacco control activities. The survey is designed to allow international comparison with similar surveys in other developed countries, being Global Youth Tobacco Survey based and meeting the criteria defined under the Framework Convention on Tobacco
Control. The YLS is funded and managed by the Health Sponsorship Council, with input from the New Zealand Cancer Society, the Quit Group and the University of Otago.

**Pre-Teen Survey**

The Health Sponsorship Council also separately surveys younger children, generally 10 to 11 years of age, on a biennial basis. The most recent survey, a classroom-based Year 6 survey, was fielded in 2004. The main purpose of the Pre-Teen Survey is to gather data on experimentation and initiation. The survey is intended to assist the Health Sponsorship Council in designing and implementing its youth-focused tobacco control interventions but should be of interest to a wider audience. For example, estimates of initiation rates are a critical input into modelling and projecting tobacco use and burden.

Together, the YLS, Pre-Teen Survey and the ASH Year 10 Smoking Survey provide much of the data necessary for monitoring adolescent tobacco use in New Zealand, especially if complemented by a repetition of the Youth2000 survey in 2006 (and each census year thereafter). The NZTUS and the NZHS flesh out the picture for older adolescents in particular.

However, none of the existing or planned surveys currently include a detailed assessment of addiction (nicotine dependence) using a tool such as the Hooked On Nicotine Checklist (HONC) (DiFranza et al 2002). Ideally a cohort study, following up Pre-Teen Survey participants from age 10 to 15, and (a subsample of) participants in the ASH Year 10 Smoking Survey or the YLS from ages 14 or 15 to ages 19 or 20, with refreshment every five years, would allow predictors of adolescent smoking to be monitored in depth.

This is particularly important from an inequalities perspective as international evidence suggests that experimentation and initiation is similar across all social classes and ethnic groups, but young people from more advantaged backgrounds are less likely to become addicted and more likely to quit than their less privileged counterparts (Reeder et al 2000). New Zealand research (Scragg et al 2003) has also identified the key importance of parental smoking in addition to peer smoking in early adolescent experimentation. This should now be included within the set of monitoring indicators.

**Smoking in pregnancy**

A key population in terms of tobacco harm is pregnant women, as exposure of the fetus in utero or of the infant after birth to cigarette constituents poses serious risks to health.

There are four approaches to monitoring tobacco use during (and after) pregnancy.

- Tobacco surveys can be analysed with regard to tobacco use by female respondents of reproductive age (whether or not they know they are pregnant).
- Questionnaires on tobacco use during pregnancy can be administered to samples of women who know they are currently pregnant (or have recently given birth) – either women included by chance in other adult surveys or recruited into a special survey of pregnant women.
• Anonymised data on tobacco use collected routinely in the process of antenatal or postnatal (or infant) care can be aggregated and analysed.

• Samples of leftover bloods collected routinely in the process of antenatal care can be tested for cotinine (again, after anonymising).

As with adolescents, pregnant women under-report smoking more than their non-pregnant counterparts (perhaps because of the greater social desirability bias). For example, a New Zealand study found that almost one quarter of cotinine positive pregnant women failed to self-report smoking, corresponding to a 5 percentage point under-reporting rate compared to 1 percentage point for non-pregnant women (Ford et al 1997). However, this does not invalidate monitoring of trends through self-reporting, provided that the level of under-reporting remains stable over time – although this may change with increasing unacceptability of smoking in pregnancy among most social groups.

Inclusion of pregnancy questions in general adult health or tobacco surveys

Surveys of the general adult female population can be used to estimate the prevalence of smoking in pregnancy, although this will typically require pooling of data from several waves as only approximately 5 percent of women aged 18 to 44 years will be pregnant at any one point in time.

The NZTUS would provide a suitable vehicle for such monitoring in New Zealand, with perhaps two or three waves needing to be aggregated to get sufficient power. Alternatively, the NZHS may have some advantages for this purpose (mainly its larger sample size and inbuilt ethnic oversampling), despite its lower frequency (three-yearly rather than annually).

Administrative data collection: Plunket database

Since July 2002, the Royal New Zealand Plunket Society has been monitoring smoking during pregnancy and (more especially) around infants and toddlers. At every core visit, two smoking-related questions are asked.

• Is there anyone in your household who is a tobacco smoker?
• During the past three days, did you or any other person smoke in places while your baby was there?

The data are recorded on palmtop computers and downloaded weekly for central processing. The core visits at which this data are collected are scheduled for ages 4 to 6 weeks, 6 to 9 weeks, 3 months, 5 months, 9 months, 15 months, 2 years and 3 years. Data on smoking history before and during the pregnancy are collected retrospectively at the first visit.

This is a potentially useful source of data about smoking after as well as during pregnancy, although coverage is not yet complete.
Administrative data collection: birth record linkage

PHI has begun linking antenatal, delivery and postnatal records for each birth cohort from 1997 onwards. Estimates of smoking prevalence in pregnancy are similar to those derived from other sources (eg, in 2000, 18.5 percent among pregnant women compared to 25 percent among the general female population matched for age).

This record linkage approach also enables the health impact of smoking in pregnancy to be monitored by following up each cohort of infants of smoking and non-smoking mothers for birth outcomes (birthweight, prematurity, complicated delivery) and subsequent hospitalisations (and death).

The linkage method currently in use is deterministic, matching records from the Lead Maternity Carer database (so covering home as well as hospital births), the hospital separations database and the mortality collection (all operated by New Zealand Health Information Service). At present, we succeed in linking infants to mothers for over 80 percent of each birth cohort (since 1997).

Antenatal blood testing

Pregnant women routinely have two antenatal blood samples taken, one in the first and the other in the third trimester. Leftover samples in each case can be tested for cotinine, and the results related (anonymously) to the (limited) sociodemographic and clinical data collected on the laboratory request form. Linking first and third trimester samples from the same woman allows quit rates during pregnancy to be estimated (and possibly related to type of lead maternity provider and health district).

This method has been used successfully to monitor smoking in pregnancy, including trends from 1994 to 1997, in Christchurch (Ford et al 1997). There would seem to be little reason why this method could not be rolled out nationally, using a nationally representative random sample of anonymised leftover bloods. Its major limitation is the sparse sociodemographic data available on the lab request form.

Each of the monitoring methods described above has advantages and disadvantages, and a combination of three or four of the listed approaches may prove most cost effective. This requires further exploration.

Exposure to second-hand smoke

Monitoring of exposure to second-hand smoke (‘passive smoking’) in various settings (home, work, recreation, commuting) is central to the Smoke-free Environments Act 1990 and its Amendment Act 2003. Recent research has documented the extent, attitudes to and health impact of such exposure in New Zealand in work (Woodward and Laugesen 2001a, Wilson and Thomson 2002), home (Hill et al 2004, Thomson et al 2005b) and car (Thomson et al 2005a) settings.
National Research Bureau second-hand smoke surveys

Currently, trends in second-hand smoke exposure have been monitored mainly through surveys commissioned by the Ministry of Health and fielded by the National Research Bureau in 1989, 1991, 1996 and 2001. However, these telephone surveys (typically with around 2000 respondents) are largely restricted to collecting data about exposure at work only (as well as public attitudes to such exposure).

Other surveys and administrative databases

In future, data on exposure in (some or all of) home, car, hospitality and recreational venues and work settings will be available from multiple sources:

- New Zealand Census–Mortality Study (provided smoking questions are retained in the census)
- Plunket database
- New Zealand Health Monitor (both the NZTUS and the NZHS)
- the Health Sponsorship Council’s Smokefree/Auahi Kore Monitor, the YLS and ASH’s Year 10 Smoking Survey.

However, none of these data systems will collect sufficiently detailed information about exposure in the workplace, necessitating repetition of the specialised National Research Bureau survey at regular (possibly five-yearly) intervals.

The National Research Bureau or NZTUS surveys will also need to be extended to include detailed questions about exposure in hospitality venues, in view of the new legislation. The Ministry of Health is also considering monitoring this policy by commissioning cotinine testing of samples of bar patrons (although this would be a component of a time-limited evaluation of the new legislation rather than an ongoing monitoring activity).

Tobacco products

Mix of tobacco products

The ratio of roll your own to manufactured or tailor-made cigarettes consumed by New Zealanders has risen over (at least) the past decade, perhaps reflecting price differences between these products, and currently is approaching 50 percent overall (Ministry of Health 2003). This is important in view of the fact that roll your own cigarettes are not necessarily filtered and because of differences in tobacco weight and constituent composition between roll your own and tailor-made cigarettes (and between different brands of roll your own tobacco).

4 These National Research Bureau surveys also collect data on active smoking and so are yet another source of smoking prevalence estimates. However, adult active smoking prevalence estimates from these surveys are consistently lower than corresponding estimates from other surveys, possibly reflecting restriction of the target population to adults living in private dwellings with a working landline.
Among manufactured cigarettes, there are similar differences between brands and brand types and variants. Market shares by brand therefore need to be monitored as well. There are also recent changes in cigarette design, largely related to the so-called ‘less dangerous’ cigarette, that may lead to substantial changes in market shares over the next 5 to 10 years.

Non-cigarette tobacco products, and novel tobacco products such as ‘reduced smoke’ cigarettes, are not yet sufficiently widely used to be of major health significance in New Zealand, although there is concern that chewing tobacco is gaining in popularity among some immigrant communities. Surveillance over the importation, smuggling and consumption of these products needs to be maintained, and regular monitoring may need to be introduced should consumption increase to significant levels.

Beyond monitoring the mix of tobacco products sold (especially manufactured cigarettes versus roll your own cigarette tobacco, and the use of filters in relation to the latter), key constituents of tobacco products and their emissions (combustion products) should be included in any comprehensive tobacco monitoring strategy.

**Unburnt tobacco (tobacco ingredients and additives)**

Weight of tobacco per cigarette has declined over time in New Zealand (Laugesen and McClellan 2000). The weight of tobacco per manufactured cigarette differs by brand and brand type. Trends in the distribution of tobacco weight in roll your own cigarettes are difficult to monitor, and research to develop methods for doing this accurately and cost-effectively is increasingly needed as the proportion of roll your own cigarettes increases.

Monitoring tobacco weight per cigarette is important for estimating tobacco consumption from data on product sold, both for trend analysis and for international comparison (weight per cigarette varies across countries as well as brands).

Data on weight of tobacco per cigarette are available in the annual tobacco returns provided (by law) by tobacco manufacturers and importers to the Ministry of Health. Data on tobacco weight by brand for all tobacco products on which excise is paid are also available from the Customs Service (Napier and Petone). At least one manufacturer also provides this information on its website.

Beyond tobacco weight, other constituents of unburnt tobacco that may be considered for monitoring include a range of additives and ingredients, in particular toxins such as nitrosamines and heavy metals (Ministry of Health 2004f). Testing of unburnt tobacco constituents does not require a smoke machine, and there are several laboratories that could undertake this monitoring work, using appropriate analytical standards.
Cigarette smoke (tobacco emissions)
Tobacco products vary in the emissions (combustion products) generated when burnt, in particular the concentration in smoke of addictive substances (nicotine and possibly other substances), carcinogens (tar and gaseous phase compounds) and other toxins, both over time and across brands. Under the Smokefree Environments Act 1990 manufacturers and importers are at present required to report only the quantity of tar, nicotine and carbon monoxide per cigarette. This restricted set of constituents provides only a limited – and even misleading – assessment of the hazards in smoke.\(^5\)

The Smoke-free Environments Amendment Act 2003 may allow the government to regulate to require disclosure by the industry of a wider range of harmful constituents (potentially by brand and brand variant). The Ministry of Health has recently consulted on this issue, by releasing a discussion paper and calling for submissions (Ministry of Health 2004f). Based on this, further policy work may be done as to which emissions are most harmful, which constituents to test for, what testing methodologies to use, how to adjust for compensatory oversmoking and what quality standards to require.

More fundamentally, the question needs to be asked as to what the policy usefulness of additional emissions data would actually be, particularly in the context of growing international policy interest in harm reduction approaches to tobacco control, whether through tobacco product modification or development of alternative nicotine delivery systems.

**Tobacco industry activities**
Several tobacco industry activities, including tobacco products and supply, have already been described. Here we consider just two additional aspects of industry behaviour:

- marketing activity
- tobacco imagery.

**Marketing activity**
A range of industry marketing activities could be monitored, especially in relation to precisely timed tobacco sales data and enforcement activities. They include the following:

- product placement in retail outlets (including signage)
- extent of sales representative contact with retailers
- websites
- marketing to youth through text messaging and other new media
- industry contact with youth-related organisations
- changes in product packaging.

\(^5\) The identifiable fraction of tobacco smoke toxicity is mainly due to low molecular weight volatiles in the vapour phase of the smoke, rather than to particulates or tar. A New Zealand study found that – adjusting for nicotine yield, filter ventilation and compensatory oversmoking – 1,3 butadiene, hydrogen cyanide and acrolein were major contributors to cancer, cardiovascular and respiratory toxicity respectively (Fowles and Dybing 2003).
**Tobacco imagery**

The main sources of tobacco imagery in New Zealand today are movies, television programmes and imported magazines. Positive images of smoking in the media, especially if this involves movie stars and pop musicians, may be linked to initiation of smoking by youth.

Methods for monitoring the occurrence and nature of tobacco imagery in these media (but not the internet) are well developed\(^6\) (Glantz et al 2004). Trends in tobacco imagery could then be linked to trends in youth smoking (from the surveys described above) to inform policy development with respect to initiatives to discourage initiation.

**Tobacco control activities**

From a monitoring and evaluation perspective, tobacco control activities can usefully be categorised as follows:

- funding
- meta data on monitoring, research and evaluation
- evaluation of the TCP (or specific tobacco-related policies)
- regulatory (enforcement) activities:
  - access restrictions/sales to minors
  - protection of smokefree environments
  - tobacco product constituents and labelling
- social marketing activities:
  - mass media campaigns
  - media advocacy (unpaid media publicity)
- other health promotion activities:
  - school-based health education programmes
  - health professional education and resourcing
  - special programmes targeting high need or ‘hard to reach’ groups
- smoking cessation services:
  - provision of tobacco dependence treatment (eg, Quitline, brief intervention in primary health care settings)
  - special treatment services for high need groups (eg, people living on low incomes, pregnant women, hospital patients)
  - subsidy for nicotine replacement therapy
- excise tax policy (tobacco mainly, but also alcohol as this also affects tobacco use).

\(^6\) For example, one method is to ascertain the top 10 movies seen by teenagers every school holidays, score them for tobacco imagery (and sum the scores) and monitor trends in this exposure over time.
Several of these activities require an evaluation rather than a monitoring approach; others have already been discussed under other headings. Here we comment briefly on just three control activities from a monitoring perspective:

- level of funding of the TCP
- social marketing activities
- smoking cessation services.

**Level of funding of the TCP**

Total funding on tobacco control can be compared with international benchmarks (United States Centers for Disease Control 1999), with expenditure on other public health programmes (e.g., problem gambling) and with the tobacco excise tax take.

The balance between funding of various tobacco control activities can also be examined (e.g., expenditure on enforcement versus media campaigns versus subsidised smoking cessation services).

The coverage of funding and subsidies for different subgroups of the population (i.e., the degree of targeting of resources to high-need groups) can also be examined.

**Social marketing activities**

Administrative data is available from the Health Sponsorship Council on its social marketing activities. Any major mass media campaign will have evaluation built in from the outset. Here we comment briefly on media advocacy.

The public’s exposure to news stories largely outweighs their exposure to mass media campaigns (Durrant et al. 2003) and so can be a valuable and inexpensive complement to paid advertising (albeit less controllable in message and medium). Previously, a newsclipping service had been used to monitor tobacco-related stories in the print media (Laugesen and McClellan 2000). More recently, methods that use electronic searching of the print media and also cover the electronic media have been used by some NGOs and researchers (Thomson and Wilson 2004).

**Smoking cessation services**

Administrative databases are available to monitor use of subsidised nicotine replacement therapy and provision of counselling in general practice and other primary health care settings. Data on nicotine replacement therapy sales are available from Pharmac. Also, HealthPac collects data from pharmacies on redeemed nicotine replacement therapy cards provided through the Quitline as well as Quit Cards, a cessation programme run by the Quit Group. This as yet untapped data source would allow use of nicotine replacement therapy products provided through these programmes to be monitored.

The Quit Group monitors calls to Quitline. Daily monitoring has enabled response to a single television commercial to be assessed (Wilson 2004). Interestingly, this data source was also able to reveal the ‘September 11’ effect (Wilson et al. 2002). As well as fine temporal resolution, analysis by STD code may allow monitoring of Quitline use by DHBs.
In summary, despite concerns as to selection bias, Quitline data represents a data source that could be more widely used to inform tobacco monitoring at both national and health district levels. Its value would be further enhanced if it were combined with precisely timed tobacco use data. Repetition of the Quitline Longitudinal Study (see page 15), in which callers are re-contacted to estimate short- and longer-term quit and relapse rates, would be a useful enhancement of this data source.

The Ministry of Health is also developing a ‘standardised smoking cessation reporting template’. This will assist in evaluating the effectiveness of all providers of cessation services and should also be explored for possible monitoring value.

Social impact of tobacco consumption

Health impact
Quantifying and monitoring the health impact of tobacco consumption powerfully informs tobacco control policy, builds public support for tobacco control initiatives (including taxation) and contributes to evaluation of the overall performance of the TCP.

Mortality
Fatal outcomes attributable to active smoking by adults are currently monitored annually using Peto’s method (Peto et al 1992). Such monitoring could be made more timely if the New Zealand Cancer Registry accorded priority attention to coding lung cancer registrations and deaths, as is done for breast and cervical cancer.

The method could also be improved by using a smaller correction factor for confounding in the relative risk estimates than is conventional (Thun et al 2000, Malarcher et al 2000). Use of relative risk estimates derived from the New Zealand Census–Mortality Study rather than the US Cancer Prevention Study II should also be explored, as the former are more appropriate for Māori (Hunt et al 2004).

Smoking-attributable mortality can be measured not only in terms of counts and rates (all cause and by cause) but also in terms of years of life lost, contribution to avoidable mortality burden and impact on survival (smoking deleted life expectancy).

The mortality impact can be monitored not only by year but also by health district and even by electorate (pooling several years of data to obtain stable estimates). Analysis by demographic group and by precise cause of death also has major policy implications.

Morbidity
There are two major sources of data on non-fatal outcomes that can be related to patterns of tobacco use:

- administrative databases (such as public hospital discharges, registers such as the registered blind and databases of prescriptions)
- surveys (such as those listed above).
In each case, counterfactual modelling similar to that described above for mortality can be done to attribute a proportion of the morbidity or disability to tobacco use.

**Summary measures of population health**

Attributable mortality and morbidity (disability) data can be combined mathematically to estimate the health burden of tobacco in terms of disability adjusted life years (Ministry of Health 1999) or impact on health expectancy (smoking deleted health expectancy). Such summary measures of the tobacco burden are useful in assessing overall trends and contrasts and provide useful outcome measures for evaluating the overall performance of the TCP.

In general, these measures may be calculated for subnational populations (eg, ethnic groups, socioeconomic groups) and DHBs, as well as at national level. The costs to the publicly funded health system of preventing and treating tobacco-related diseases may also be estimated, given data (available from the Ministry of Health) on cost of illness.

**Second-hand smoke**

Mortality and morbidity attributable to passive smoking have been estimated using conventional population-attributable risk techniques (Woodward and Laugesen 2001a, 2001b). Attributable mortality relating to home exposure has also been estimated using the New Zealand Census–Mortality Study 1996–99 cohort, perhaps the world’s largest study on this topic (Hill et al 2004).

Both methods can be repeated at regular intervals to monitor this burden, although the New Zealand Census–Mortality Study method depends on continued inclusion of the smoking questions in future censuses (beyond 2006).

**Projections of mortality and morbidity**

A range of modelling and forecasting methods, including age/period/cohort, multistate life table, microsimulation and system dynamics models can be used to project exposure (tobacco consumption and use patterns) and burden (fatal and non-fatal outcomes of active and passive smoking) for different population subgroups.

While such projections can be very useful for planning, it is essential that uncertainty of the projections not only be quantified but that the sources of uncertainty are understood (and, if possible, minimised).

**Economic impact**

The cost of tobacco consumption to New Zealand (from a societal perspective) and to government (especially to Vote Health) can be quantified (Phillips et al 1992, Easton 1997, Public Health Commission 1994). Such information is again powerful both for policy advocacy and for health promotion.
The United States Centers for Disease Control has developed software (SAMMEC) to estimate smoking-attributable mortality, morbidity and economic costs that covers maternal and child as well as adult age groups and allows these burdens to be estimated using internationally consistent definitions and methods (see www.cdc.gov/tobacco), so permitting international comparative studies. SAMMEC could be used alongside methods ‘customised’ for New Zealand.

The impact of smoking on disposable household income is important for low income smoking households, especially those where the smoker(s) appears unable to quit or cut down in response to excise tax rate increases. The Household Economic Survey has been used (with adjustment for under-reporting)7 to estimate that some low income households may be spending as much as 14 percent of total disposable income on tobacco products (Thomson et al 2002, Wilson et al 2004). Associations between household tobacco spending and other factors, such as nutrition and social stress, can also be studied from this and similar surveys. Such information is important in New Zealand, where taxation is the major policy lever for tobacco control.

Tobacco and inequality

Tobacco is not an equal opportunity killer, and inequalities in the distribution of both tobacco consumption (and exposure to second-hand smoke) and the tobacco burden (health and economic) need to be carefully monitored (Kunst et al 2004). New Zealand studies have thoroughly documented the contribution of tobacco to socioeconomic and ethnic (especially Māori to non-Māori) gradients in mortality (Ministry of Health 2002, Blakely and Wilson 2005, Hill et al 2003, Crampton et al 2000, Barnett et al 2005).

However, tobacco use cannot be understood merely as an individual-level behaviour: neighbourhood effects and the influence of higher collectivities (eg, acculturation of migrants with loss of cultural non-smoking norms for migrant women) need to be examined as well. This necessitates multilevel thinking, if not multilevel analysis. Related to this are the effects of place itself, that is, geographic inequalities independent of social or cultural context An example would be the impact on health inequalities of local availability of tobacco outlets and the quality and reach of local tobacco control programmes (eg, access to subsidised nicotine replacement therapy, enforcement of youth access and smokefree environment legislation).

There is evidence (Reeder et al 2000) that socioeconomic gradients in adolescent experimentation with and initiation of smoking are relatively small but that young adults from disadvantaged backgrounds find it more difficult to quit than do their more privileged counterparts. This means that disadvantaged groups not only typically have higher smoking prevalence rates than more advantaged groups but also have longer durations of smoking on average and higher cumulative pack years of exposure (although their smoking intensities may be similar).

7 The Household Economic Survey has been found to underestimate household tobacco consumption (expenditure) by up to 50 percent (Thomson et al 2002, Wilson et al 2004), necessitating use of external data to adjust the Household Economic Survey data, a not entirely satisfactory solution. Attempts to improve the quality of the empirical data collected in the Household Economic Survey are required.
Ethnic differences in the health and economic impacts of tobacco consumption in New Zealand are shaped by the experience of multiple disadvantage and discrimination (Robson 2004). Tobacco monitoring needs to include such ‘upstream’ determinants rather than merely content itself with describing ethnic patterns of tobacco use in isolation of the social context of such use.

Routine health statistics (births, deaths, hospitalisations, cancer registrations) can be geocoded to census area unit (so allowing a deprivation score to be assigned using the New Zealand Deprivation Index (Crampton et al 2000)). Most of the tobacco use surveys described in this report collect extensive sociocultural and demographic data (as well as geocodable residence), allowing detailed analysis of inequalities in consumption (and to a lesser extent second-hand smoke exposure) to be carried out.

Having said this, it must be acknowledged that all current and planned surveys have limited statistical power for analysis of relatively small subgroups (eg, rates for young Māori, Pacific or Asian women – a matter of some policy importance). Equal explanatory power is particularly difficult to achieve for surveys using an area-based sampling frame. Innovative survey designs (such as use of multiple sampling frames) and small area (population) estimation methods may be necessary to produce reasonably precise estimates for small groups, especially taking respondent burden into account.

Economic burden of tobacco at household level can be related to household characteristics through the Household Economic Survey (Statistics New Zealand). This has been used (Wilson et al 2004) to quantify the impact of increases in cigarette prices on low income households where the smoker(s) are not always able to cut down or quit in response to the price increase, an issue of some policy importance, perhaps especially for Māori whānau (Robson 2004).

Beyond surveys, inequalities in smoking and in the smoking burden are monitored through the New Zealand Census–Mortality Study (albeit such monitoring is currently restricted to fatal outcomes, although extension to cancer registrations is currently under development). So long as the smoking questions remain in the census, the New Zealand Census–Mortality Study provides serial cohort studies in which the entire population is followed up for mortality (by cause) in relation to smoking behaviour and a wide range of sociodemographic variables.

Furthermore, counterfactual modelling of smoking attributable mortality can be based on exposure and risk estimates derived from the same dataset (ie, from the New Zealand Census–Mortality Study itself). As mentioned earlier, New Zealand-specific relative risk (hazard) estimates are particularly relevant for Māori, for whom the conventionally used Cancer Prevention Study II estimates (derived from a United States population) may be less appropriate (Hunt et al 2004). Also, the New Zealand Census–Mortality Study simultaneously provides estimates for the prevalence and burden of second-hand smoke exposure in the home (by demographic factors including household type), with the relative risk estimates once again being appropriate for our population groups.
The major limitation of the New Zealand Census–Mortality Study is that data will only become available every five years. Longitudinal data on exposure and burden will also be available from the Survey of Family, Income and Employment, a longitudinal study of approximately 20,000 adults currently being fielded by Statistics New Zealand, which includes the New Zealand Health Survey tobacco instrument in waves 3, 5 and 7. While likely to provide less detail on socioeconomic circumstances, data from the proposed Longitudinal Survey of Smokers should also be useful in this regard.

Analysis of geographic variation in tobacco use is challenging using survey datasets, especially if estimates by population subgroup (age, gender, ethnicity, class) are required for relatively small regions (such as most health districts). Small area estimation techniques may be used to model this data, otherwise reliance must continue to be placed on the five-yearly census. Also, multilevel modelling should be explored to throw light on neighbourhood, peer group and family influences on an individual’s tobacco use and (especially) initiation, quitting and relapsing behaviour.
Conclusions

Information domains

This report includes a conceptual model (Figures 1 and 2, page 5) that structures tobacco monitoring information into a logical framework. This may assist data suppliers to see how their contribution fits into the ‘big picture’ while also assisting information users to adopt a systems view and make sense of what might otherwise appear to be disconnected ‘islands’ of information. The framework was also found to be helpful in identifying unmet information needs (gaps in coverage of the monitoring system), as discussed below.

Gaps in tobacco monitoring

The stocktake of monitoring activities (current and planned) undertaken for this report was mapped against a theoretically optimal national tobacco monitoring system (based in part on Ferrence and Stephens 2000). This identified a number of unmet or partially met information needs in several of the information domains identified in Figure 1 (page 5). Indicators to meet these needs were further refined and prioritised in consultation with experienced tobacco control workers in New Zealand. The prioritisation criteria were (1) salience of the indicator for tobacco control policy and (2) feasibility of collecting or analysing the data necessary to generate the indicator.

The results of this process are summarised in Table 2, in which the priority order has been slightly modified to bring indicators or data sources tapping the same information domain together – which is necessary to make the proposed monitoring developments sensible from a systems perspective.

Table 2: Possible additional indicators or data sources and suggested actions to implement them, in prioritised order*

<table>
<thead>
<tr>
<th>Indicator or data source</th>
<th>Actions</th>
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<tbody>
<tr>
<td><strong>Tobacco use</strong></td>
<td>Implement survey currently under development, with annual waves and oversampling of Māori.</td>
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<tr>
<td></td>
<td>Collect detailed data on smoking intensity, including number of puffs per cigarette and extent of inhalation.</td>
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<td></td>
<td>Include assessment of nicotine addiction/tobacco dependence.</td>
</tr>
<tr>
<td></td>
<td>Critical issue is to be able to monitor not only prevalences, but also quitting and relapse rates.</td>
</tr>
<tr>
<td>New Zealand Tobacco Use Survey</td>
<td>Implement survey currently under development, with annual waves and oversampling of Māori.</td>
</tr>
<tr>
<td></td>
<td>Collect detailed data on smoking intensity, including number of puffs per cigarette and extent of inhalation.</td>
</tr>
<tr>
<td></td>
<td>Include assessment of nicotine addiction/tobacco dependence.</td>
</tr>
<tr>
<td></td>
<td>Critical issue is to be able to monitor not only prevalences, but also quitting and relapse rates.</td>
</tr>
<tr>
<td>Smoking in pregnancy and around baby</td>
<td>Fully utilise Plunket database.</td>
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<td>Further develop Public Health Intelligence’s Birth Linkage Study.</td>
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<td></td>
<td>Investigate practicality of cotinine testing of leftover antenatal blood samples as part of an ongoing, nationwide monitoring system (eg, based on a random sample of antenatal clinics).</td>
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<tr>
<td>Indicator or data source</td>
<td>Actions</td>
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<tr>
<td>Youth smoking</td>
<td>Improve quality of ASH Year 10 Smoking Survey (frame, non-response, probability sampling) and ensure co-ordination with the YLS.</td>
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<td></td>
<td>Advocate for funding of Youth2006 survey and its repetition every census year.</td>
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<td></td>
<td>Investigate building a longitudinal component onto the Pre-Teen and YLS (or ASH) surveys to monitor predictors of youth smoking (possibly</td>
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<td>including a nicotine addiction scale such as the Hooked On Nicotine Checklist).</td>
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<tr>
<td>Census 2006 and New Zealand Census–Mortality</td>
<td>Advocate for inclusion of the smoking questions in censuses beyond 2006.</td>
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<tr>
<td>Study</td>
<td>If successful, use New Zealand Census–Mortality Study to monitor hazards of active and passive smoking (mortality and cancer), and</td>
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<td>inequalities in these hazards.</td>
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<tr>
<td>Inequalities</td>
<td>Explore ways to achieve adequate statistical power in all surveys to permit full analysis of inequalities (including innovative survey</td>
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<td></td>
<td>designs and small population estimation techniques).</td>
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<tr>
<td>Smoking cessation</td>
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<tr>
<td>Quitline</td>
<td>Fully utilise Quitline database as a monitoring tool for smoker behaviour and its psychosocial correlates, including responses to</td>
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<td>interventions such as new legislation, price rises and media campaigns.</td>
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<td></td>
<td>Carry out a second longitudinal study of callers, unless a population-based Longitudinal Survey of Smokers is implemented.</td>
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<tr>
<td>Longitudinal Survey of Smokers</td>
<td>Investigate costs and benefits of implementing such a survey, including international benchmarking.</td>
</tr>
<tr>
<td>NRT use</td>
<td>Utilise available data on sale of nicotine replacement therapy (Pharmac) and redemption of nicotine replacement therapy cards (HealthPac)</td>
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<td></td>
<td>as an additional means of monitoring smoking cessation.</td>
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<tr>
<td>Nicotine addiction/tobacco dependence</td>
<td>Investigate possible instruments (eg, Hooked On Nicotine Checklist) and vehicles for monitoring nicotine addiction/tobacco dependence</td>
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<td></td>
<td>(especially, but not exclusively, in adolescents – see above regarding Youth2006 survey).</td>
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<tr>
<td>Second-hand smoke exposure</td>
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<tr>
<td>Workplace settings</td>
<td>Implement the National Research Bureau survey on a regular basis (at least five-yearly).</td>
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<td></td>
<td>Investigate use of other data sources (ie, most of the tobacco use surveys) to complement this survey.</td>
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<tr>
<td>Hospitality venues</td>
<td>Implement a regular survey, or extend the existing National Research Bureau or other tobacco use surveys, to include monitoring of</td>
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<td>exposure (and attitudes etc) in hospitality venues.</td>
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<tr>
<td>Home settings</td>
<td>Investigate best use of existing sources (including Plunket database and most tobacco use surveys, for example, the ASH Year 10</td>
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<tr>
<td></td>
<td>Smoking Survey) to monitor exposure in the home, and relate this to five-yearly census estimates (if smoking questions retained).</td>
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<tr>
<td>Indicator or data source</td>
<td>Actions</td>
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<tr>
<td><strong>Tobacco demand</strong></td>
<td></td>
</tr>
<tr>
<td>Index of cigarette price</td>
<td>Monitor real rather than nominal indexes of cigarette and tobacco prices, and their decomposition (trade, tax, Consumer Price Index adjustment).</td>
</tr>
<tr>
<td>Index of cigarette affordability</td>
<td>Monitor both ‘minutes to earn’ and ‘proportion of per capita GDP’ based indexes.</td>
</tr>
<tr>
<td>Price elasticity of demand</td>
<td>Use precisely timed data on price and consumption (the latter estimated using weekly supermarket sales data together with homescanning data) to regularly monitor price elasticity, overall and by demographic subgroup.</td>
</tr>
<tr>
<td><strong>Tobacco supply</strong></td>
<td></td>
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<tr>
<td>Annual tobacco returns by month of sale and district of sale</td>
<td>Investigate added value of seeking disaggregated monthly sales data in the annual tobacco returns (as a complement to weekly supermarket sales data). Investigate disaggregation by geographic region of retailer (and retailer type) to better inform local control activities.</td>
</tr>
<tr>
<td>Weekly supermarket sales data</td>
<td>Regularly purchase weekly supermarket sales data (1) as an input into monitoring price elasticity and (2) to relate to other ‘shocks’, for example, introduction of new legislation, media campaigns, etc.</td>
</tr>
<tr>
<td>Homescan</td>
<td>Investigate purchase of Homescan data to enable demographic subgroup monitoring of trends in consumption (for use alongside weekly supermarket sales data, or possibly as a substitute for this).</td>
</tr>
<tr>
<td><strong>Tobacco products</strong></td>
<td></td>
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<tr>
<td>Tobacco weight</td>
<td>Investigate cost-effective methods of monitoring tobacco weight in roll your own cigarettes accurately and precisely. Investigate regulating to require all tobacco manufacturers and importers to report weight of tobacco (by brand and brand type).</td>
</tr>
<tr>
<td>Unburnt tobacco constituents (ingredients and additives)</td>
<td>Investigate costs and benefits of regular laboratory testing of key toxic or otherwise harmful constituents (including additives) that can be measured in unburnt tobacco, such as nitrosamines and heavy metals (see Ministry of Health 2004f).</td>
</tr>
<tr>
<td>Cigarette smoke constituents (emissions)</td>
<td>Investigate costs and benefits of testing a wider range of smoke constituents (emissions) than is currently done (by brand and brand variant if possible), using appropriate methods (eg, to adjust for compensatory smoking) (see Fowles and Bates 2000, Ministry of Health 2004f).</td>
</tr>
<tr>
<td><strong>Health and economic impacts of tobacco</strong></td>
<td></td>
</tr>
<tr>
<td>Societal and government cost</td>
<td>Use available data to monitor economic effects of tobacco routinely, as is done for health impact.</td>
</tr>
<tr>
<td>Household spending on tobacco</td>
<td>Investigate ways to reduce under-reporting of tobacco expenditure in the Household Economic Survey, or identify other data sources to monitor proportion of household income spent on tobacco, by household type and socioeconomic position.</td>
</tr>
<tr>
<td>Indicator or data source</td>
<td>Actions</td>
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<tr>
<td>Health impacts, including by type and small area</td>
<td>Investigate ways to improve monitoring of attributable mortality, including by small population and small area. Investigate ways to improve monitoring of attributable morbidity and disability. Regularly update estimates of health impact of passive smoking, using New Zealand Census–Mortality Study and/or other data sources. Investigate ways to improve estimation of tobacco’s contribution to health inequalities (and of inequalities in tobacco use, consumption and exposure to second-hand smoke). Investigate ways to improve the modelling and projection of tobacco use, consumption, second-hand smoke exposure and health impacts (level and distribution).</td>
</tr>
<tr>
<td>Tobacco industry activities</td>
<td></td>
</tr>
<tr>
<td>Tobacco imagery</td>
<td>Implement regular monitoring of tobacco imagery on television, movies and imported magazines.</td>
</tr>
<tr>
<td>Disclosure</td>
<td>Fully utilise tobacco industry data on products, sales and marketing available under the smoke-free environments regulations, or published on company websites.</td>
</tr>
<tr>
<td>Tobacco exports</td>
<td>Utilise data routinely available from Statistics New Zealand to monitor trends in export of finished tobacco products from New Zealand, especially to our Pacific neighbours.</td>
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<tr>
<td>Tobacco control activities (NEC)</td>
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</tr>
<tr>
<td>Aggregate tobacco control programme funding</td>
<td>Utilise data available from the Ministry of Health and NGOs to monitor the level and distribution of expenditure on tobacco control activities and their evaluation, and benchmark nationally and internationally.</td>
</tr>
<tr>
<td>Media advocacy</td>
<td>Investigate ways to monitor content, frequency, reach and impact of unpaid media reports and articles on tobacco control.</td>
</tr>
<tr>
<td>Enforcement activity</td>
<td>Although this is more evaluation than monitoring, various aspects of enforcement activity can be monitored, for example, youth access restrictions, underage sales, smokefree environments. Perhaps of most importance is to monitor the numbers of controlled purchase operations carried out (by district) and resultant prosecutions and convictions.</td>
</tr>
<tr>
<td>Monitoring activity</td>
<td>Improve co-ordination of monitoring activities (especially surveys) through regular networking (including an annual monitoring review meeting) and encouraging agencies to share their monitoring and survey plans. Ensure consistency of data definitions and data collection instruments and methods used by all New Zealand tobacco monitoring agencies. Investigate harmonisation of tobacco monitoring with Australia and with the WHO’s emerging Global Tobacco Surveillance System (see Box 3, page 36).</td>
</tr>
<tr>
<td></td>
<td>Update this report in 3 to 5 years’ time.</td>
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</tbody>
</table>

* Indicators listed in priority order from highest to lowest. Actions are not prioritised within indicators/data sources.
This is a lengthy list, hence the need to prioritise – although the priority listing suggested above may not meet with universal agreement. Note that the proposed actions are not costed, nor is responsibility for them assigned to specified agencies. Rather the purpose of this list (and of this report as a whole) is to provide a basis for discussion with tobacco monitoring agencies and policy users of such information.

**Roles and responsibilities in tobacco monitoring: Public Health Intelligence**

Many agencies are involved in tobacco monitoring (some also in evaluation and research) (see Appendix, page 42). Here we briefly summarise the role of Public Health Intelligence (PHI) only.

PHI is the unit of the Ministry of Health mandated to monitor the health of the population, including both level and distribution of health and risks to health. As such, PHI holds overall responsibility for co-ordinating the ‘virtual network’ of agencies involved in different monitoring activities, which together could be said to constitute the ‘national tobacco monitoring system’. Co-ordination could make monitoring more effective and efficient by minimising unnecessary overlaps in data collection while at the same time identifying gaps (as has been done in this report), facilitating collaboration and sharing of data between agencies and enhancing the policy relevance of the data collected by engaging users of this information in an ongoing debate on monitoring. Co-ordination could be achieved through agencies sharing monitoring plans and through an annual monitoring review meeting, as well as through ongoing networking and regular updating of this overview report.

As well as network co-ordination, PHI takes the lead in ongoing planning for, and evaluation of the performance of, the ‘national tobacco monitoring system’ more generally. Again, involvement of users is essential in this process. Gaining consensus for (and publishing) ‘best practice’ standards for monitoring, including agreement on selection of data collection instruments, and standardisation of data definitions, are important parts of this role. This may require PHI to undertake or commission research to test new instruments or assess the feasibility of new data collection vehicles (eg, surveys).

PHI also represents New Zealand’s tobacco monitoring system at the international level. This includes sharing monitoring methods and results with the relevant Australian agencies, as well as with intergovernmental organisations such as the WHO (in terms of the Framework Convention on Tobacco Control) and the OECD. Being aware of developments in tobacco monitoring internationally can be helpful in improving our own monitoring system, and in interpreting international comparisons of tobacco monitoring indicators in a way that is meaningful (see Box 3, page 36).
Box 3: The Global Tobacco Surveillance System (GTSS)

The WHO, with support from the United States Centers for Disease Control and other organisations, is currently developing the Global Tobacco Surveillance System (GTSS). The goal of the GTSS is to improve the ability to monitor the tobacco epidemic globally and to assist countries to monitor their domestic tobacco epidemics and evaluate their own tobacco control programmes.

The GTSS has four components:

- The **Global Youth Tobacco Survey** (GYTS), which collects data on initiation, prevalence, access, exposure to second-hand smoke, exposure to media and advertising, addiction and cessation. The GYTS uses a standardised methodology for constructing the sampling frame and selecting schools and classes, and it employs a uniform questionnaire, consistent field procedures and standard data management, analysis and reporting processes. This ensures cross-country consistency, allowing national benchmarking and learning from the experience of other countries. The Youth Lifestyle Study operated by the Health Sponsorship Council is GYTS compatible.

- The **Global School Personnel Survey** (GSPS), which collects data on tobacco use by school personnel, tobacco policies in schools and the extent to which tobacco and health is included in school curricula. This component recognises the school as a key setting for preventing initiation of youth into tobacco use. There is no equivalent New Zealand survey, although data on school policies and curricula is available from the education sector.

- The **Global Health Professionals Survey** (GHPS), which collects data on tobacco use, knowledge and attitudes from health professionals and students attending medical, dental, nursing and pharmacy schools. This recognises the importance of attitudes of health professionals (ie, antismoking but not antismoker) and their competence in brief interventions for smoking cessation. This topic is not regularly surveyed in New Zealand, although some data is available from ad hoc surveys carried out by one or other medical or nursing school. Basic smoking prevalence data for doctors, nurses and teachers are available from censuses that have included the smoking questions.

- The **Global Information System for Tobacco Control** (GISTC), which compiles statistics for all member states regarding prevalence, consumption, economic aspects of tobacco and laws and regulations relating to access and use by both youth and adults. When fully developed, the GISTC will include interactive web-based tools for each of the WHO’s six regions. Country requirements for statistics to be provided under the GISTC are currently being revised to be Framework Convention on Tobacco Control compatible.

Finally, PHI is involved in reporting the findings from the monitoring system, and assisting the National Drug Policy Team to integrate this information with the results of evaluation and research studies as appropriate, to feed into the policy cycle.
'Headline’ indicators relating to tobacco are included within the Ministry of Health’s general reporting frameworks, for example in three annual reports: the *Health and Independence Report* (Ministry of Health 2004c), *Implementing the New Zealand Health Strategy* (Ministry of Health 2004d) and *An Indication of New Zealanders’ Health* (Ministry of Health 2004a). For some key indicators, the recently released five-year strategic plan for tobacco control, *Clearing the Smoke* (Ministry of Health 2004b), specifies quantitative targets, which will need to be closely monitored.

More detailed (albeit still summarised) monitoring information is useful for the wider tobacco control community and is currently reported annually in *Tobacco Facts* (eg, Ministry of Health 2003) and less frequently (approximately four- to five-yearly) in *Tobacco Statistics* (eg, Cancer Society 2000).

Recently, reporting has begun to move away from traditional print media towards electronic products that allow users more flexibility and interaction with the data (often presented in the form of highly customisable maps, charts and tables for each indicator). Ongoing consultation with users will be necessary to ensure that reporting evolves in a way that meets the needs of the tobacco control community as a whole.

In summary, the present ‘overview’ report on tobacco monitoring has identified and (to some extent) prioritised gaps in monitoring and has suggested solutions to close those gaps, as a basis for further discussion within the tobacco control community. The monitoring debate should include both consumers of scientific evidence and agencies involved in producing the evidence.

Such a debate should lead to a more comprehensive and better co-ordinated national tobacco monitoring system over the next two to three years. Regular (eg, three- to five-yearly) updates of this report will then serve as a means of evaluating progress in tobacco monitoring overall and so contribute to continuous improvement of New Zealand’s Tobacco Control Programme.
References


Appendix: Agencies involved in Tobacco Monitoring

This appendix lists agencies undertaking monitoring activities in alphabetical order (agencies whose involvement in monitoring is restricted largely to funding these activities, eg, the Cancer Society, the Heart Foundation, have not been included).

**Action on Smoking and Health New Zealand (ASH)**
ASH administers the Year 10 Smoking Survey and provides feedback on survey results to secondary schools and public health units.

**Health Sponsorship Council**
The Health Sponsorship Council undertakes youth surveys, including the Youth Lifestyle Study and the Pre-Teen Survey, and operates the Smokefree Auahi Kore Monitor.

The Health Sponsorship Council is a social change agent, marketing important health messages to New Zealanders. It has developed the health brands Smokefree and Auahi Kore and promotes these through social marketing, including mass media campaigns, media advocacy, public relations, sponsorships and educational programmes and resources. Its surveys are aimed particularly at informing and evaluating its health promotional activities.

**Institute of Environmental Science and Research (ESR)**
ESR, a Crown Research Institute, has at times been commissioned to undertake analysis of the constituents of unburnt tobacco and tobacco smoke. One of the actions proposed in this report would involve an extension of this role.

**Ministry of Health**
The arm of the Ministry responsible for tobacco monitoring is Public Health Intelligence. The specific roles and responsibilities of PHI in this regard have been discussed on page 35.

More generally, PHI’s role is to monitor the health of New Zealanders, risks to their health (including tobacco) and social determinants of health. As well as levels of health (or risk), PHI is charged with monitoring distributions of these variables (ie, social and geographic inequalities in health). Such inequalities are particularly prominent in relation to tobacco.

**Public Health Units of District Health Boards**
Staff employed by Public Health Units include smokefree officers and health protection officers. These staff conduct controlled purchase operations and monitor other aspects of youth access restrictions and smokefree environments.

Health promotion staff of Public Health Units also monitor and evaluate other aspects of local tobacco control activities, often carried out jointly with local government or other agencies.
Royal New Zealand Plunket Society (Plunket)

Plunket (a major non-profit organisation providing well child and family health services) collects smoking related data from carers of infants on an ongoing basis, including data on smoking in pregnancy and around infants and toddlers. This report proposes more extensive use of the Plunket database.

The Quit Group

The Quit Group manages the Quit/Me Mutu Campaign. Quit smoking support is provided through the free Quitline service. The group also carries out media campaigns, other advertising and public relations activities to encourage smokers to stop smoking and to call the Quitline for support and advice. The Quitline is contracted to provide support, advice and nicotine replacement therapy to up to 35,000 callers a year (it is one of few such services worldwide to include subsidised nicotine replacement therapy as part of its smoking cessation services).

The Quit Group analyses data on the Quit/Me Mutu Campaign and data relevant to smoking characteristics of callers using the Quitline. The Quit Group recently completed a longitudinal (follow-up) study of Quitline callers to analyse callers’ quitting behaviours in the short and longer terms and is currently seeking funding for a second such survey. This report proposes that such a repeat survey be considered and more generally that greater use be made of the extensive database on smokers’ intentions, behaviours and quitting experiences built up by the Quit Group from its logged calls and follow-up calls.

Statistics New Zealand

Statistics New Zealand undertakes censuses that intermittently include questions regarding tobacco smoking. The need to advocate for retention of the smoking questions in censuses beyond 2006 has been emphasised at several points in this report.

Statistics New Zealand also undertakes surveys, including the Household Economic Survey, which provides information regarding household spending on tobacco products. Statistics New Zealand collects and publishes Customs Service data regarding tobacco products released and calculates the tobacco component of the CPI. The need to reduce under-reporting of expenditure on tobacco products in the Household Economic Survey has been mentioned previously in this report.

Universities

Universities are mainly involved in tobacco related research and evaluation (which are outside the scope of this report) but may assist with monitoring activities as well. For example, the New Zealand Census–Mortality Study is a joint project of the Ministry of Health and the University of Otago. The University of Otago has also been involved with monitoring the economic cost of tobacco consumption borne by households.