

*Do Bugs Need Drugs?*

2012/13

Annual Evaluation Report



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**2012/13 Annual Evaluation Report**

**July 2013**

**Prepared for  
British Columbia Ministry of Health,  
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## About this Report

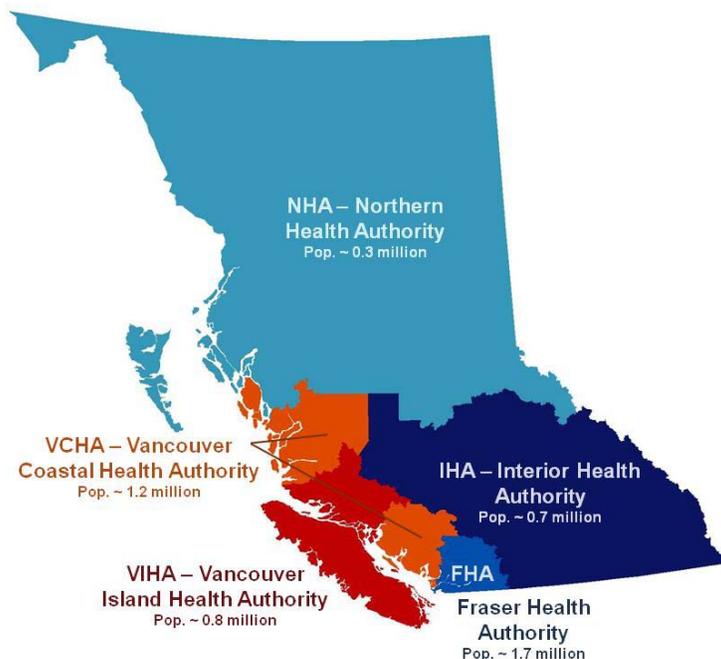
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The *Do Bugs Need Drugs?* (DBND) program is a multifaceted public and health care professional education program geared towards decreasing antibiotic overuse and misuse and the spread of resistant organisms ([www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)). The DBND program was initially implemented in British Columbia (BC) in the fall of 2005, following the success of the program in Alberta. Since then, various components of the program have been established province-wide.

Evaluation of the DBND program includes Program Process Evaluation and Program Outcome Evaluation components. Program Process Evaluation is comprised of a media campaign, a health care professional and public education program, a public teaching program, and print material distribution. Program Outcome Evaluation includes surveillance of antimicrobial utilization and antimicrobial resistance trends in BC.

This report highlights program implementation and evaluation activities for the DBND program in BC for the 2012/13 fiscal year. Historical data from previous years' reports are presented to examine longer-term trends over time. Education activity numbers are presented by fiscal year (April to March), while public teaching numbers are presented by school year (September to August) to correspond to the peak teaching periods for the DBND program. As program implementation numbers can vary considerably, scale bars on figures are not consistent across program components.

BC is divided into five regional health authorities: Interior Health Authority (IHA), Fraser Health Authority (FHA), Vancouver Coastal Health Authority (VCHA), Vancouver Island Health Authority (VIHA), and Northern Health Authority (NHA) (**Figure 1**). Wherever possible, program implementation and evaluation numbers are presented separately for each Health Authority (HA).



**Figure 1.** Map of regional Health Authorities in BC, including 2012 population estimates (P.E.O.P.L.E. 2012)

## Acronyms

ATC	Anatomical Therapeutic Chemical
BC	British Columbia
DBND	<i>Do Bugs Need Drugs?</i>
DDD	Defined Daily Doses
ECE	Early Childhood Educator
FHA	Fraser Health Authority
HA	Health Authority
IHA	Interior Health Authority
K-3	Kindergarten to Grade 3
NHA	Northern Health Authority
PSA	Public Service Announcement
VCHA	Vancouver Coastal Health Authority
VIHA	Vancouver Island Health Authority
VFS	Vancouver Film School

## Funding

The DBND program evaluation was originally funded by the Michael Smith Foundation for Health Research for two years, starting in June 2006. Ongoing evaluation is now funded on three-year funding cycles by the Pharmaceutical Services Division of the BC Ministry of Health as part of the overall DBND program implementation in BC. The current funding period ends in March 2014.

## Executive Summary

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This report summarizes the evaluation of the *Do Bugs Need Drugs?* (DBND) program in British Columbia (BC) for the 2012/13 fiscal year. Since its implementation in BC in the fall of 2005, the DBND program has been an important public health initiative. Evaluation of the DBND program encompasses **Program Process Evaluation** and **Program Outcome Evaluation** components.

### Program Process Evaluation

- This year's paid **public transit advertising campaign** ran from September 3 to September 30, 2012, and was viewed an estimated 30 million times during this period in the Metro Vancouver area. Additional advertising ran from October 1 to October 14, 2012, at no charge to the DBND program.
- The **television advertisement campaign** ran for a five to six week period in January and February 2012 and featured a 30-second advertisement focusing on hand washing. Target audience reach exceeded 60% in all regional markets.
- A total of 39 health care professional and public education sessions were held during the 2012/13 fiscal year, including one **Public Education** session with members of the general public, three **Program Introduction** sessions to recruit academic and health care institutions to participate in the program, seven **Continuing Education** sessions with health care professionals, and 28 **Train-the-Trainer** sessions to teach health care professionals and students how to deliver the DBND public teaching components.
- During the 2012/13 fiscal year, 489 public teaching sessions were taught to over 10,000 individuals across the province. By program component, 312 **Grade 2** sessions were taught to 7,107 children; 39 **Daycare** sessions were taught to 589 children; six **Older adult** sessions were taught to 118 staff and residents in long-term care; 84 **General Teaching** sessions were taught to 1,979 individuals; and 48 sessions under the **K-3 Teacher Resources** component were provided to 1,125 children.
- In 2012, over 80,000 **print materials**, including activity placements, stickers, signs and posters, parent guides, and pamphlets, were distributed across the province.
- The new 2012 edition of the *Bugs and Drugs* book has been distributed to 13,963 health care professionals (12,163 hardcopies and 1,800 iPhone Apps), as of July 3, 2013.

### Program Outcome Evaluation

- A comprehensive summary of antimicrobial utilization trends in the province of BC is compiled in a separate report entitled "British Columbia Annual Summary of Antibiotics Utilization." The most recent version of this report (2010) is available from our website: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd).
- A comprehensive summary of antimicrobial resistance trends in the province of BC is compiled in a separate report entitled "Antimicrobial Resistance Trends in the Province of British Columbia." The most recent version of this report (2011) is available from our website: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd).

# Introduction

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Human antibiotic use is a known driver of antibiotic resistance.<sup>1,2</sup> Although antibiotic resistance is a naturally occurring biological phenomenon, it has been exacerbated by the abuse, overuse and misuse of antimicrobials. As such, efforts should be put in place to strategically reduce the overuse and misuse of antibiotics at the individual and population levels. Combined, these efforts not only have the potential to arrest and possibly reverse the current upward trends in resistance, but also have the potential to alleviate the burden placed on individuals and the health care system associated with antimicrobial resistant infections.

Various interventions have been implemented in an effort to improve judicious antibiotic use and to reduce inappropriate use. These interventions can be generally classified as those targeting changes in prescribing behaviour among prescribers and patients,<sup>3,4,5</sup> public health campaigns to raise awareness about antibiotic resistance and inappropriate antimicrobial therapy,<sup>6</sup> and administrative restrictions and policies such as formulary restrictions.<sup>7,8</sup> The most successful results appear to be associated with multifaceted interventions, specifically those combining physician, patient, and public education through a variety of venues and formats.<sup>4</sup>

## Do Bugs Need Drugs? Program

The *Do Bugs Need Drugs?* (DBND) program is a multifaceted public and health care professional education program geared towards decreasing antibiotic overuse and misuse and the spread of resistant organisms ([www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)). The program focuses on providing educational material, presentations, and workshops centred around three key messages to the public and health care professionals in the community:

1. **Wash your hands!** Hand washing is the best way to stop the spread of infections.
2. **Not all bugs are created equal.** Antibiotics work against bacteria, but not against viruses.
3. **Use antibiotics wisely!** Bacteria can become resistant to antibiotics.

The DBND program was initially implemented in British Columbia (BC) in the fall of 2005, following the success of the program in Alberta. Since then, various components of the program have been established province-wide. The current report highlights program implementation and evaluation activities for the DBND program in BC for the 2012/13 fiscal year.

Evaluation of the DBND program includes two main components: **Program Process Evaluation** and **Program Outcome Evaluation**. Process evaluation includes surveillance of program implementation and scope including monitoring media reach, health care professional and public education, program teaching numbers, and print material distribution. Outcome evaluation is currently comprised of surveillance of antimicrobial utilization and antimicrobial resistance trends in the province of BC. Ongoing evaluation of the DBND program is necessary to assess the impacts of this program, direct future efforts, and ensure continued public benefit.

The DBND evaluation objectives are to measure the following:

1. **Program Implementation.** Tracking and evaluating the progress of the different components and efforts of the program, including the number of health care professionals and members of the public exposed to various components of the program.
2. **Changes in Knowledge, Attitudes, and Intended Behaviour.** Pre- and post-assessments of the public and health care professionals knowledge and attitudes regarding antibiotic use and resistance in relation to the program.
3. **Trends in Antimicrobial Utilization.** Epidemiological analysis of trends in antimicrobial utilization over time with respect to overall use of antibiotics, overuse of specific antibiotic classes, and misuse of antibiotics for common infections when they are not required.
4. **Trends in Antimicrobial Resistance.** Updates from the annual “Antimicrobial Resistance Trends in the Province of British Columbia” report, which monitors trends in antimicrobial resistance among key organisms.

## Publications

Each year, the DBND program prepares annual surveillance reports to monitor trends in antimicrobial utilization and antimicrobial resistance in BC. These reports are intended to inform the Ministry of Health, health care professionals, and the general public about our surveillance and outcome evaluation activities. Annual reports include the “British Columbia Annual Summary of Antibiotics Utilization” and “Antimicrobial Resistance Trends in the Province of British Columbia.” The most recent versions of these reports are available on our website: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd). Updated versions of these reports are anticipated later this year.

To date, team members have contributed to three peer-reviewed publications as part of the overall DBND program evaluation. The primary audience of these publications is the academic and medical communities. Two articles discuss aspects of the evaluation of the program; these articles were published in the *Canadian Journal of Public Health* and the *Canadian Journal of Infectious Diseases and Medical Microbiology* in 2010 and 2011, respectively.<sup>9,10</sup> A third publication evaluating the addition of moxifloxacin to the BC provincial drug formulary was accepted for publication in the *Canadian Journal of Infectious Diseases and Medical Microbiology* in June 2013.

During the past year, DBND team members presented the results of an analysis examining a drug resistance index at the Association of Medical Microbiology and Immunology (AMMI) Canada Annual Conference in Quebec City, QC, in April 2013 and at the Canadian Public Health Association (CPHA) Annual Conference in Ottawa, ON, in June 2013. These results were also presented as part of the BC Centre for Disease Control Research Week in November 2012. A poster summarizing some of the implementation and evaluation components of the DBND program was presented at the Provincial Health Services Authority (PHSA) Nursing Week in May 2013.

The DBND program is also increasingly referenced in the published scientific literature. Two peer-reviewed articles include DBND among campaigns reviewed for their impact and characteristics.<sup>6,11</sup> A recent article describes the use and adaptation of DBND program materials to a particular context.<sup>12</sup> These examples are suggestive of the growing public health community recognition of, and support for, the program.

## Program Logic Model

The Program Logic Model depicts the different components of the overall program as well as how they contribute to a decrease in antibiotic resistance in BC through public and professional education and an increase in proper antibiotic prescribing practices (**Figure 2**). The model is used in the planning, implementation, and evaluation of the program. The model is dynamic and changes as the program develops.

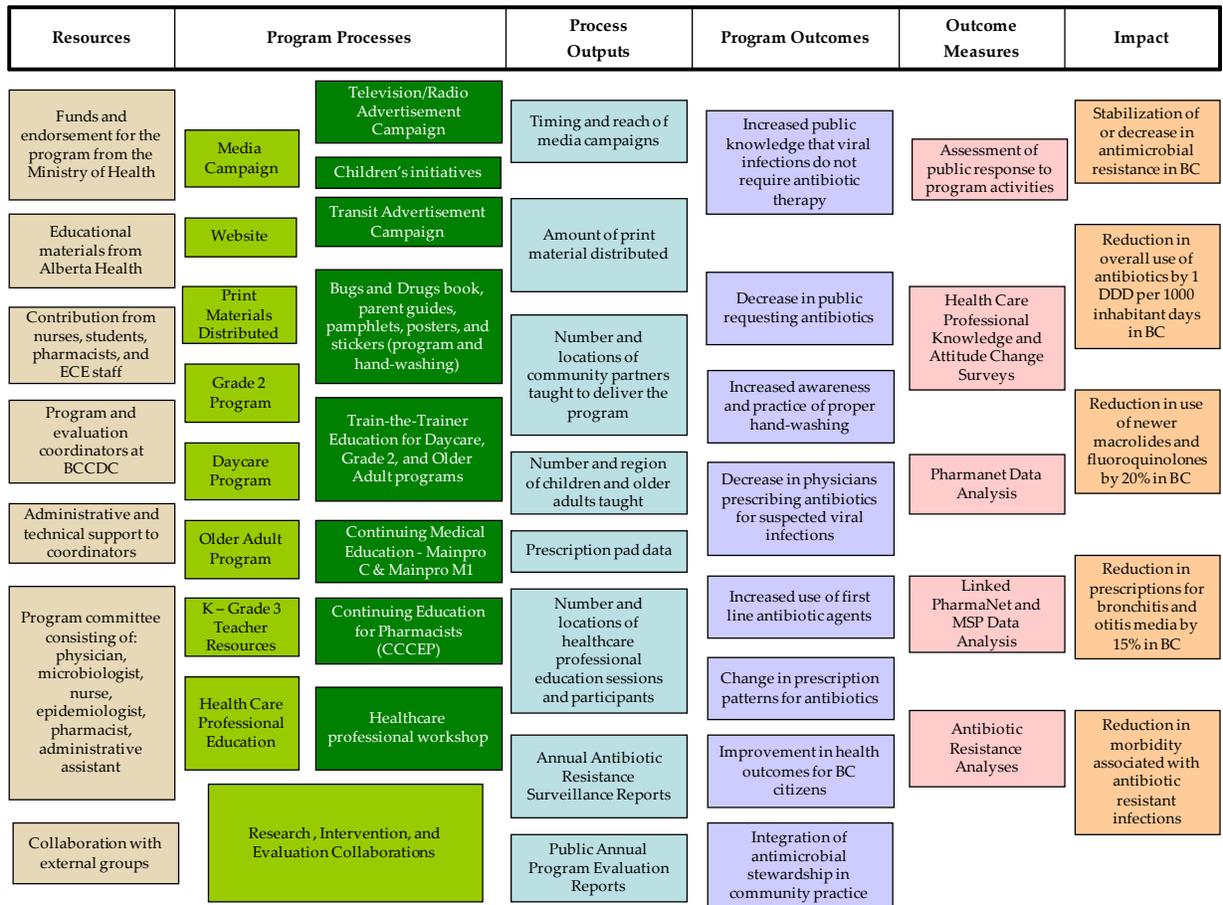


Figure 2. Program logic model (revised June 2012)

# Program Process Evaluation

## Media Campaign

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The DBND media campaign is composed of three major advertisement campaigns: 1) public transit, 2) television, and 3) children's initiatives. Since implementation in 2006 (television) and 2007 (public transit), these media campaigns have been run on an annual basis. The target audience for these campaigns is women aged 25-54, with secondary target audiences including men aged 25-54, teachers and educators, and doctors and other health care professionals. The children's media initiatives are targeted toward young children aged 2-11 and their parents through co-viewing.

In response to suggestions from stakeholders following our 2010 Annual DBND Stakeholder Advisory Committee Meeting, media messaging moved away from the focus on hand washing to again include messaging focused on antimicrobial resistance and appropriate antimicrobial use. Accordingly, new media campaign material was developed, including new transit advertising posters (see Appendix) and a new television advertisement, which was developed and produced in Alberta. These advertisements ran initially during the 2011/12 media campaign.

In order to improve our understanding of the public responsiveness to this messaging shift, a series of focus groups were held in 2011 with mothers, fathers, and adults aged 65 and over. Findings from the focus groups suggested that, while there was generally strong support for the content of the television advertisement aired in January and February 2012, there were mixed opinions about the advertisement itself. Many participants did not fully understand or hear the messages until a second or third focused viewing. Focus group participants suggested that the content of the advertisements should be simplified, for example by showing fewer scenes. In response to these suggestions, a decision was made to air a television advertisement that focused on hand washing from 2008/09 for this year's media campaign. A more detailed summary of the focus group findings can be found in the 2011 DBND Annual Program Evaluation Report.

In an effort to create new media campaign materials that are aligned with our messaging shift towards antimicrobial resistance and appropriate antimicrobial use, collaboration was initiated with the Vancouver Film School (VFS). In the fall of 2012, VFS students were invited to participate in creating a 30-second video and related media campaign materials for the BC DBND program. The incentive was intended to align with the VFS course requirements. Transit advertisements based on the VFS students' design will be used for the 2013/14 media campaign.

### Public Transit Advertisement Campaign

This year's paid public transit advertising campaign ran from September 3, 2012 to September 30, 2012. Additional advertising ran from October 1, 2012 to October 14, 2012 at no charge to the DBND program. A total of 582 advertisements were posted during this year's campaign: 33 advertisements on the Skytrain in Metro Vancouver, 20 advertisements on the Canada Line in Metro Vancouver, and 529 advertisements on buses in Metro Vancouver, Victoria, and Kelowna (**Table 1**).

Ridership was estimated at 10.6 million people on the Expo Skytrain line and 3.0 million people on the Millennium Skytrain line for the months of September and October in 2012.<sup>13</sup> Ridership on the Canada Line during the same time period was 6.3 million people. Average monthly boardings for buses in Metro Vancouver totalled 18.7 million people per month in 2012, ranging from 1.0 million people per month in North Vancouver to 8.2 million people per month in Vancouver.

**Table 1.** Number of public transit advertisements posted by type of transit and type of advertisement, fall 2012

Type of Transit	Type of Advertisement*				TOTAL
	Platform Posters	Exterior Cards (Trains)	Interior Cards (Buses)	Exterior Cards (Buses)	
Skytrain (Vancouver)	25	8	-	-	33
Canada Line (Vancouver)	16	4	-	-	20
Buses (Vancouver)	-	-	260	30	290
Buses (Victoria)	-	-	150	30	180
Buses (Kelowna)	-	-	50	9	59
<b>TOTAL</b>	<b>41</b>	<b>12</b>	<b>460</b>	<b>69</b>	<b>582</b>

\* Skytrain platform posters are 70.75" x 45" and are placed on Skytrain and Canada Line platforms. Exterior cards (trains) are 36" x 444" and are placed on the exterior of Skytrains and Canada Line trains. Interior cards (buses) are 11" x 35" and are placed in the interior of buses. Exterior cards (buses) are 39" x 140" and are placed on the exterior of buses.

## Television Advertisement Campaign

The television advertisement campaign ran for a five to six week period in January and February 2012. As described above, this year's campaign featured a 30-second television advertisement focusing on hand washing that originally aired during our 2008/09 media campaign.

A television campaign Post Buy Summary was provided by Hallamedia Inc.<sup>14</sup> Target audience reach and average viewing times among women aged 25-54 by regional market are provided in **Table 2**. Regional market coverage included Metro Vancouver/Vancouver Island (CTV, CTV2, Global, CITY, and Omni television networks), Kelowna (CHBC-TV television network), the Kootenays (CHAN1-K television network), Prince George/Kamloops (iNTV and CHAN1-PG television networks), Terrace/Kitimat (CFTK, CHAN1-TK, and CTV-TK television networks), and Dawson Creek (CJDC and CHAN1-DC television networks).

**Table 2.** Target audience reach and average viewing times among women aged 25-54 by regional market, January to February 2013

Regional Market	Percent of Target Audience Reached*	Average Number of Times Viewed / Campaign Period
Vancouver/Vancouver Island	78%	12.2 times / 6 weeks
Kelowna	60%	3.3 times / 5 weeks
The Kootenays	68%	6.7 times / 5 weeks
Prince George/Kamloops	68%	5.8 times / 5 weeks
Terrace/Kitimat	60%	5.2 times / 5 weeks
Dawson Creek	60%	5.8 times / 5 weeks

\* Percentages do not include public service announcement (PSA) time that may have occurred when the television advertisements ran over and above the negotiated contracts.

## **Children's Media Initiative**

As part of the children's media initiative, additional television media coverage was purchased on the province-wide Knowledge Network for a 13-week period from January to March 2013. As with the general television advertisement campaign, this year's campaign featured a 30-second advertisement focusing on hand washing. Target audiences included children aged 2-11 and mothers through co-viewing. Rating numbers are not available for children in this age group due to sample size limitations and research methodology requirements.

In addition to the television campaign, a DBND activity placemat was placed in 13,145 BC subscriptions for ChickaDEE and Owl children's magazine. Target audiences include children aged 6-9 years for ChickaDEE and 9-13 years for Owl.

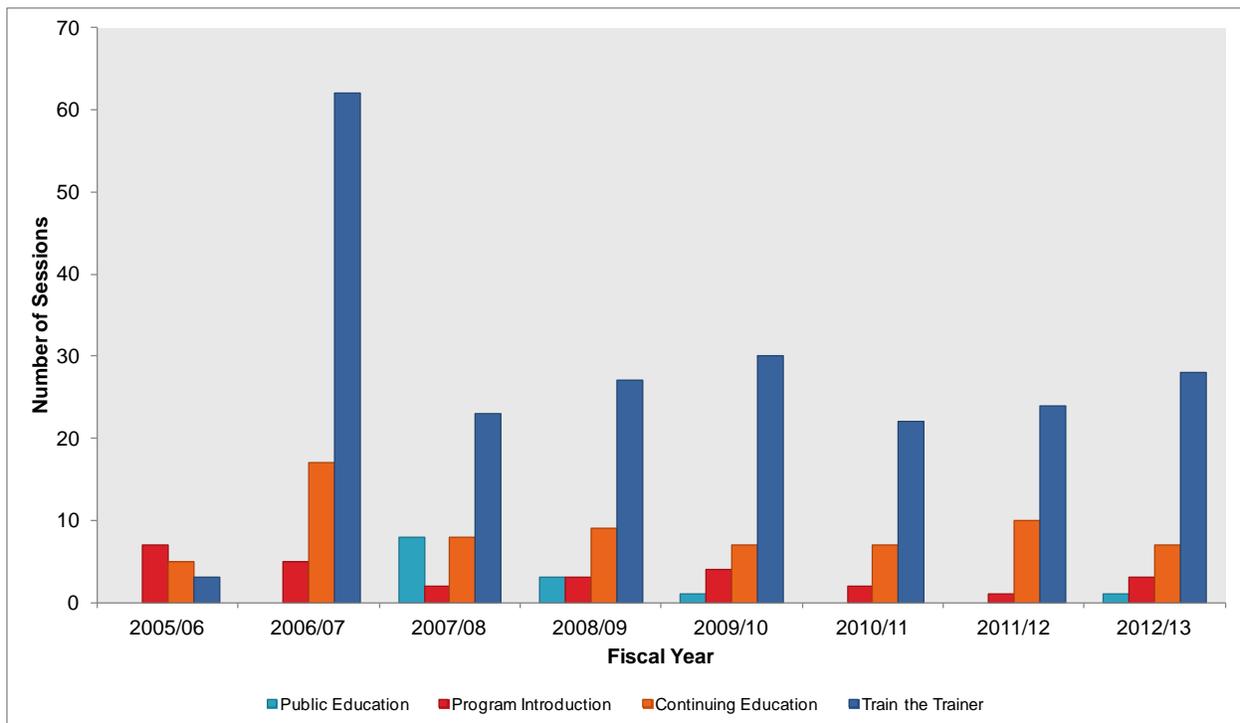
## Health Care Professional and Public Education

Health care professional and public education within the DBND program is comprised of several components, including Public Education, Program Introduction, Continuing Education, and Train-the-Trainer. These components are described in more detail below.

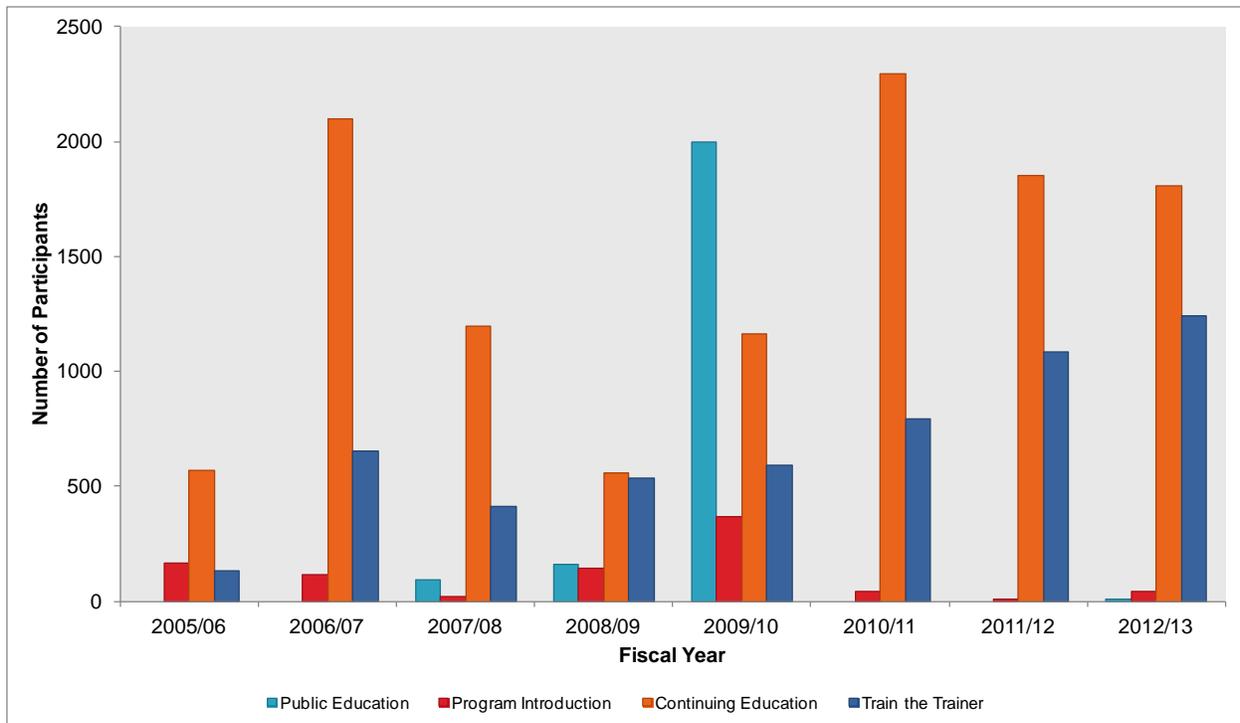
Education sessions are often attended by various types of audiences. Only individuals considered target audience members for the DBND program and its key messages are included in the results presented below. Estimated attendance numbers for other audience members are included as footnotes to the tables or figures.

### Public Education

The Public Education sessions are targeted towards members of the general public. These sessions are a means of providing an overview of the DBND program and its three key messages and distributing print materials. Since implementation of the DBND program during the 2005/06 fiscal year, 13 Public Education sessions have been held (**Figure 3**). These sessions were attended by a total of 2,263 participants (**Figure 4**). The large number of participants during the 2009/10 fiscal year represents educational activities provided as part of the Vancouver International Children's Festival. During the 2012/13 fiscal year, one Public Education session was held, attended by seven members of the general public.



**Figure 3.** Number of education sessions by type of session and fiscal year, 2005/06 to 2012/13



**Figure 4.** Number of participants attending education sessions by type of session and fiscal year, 2005/06 to 2012/13\*

\* Only target audience participants are included on figure; a total of 984 individuals have participated in sessions as other audience members.

## Program Introduction

Program Introduction sessions are held with various academic and health care institutions in order to introduce the DBND program and solicit interest in becoming affiliated with the DBND program for training and program delivery purposes. Since program implementation, 27 Program Introduction sessions have been held (**Figure 3**). These sessions were attended by a total of 909 participants (**Figure 4**). Three Program Introduction sessions were held during the 2012/13 fiscal year. These sessions were attended by a total of 40 participants, of whom one-third were assisted living staff (**Table 3**).

## Continuing Education

Continuing Education sessions are designed to deliver the DBND program to health care professionals, including physicians, pharmacists, nurses, and infection control practitioners. Sessions include accredited Continuing Medical Education (CME) sessions as well as oral and poster sessions at provincial, national, and international conferences. Since program implementation, DBND team members have attended 70 Continuing Education sessions (**Figure 3**). The estimated number of health care professionals at these sessions, and who potentially were exposed to components of the DBND program, is 11,536 individuals (**Figure 4**). During the 2012/13 fiscal year, DBND team members presented at seven Continuing Education sessions. The estimated number of health care professionals was 1,805 individuals, the majority (>95%) of whom were physicians (**Table 3**).

## Train-the-Trainer

Train-the-trainer sessions are conducted with health care professionals and students to provide program introduction and training required for delivery of the public teaching program components. Since program implementation, 219 Train-the-Trainer sessions have been held (**Figure 3**). A large number of Train-the-Trainer sessions were provided during the initial phases of program implementation; since then, Train-the-Trainer sessions have been sustained at a more constant level. In total, 5,444 participants have attended Train-the-Trainer sessions (**Figure 4**). During the 2012/13 fiscal year, 28 Train-the-Trainer sessions were provided to 1,240 participants. The majority of these participants were either nursing students (70%) or medical students (23%) (**Table 3**).

**Table 3.** Number of target audience participants by target audience and year, 2012/13 fiscal year\*

Target Audience†	Public Education, n (%)	Program Introduction, n (%)	Train the Trainer, n (%)	Continuing Education, n (%)
Public	7 (100)	-	-	-
Assisted Living Staff	-	27 (68)	39 (3)	-
Early Childhood Educators	-	-	2 (0)	-
ECE Students	-	-	31 (3)	-
Medical Students	-	-	288 (23)	-
Nursing Students	-	-	868 (70)	-
Pharmacists	-	-	12 (1)	-
Pharmacy Students	-	-	-	85 (5)
Physicians	-	-	-	1,720 (95)
Other	-	13 (33)	-	-
<b>TOTAL</b>	<b>7 (100)</b>	<b>40 (100)</b>	<b>1,240 (100)</b>	<b>1,805 (100)</b>

\* Fiscal year 2012/13 numbers are accurate as of June 24, 2013.

† Only target audience participants are included on figure; a total of 100 individuals have participated in health care professional and public education sessions as other audience members.

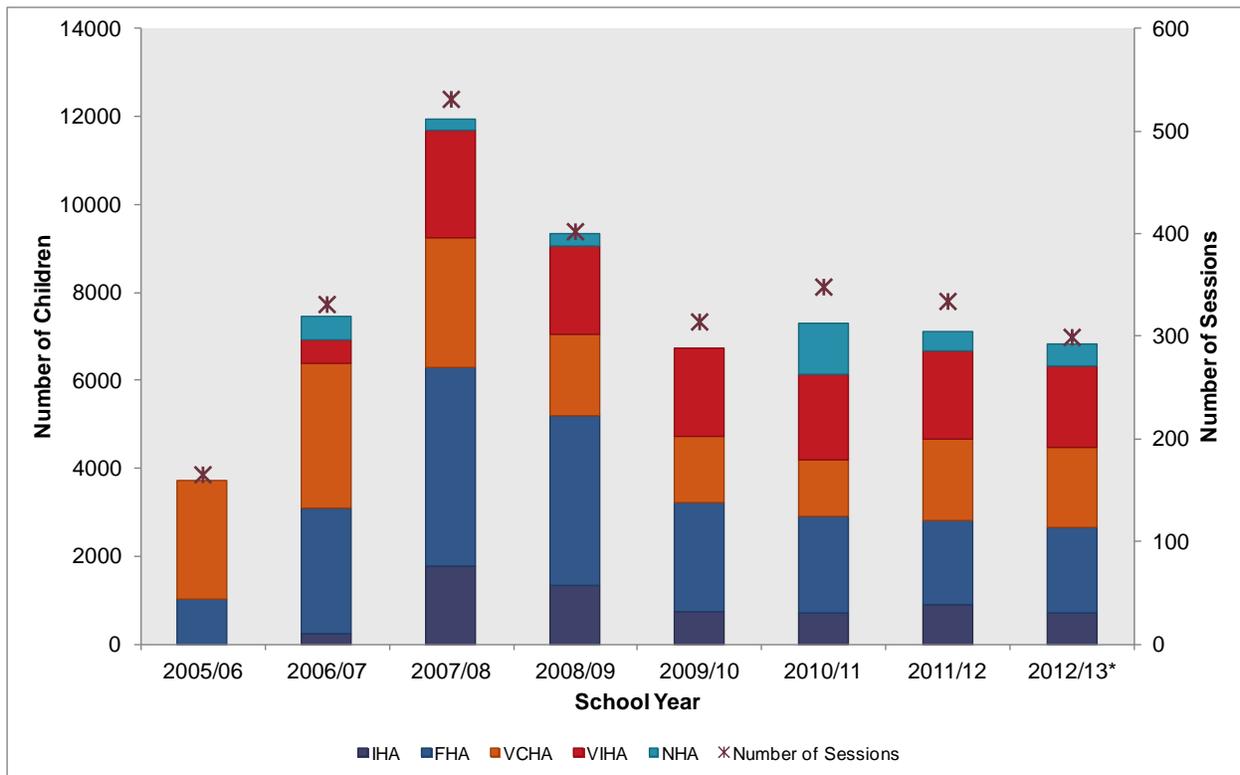
ECE = Early Childhood Education.

# Public Teaching

Public teaching within the DBND program is comprised of several components, including a Grade 2 Program, a Daycare Program, and an Older Adult Program. DBND also provides support for adaptation of the standard program under our General Teaching Program as well as for use of DBND-approved teacher resources for children in Kindergarten to Grade 3 (K-3). Public teaching programs are sustained by our community partners and are adaptable to available resources and needs. Educational resources for each of the DBND public teaching programs are publically available from the DBND website (<http://www.dobugsneeddrugs.org/>). The components of each public teaching program are described in more detail below.

## Grade 2 Program

The Grade 2 Program focuses on educating Grade 2 children, aged seven to eight years old, on the importance of frequent and proper hand washing, the dangers of misusing antibiotics, and the basic differences between viruses and bacteria. This program consists of various activities, songs, stickers, and parent-intended print material. This component of the DBND program was implemented in a staggered fashion through the province, with the first sessions taking place in VCHA in September 2005. Since then, all five health authorities have implemented and maintained the Grade 2 Program to various degrees: FHA in the spring of 2006, NHA in the fall of 2006, VIHA in the winter of 2007 and IHA in the spring of 2007.



**Figure 5.** Number of children taught under the Grade 2 Program by Health Authority and school year, 2005/06 to 2012/13

\* School year 2012/13 numbers are accurate as of June 17, 2013.

Since the DBND program was implemented during the 2005/06 school year, a total of 2,737 Grade 2 education sessions have been taught to 60,769 children across the province (**Figure 5**). The number of sessions and children taught increased to a peak in 2007/08 school year, as the program was fully implemented in all five health authorities. Since that time, teaching numbers have stabilized to a more sustainable level.

During the 2012/13 school year, 312 Grade 2 sessions were taught to 7,107 children across the province. By Health Authority, the majority of children were taught in FHA (n=2,238; 31%), VIHA (n=1,867; 26%), and VCHA (n=1,798; 25%), with smaller numbers of children being reported in IHA (n=718; 10%) and NHA (n=486; 7%). Most of these sessions for 2012/13 were taught by nursing students, medical students or pharmacists/pharmacy technicians (**Table 4**).

**Table 4.** Number of sessions taught under the Grade 2 Program by designation of person providing teaching and school year, 2012/13

<b>Designation of Person Providing Teaching</b>	<b>2012/13 School Year,* n (%)</b>	<b>All Years, n (%)</b>
Nursing Student	205 (66)	1,711 (63)
Pharmacist/Pharmacy Technician	49 (16)	608 (22)
Nurse	1 (0)	244 (9)
Medical Student	53 (17)	103 (4)
Teacher	0 (0)	30 (1)
Other	4 (1)	40 (2)
<b>TOTAL†</b>	<b>312 (100)</b>	<b>2,736 (100)</b>

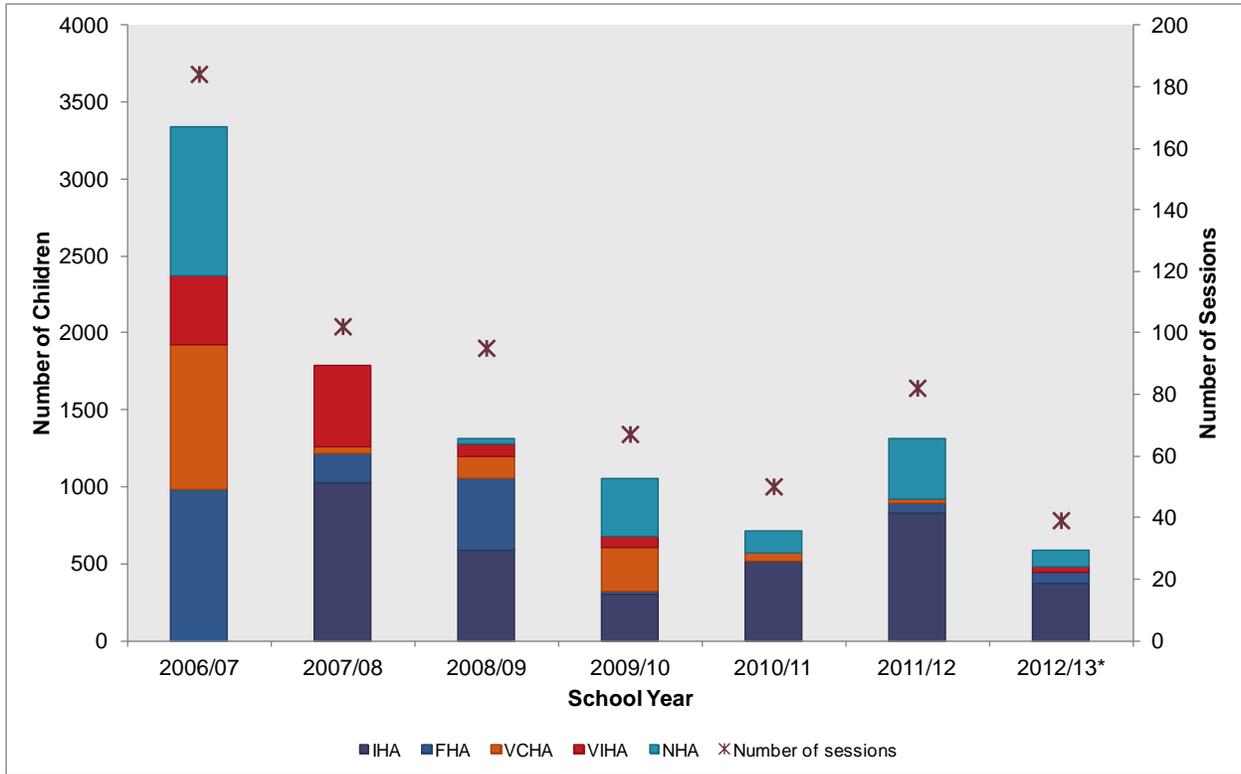
\* School year 2012/13 numbers are accurate as of June 20, 2013.

† Designation of person providing teaching was missing for one Grade 2 teaching session.

## Daycare Program

The Daycare Program is taught to pre-school children aged two to five years. It emphasizes the importance of teaching young children about how proper hand washing can prevent the spread of disease and reduce the need for antibiotics and introduces the concept of germs and illness through activities, songs, stickers, and parent-intended print material. The Daycare Program was launched in the fall of 2006; however, due to cutbacks to childcare resource personnel who initially led this initiative, implementation of this program component has been slower than anticipated. Collaborations with Early Childhood Education (ECE) programs have allowed the Daycare Program to remain active across the province. All of the health authorities have implemented the program to varying degrees.

Since the implementation of the Daycare Program, a total of 620 sessions have been taught to 10,123 children across the province (**Figure 6**). During the 2012/13 school year, 39 Daycare sessions were taught to 589 children across the province, including 376 (64%) children in IHA, 74 (13%) in FHA, 30 (5%) in VIHA, and 109 (19%) in NHA. No Daycare sessions were taught in VCHA during the 2012/13 school year.



**Figure 6.** Number of children taught under the Daycare Program by Health Authority and school year, 2006/07 to 2012/13<sup>†</sup>

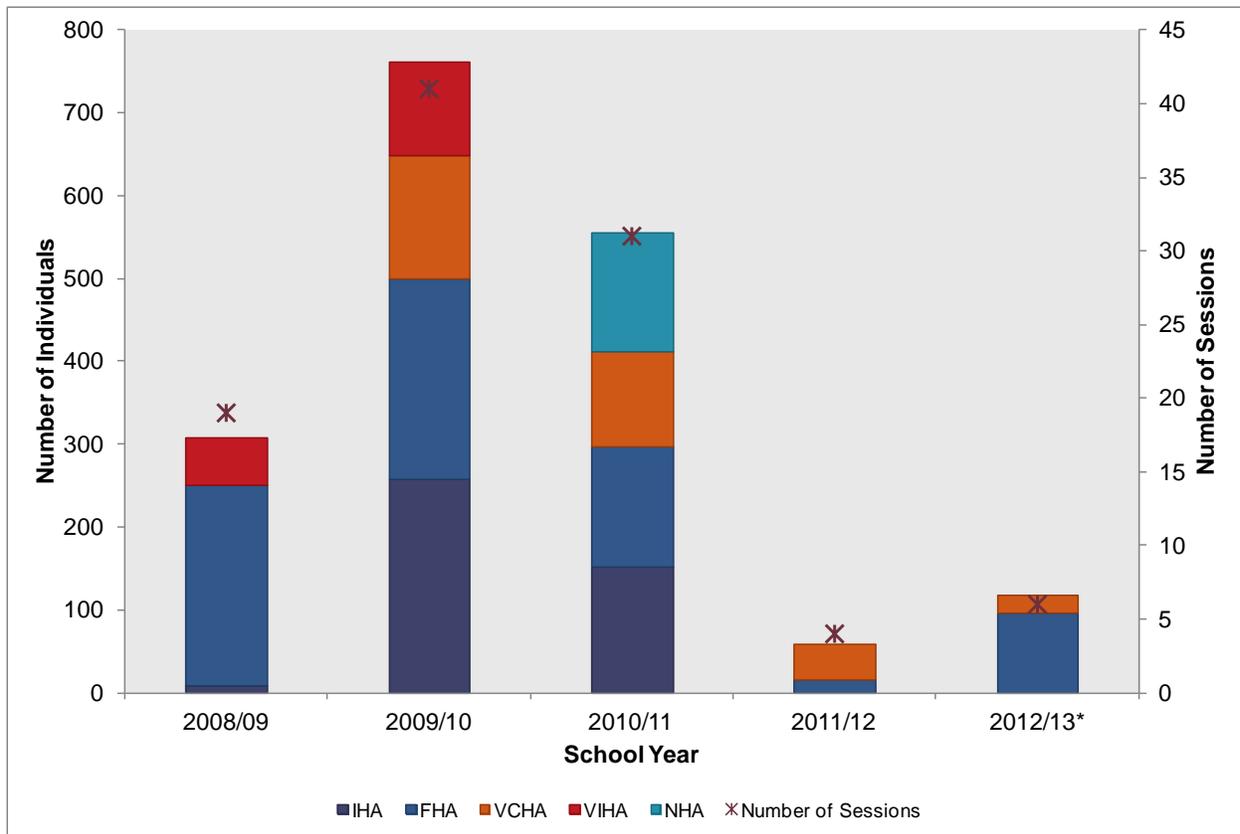
\* School year 2012/13 numbers are accurate as of June 17, 2013.

<sup>†</sup> One additional Daycare session (consisting of 4 children) was taught in school year 2005/06 in FHA; these numbers are not shown on the figure.

## Older Adult Program

The Older Adult Program, formerly called the Assisted Living Program, focuses on teaching older adults in care about the DBND three key messages. The delivery of this component is similar to the Grade 2 and Daycare programs in that personnel who are trained during train-the-trainer sessions deliver the DBND curriculum to assisted living staff, residents, and other individuals (e.g., family members). Data are presented by school year (September to August) to align with the Grade 2 and Daycare reporting.

Since implementation of the Older Adult Program, a total of 101 sessions have been taught to 1,801 individuals, including 487 staff, 1,200 residents, and 114 other individuals, across the province (**Figure 7; Table 6**). Teaching numbers for the Older Adult program fluctuate from year-to-year based on the capacity of community partners to participate in program implementation.



**Figure 7.** Number of individuals (includes staff, residents, and other individuals) taught under the Older Adult Program by Health Authority and school year, 2008/09 to 2012/13

\* School year 2012/13 numbers are accurate as of June 17, 2013.

During the 2012/13 school year, a total of six Older Adult sessions were held in two Health Authorities. Audience members during these sessions included 48 staff (41%), 67 residents (57%), and 3 other individuals (3%). By Health Authority, the Older Adult Program was taught to 96 (81%) individuals in FHA and 22 (19%) in VCHA. All of these sessions during the 2012/13 school year were taught by nurses (2 sessions) or program directors (classified as “other” individuals) (4 sessions) (**Table 6**).

**Table 5.** Number of individuals taught under the Older Adult Program by target audience and school year, 2008/09 to 2012/13

Target Audience	School Year					All Years
	2008/09	2009/10	2010/11	2011/12	2012/13	
Staff	105	229	88	17	48	487
Residents	179	461	454	39	67	1,200
Other	24	72	13	2	3	114
<b>TOTAL</b>	<b>308</b>	<b>762</b>	<b>555</b>	<b>58</b>	<b>118</b>	<b>1,801</b>

\* School year 2012/13 numbers are accurate as of June 17, 2013.

**Table 6.** Number of sessions taught under the Older Adult Program by designation of person providing teaching and school year, 2012/13

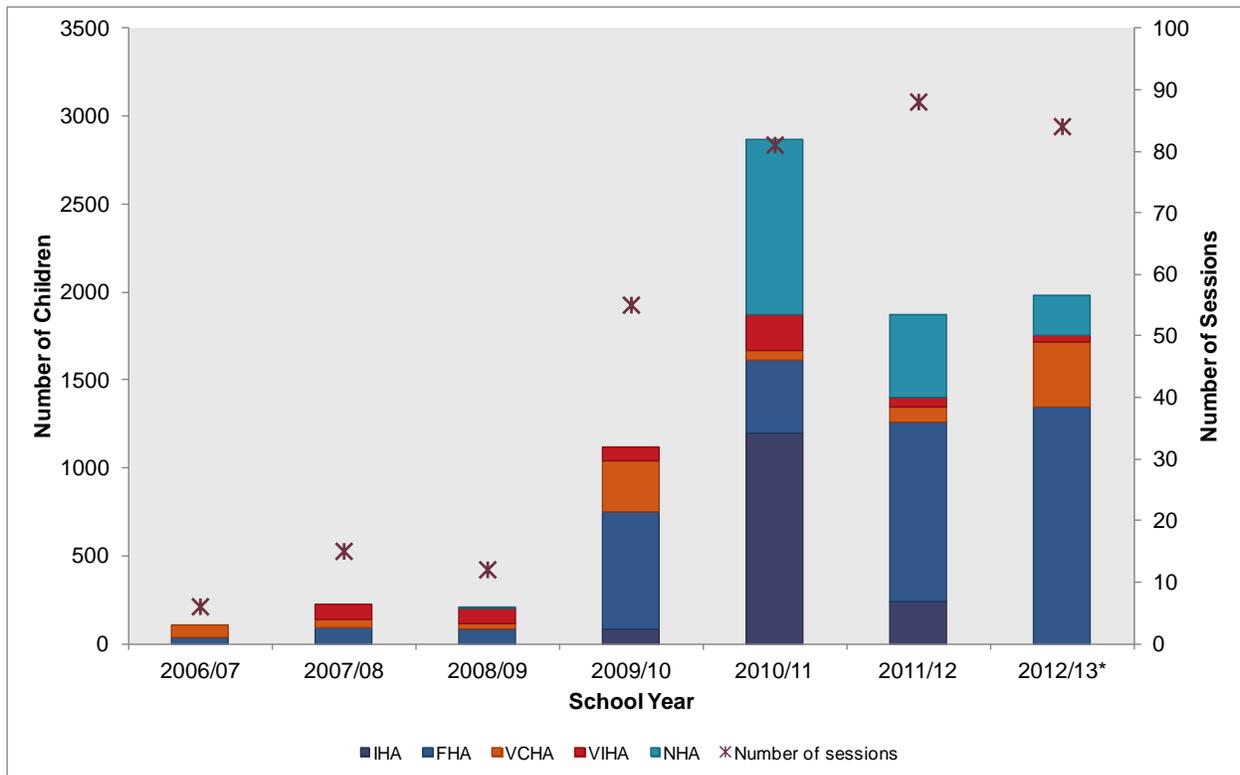
<b>Designation of Person Providing Teaching</b>	<b>2012/13 School Year,* n (%)</b>	<b>All Years, n (%)</b>
Nurse	2 (33)	44 (44)
Nursing Student	0 (0)	13 (13)
Care aide	0 (0)	5 (5)
Recreational Therapist	0 (0)	4 (4)
Manager	0 (0)	8 (8)
Site Leader	0 (0)	2 (2)
Pharmacist/Pharmacy Technician	0 (0)	1 (1)
Other	4 (67)	24 (24)
<b>TOTAL</b>	<b>6 (100)</b>	<b>101 (100)</b>

\* School year 2012/13 numbers are accurate as of June 17, 2013.

## General Teaching

Additional DBND program teaching to school-aged children, as well as their parents and teachers, occurs under the General Teaching Program. These sessions represent elements of the formal education programs that are adapted to suit different age groups or abilities. The delivery of these sessions is at the discretion of the trainer to adapt the DBND program material as necessary and may not be consistent across sessions.

A total of 343 sessions have been taught to 8,414 children across the province under the General Teaching Program (**Figure 8**). The General Teaching Program was initiated during the 2009/10 school year after realizing that instructors were adapting the DBND Preschool and Grade 2 program components to meet needs of other target audience groups, for example special needs children or high-school aged students. Since implementation, the General Teaching Program has remained an important component of the DBND public education program.



**Figure 8.** Number of children taught under the General Teaching Program by Health Authority and school year, 2006/07 to 2012/13

\* School year 2012/13 numbers are accurate as of June 17, 2013.

† An additional two General Teaching sessions (28 children total) were taught in school year 2005/06 both in VCHA; these numbers are not shown on the figure.

During the 2012/13 school year, 84 General Teaching sessions were taught to 1,979 children. By Health Authority, General Teaching sessions were taught to 1,347 (68%) children in FHA, 370 (19%) in VCHA, 40 (2%) in VIHA, and 222 (11%) in NHA. No General Teaching sessions were taught in IHA during the 2012/13 school year. Nursing students taught the majority of these sessions (90%) during the 2012/13 school year (Table 7).

**Table 7.** Number of sessions taught under the General Teaching Program by designation of person providing teaching and school year, 2012/13

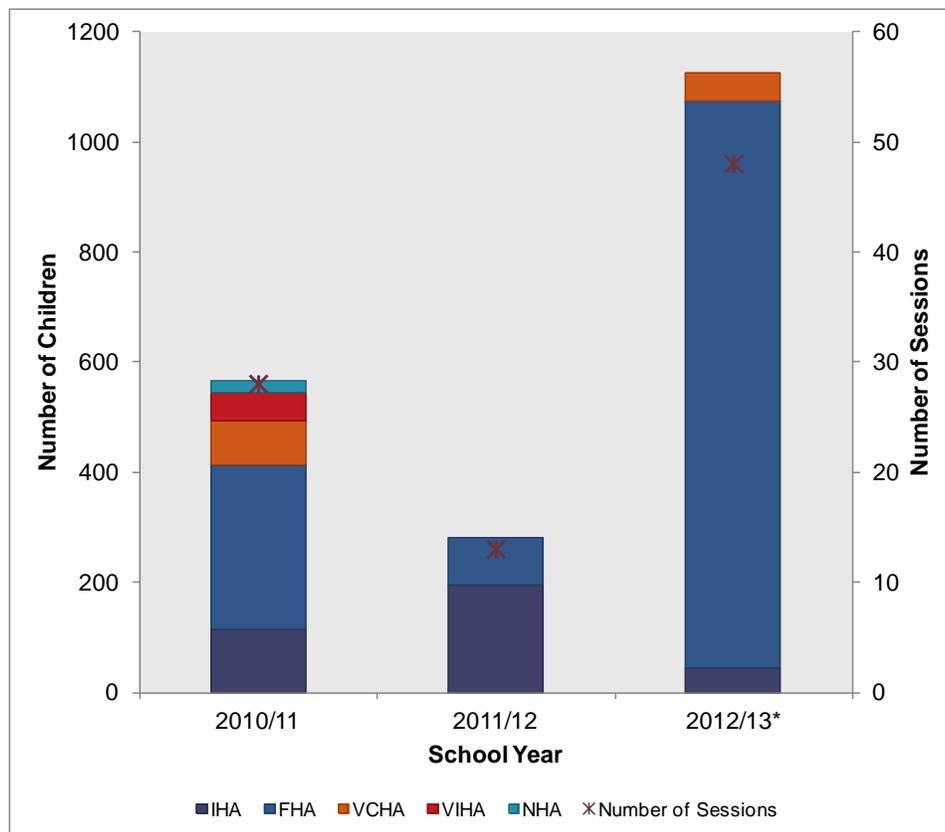
Designation of Person Providing Teaching	2012/13 School Year,* n (%)	All Years, n (%)
Nursing Student	76 (90)	271 (84)
Nurse	0 (0)	20 (6)
Pharmacist/Pharmacy Technician	2 (2)	10 (3)
Teacher	2 (2)	3 (1)
Medical Student	1 (1)	2 (1)
Other	3 (4)	18 (6)
<b>TOTAL</b>	<b>84 (100)</b>	<b>324 (100)</b>

\* School year 2012/13 numbers are accurate as of June 17, 2013.

## Kindergarten to Grade 3 Teacher Resources

Teacher Resources for children in Kindergarten to Grade 3 (K-3) were originally developed by the DBND program in Alberta in collaboration with Alberta Health and Wellness and Alberta Education and were adapted to meet the BC education curriculum by an educational consultant. These resources allow BC elementary school teachers to teach curriculum-aligned and DBND-approved material to their students. The K-3 Teacher Resource component was implemented in BC starting in the 2010/11 school year.

Since implementation of the K-3 Teacher Resource Program, a total of 89 sessions have been taught to 1,973 children across the province (**Figure 9**). During the 2012/13 school year, 48 sessions were taught to 1,125 children. Most of these children were taught in FHA (n=1,032; 92%), with smaller numbers of children being taught in VCHA (n=49; 4%) or IHA (n=44; 4%). No K-3 Teacher Resource Program sessions were held in VIHA or NHA during the 2012/13 school year.



**Figure 9.** Number of children taught under the K-3 Teacher Resource Program by Health Authority and school year, 2010/11 to 2012/13

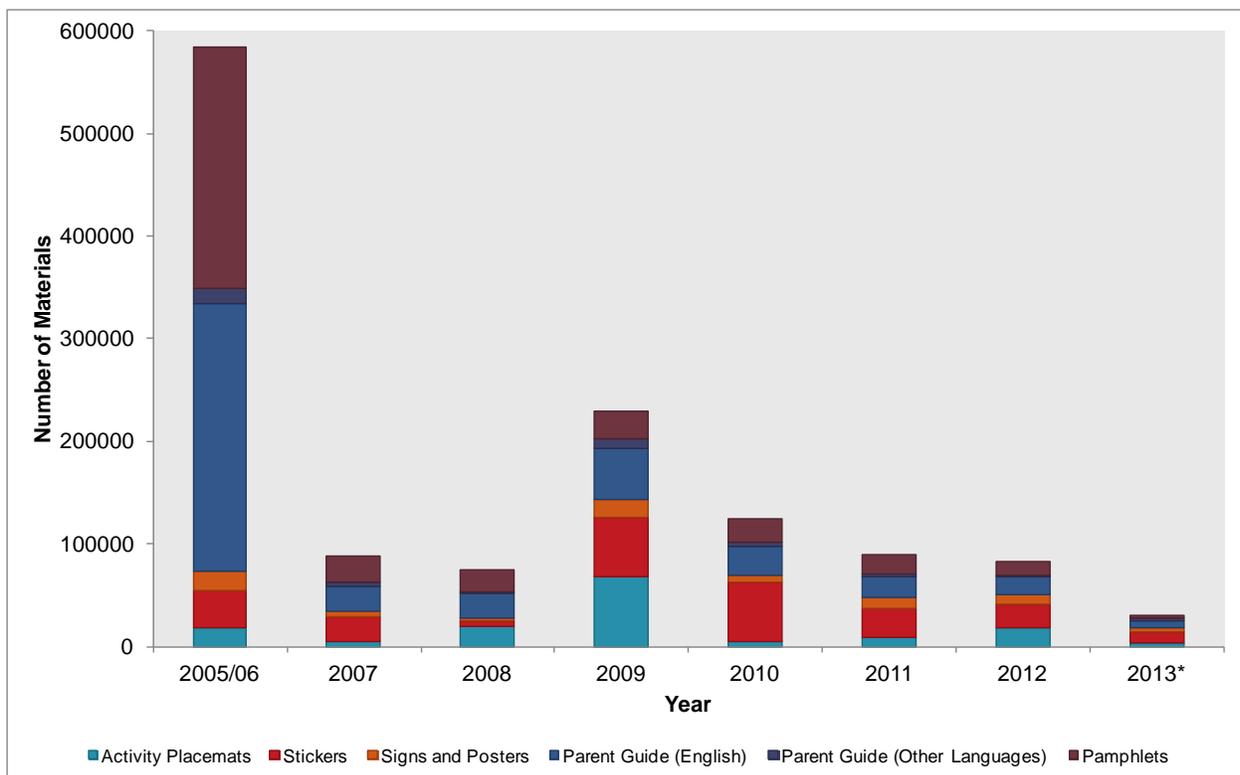
\* School year 2012/13 numbers are accurate as of June 17, 2013.

## Print Material Distribution

A variety of print material is available for distribution to the public (either in conjunction with educational sessions or upon request), through mass mail-outs, or through distribution to various health institutions. These materials are provided free-of-charge to BC residents.

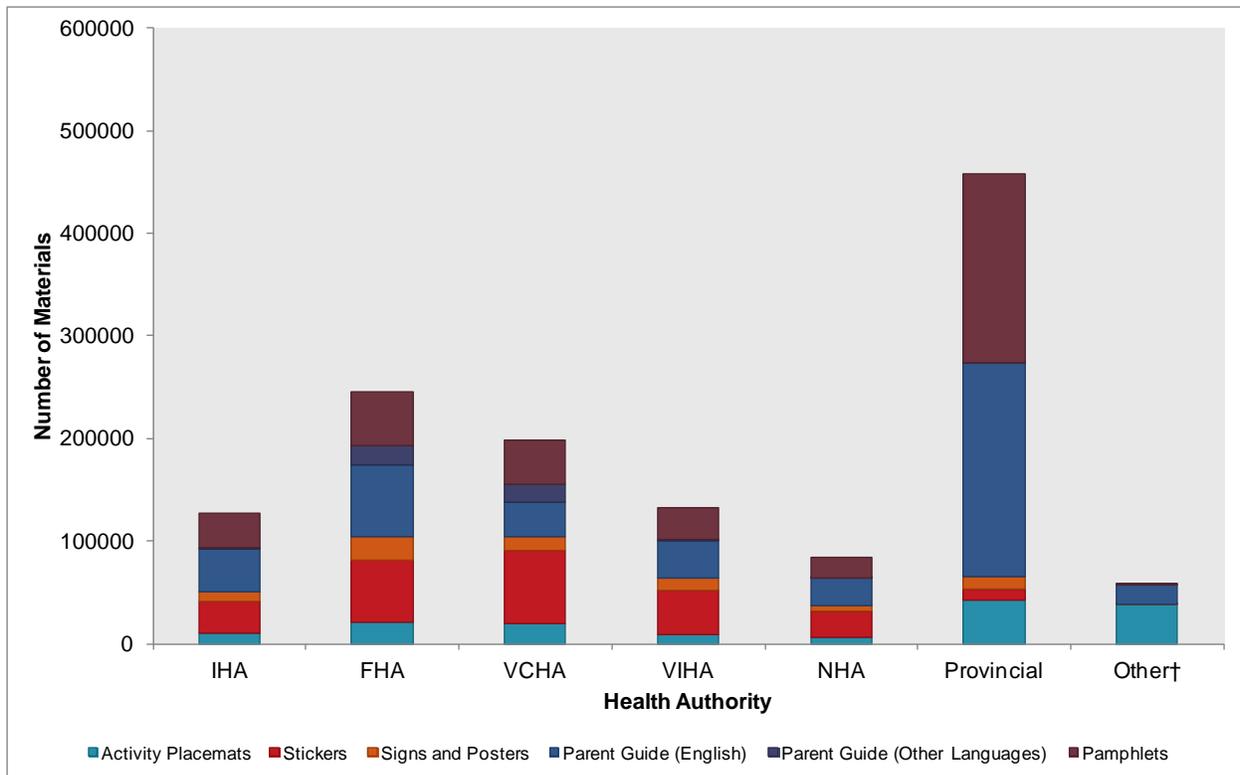
Since implementation of the DBND program, over 1.3 million print materials have been distributed across the province and elsewhere. The largest number of print materials was distributed in the first two years, as the DBND program was fully implemented across the province (**Figure 10**). Since then, print material distribution numbers have decreased to more sustainable levels. By type of material, 147,636 activity placemats, 242,236 stickers, 75,725 signs and posters, 433,195 parent guides in English, 40,868 parent guides in other languages, and 364,022 pamphlets have been distributed since 2005/06.

In 2012, over 80,000 print materials were distributed across the province: 18,424 activity placemats, 22,444 stickers, 10,514 signs and posters, 16,455 parent guides in English, 1,804 parent guides in other languages, and 12,951 pamphlets were distributed across the province. These distribution numbers include the 13,145 activity placemats distributed in ChickaDEE and Owl magazine subscriptions as part of the children's media initiative.



**Figure 10.** Print material distribution by type of material and year, 2005/06 to 2013\*

\* Includes print material distribution up to end of fiscal year (March 31, 2013).



**Figure 11.** Print material distribution by type of material and Health Authority, 2005/06 to 2013\*

\* Includes print material distribution up to end of fiscal year (March 31, 2013).

† Other distribution includes print material distribution out-of-province, nationally, and internationally.

The distribution of print materials by type of material and Health Authority are provided in **Figure 11**. The majority of print materials have been distributed provincially either as part of the initial implementation of the DBND program (e.g., parent guides in English) or as part of ongoing children’s media initiatives (e.g., activity placements). By Health Authority, 18.8% of total print materials were distributed in FHA, 15.3% in VCHA, 10.1% in VIHA, 9.7% in IHA, and 6.5% in NHA, with the remaining 39.9% distributed either provincially or to other national or international organizations (**Figure 11**).

## Bugs and Drugs Book

This year, the fifth edition (2012) of the *Bugs and Drugs* antimicrobial/infectious diseases reference book became available for physicians, dentists, pharmacists, nurse practitioners, and other health professionals in Canada.<sup>15</sup> In the revised edition, the number of indications where macrolides or quinolones are recommended as therapy has been substantially reduced, due to concerns over increased resistance to these drug classes. The *Bugs and Drugs* reference is available as either a hardcopy book or, for the first time, as an iPhone App. The hardcopy book has been available since November 2012. The iPhone App was released in February 2013. All BC physicians, nurse practitioners, dentists, hospital and community pharmacies, hospital pharmacists, and residents and students in medicine, dentistry, pharmacy, and nurse practitioner programs are entitled to receive a complimentary copy through funding from the BC Ministry of Health. The hardcopy book is also available for purchase through Amazon.com; the iPhone App can be purchased through the iTunes store.

As of July 3, 2013, 13,963 copies of the Bugs and Drugs book had been distributed: 12,163 hardcopies and 1,800 iPhone Apps. A breakdown of the distribution numbers by target group is provided in **Table 8**.

**Table 8.** Distribution of the *Bugs and Drugs* reference by type of material and target group\*

Target Group	Hardcopy Books	iPhone Apps	TOTAL
Physicians	1,758	1,267	3,025
Nurse practitioners	182	1	183
Medical residents and students	1,819	522	2,341
Other health care professional residents and students†	1,598	2	1,600
Pharmacists participating in academic detailing program‡	1,140	8	1,148
Pharmacists and pharmacies	1,894	0	1,894
Infection control practice sites	34	0	34
Dentists	3,090	0	3,090
Naturopaths	420	0	420
Midwives	205	0	205
Other	23	0	23
<b>TOTAL</b>	<b>12,163</b>	<b>1,800</b>	<b>13,963</b>

\* Includes Bugs and Drugs book distribution up to July 3, 2013.

† Includes residents and students in dentistry, pharmacy, and nurse practitioner programs.

‡ Books provided to pharmacists participating in the BC Ministry of Health's academic detailing program are meant for distribution to physicians.

# Program Outcome Evaluation

## Trends in Antimicrobial Utilization

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Trends in antimicrobial utilization in BC are monitored to:

1. Evaluate population-level antimicrobial utilization trends in BC; and
2. To assess changes in prescribing patterns by indication in BC.

These surveillance activities allow for the evaluation of the potential impact of the DBND program implementation on overall, class-specific, and indication-specific antimicrobial utilization in BC. Data for these surveillance activities are obtained from the PharmaNet database of outpatient prescriptions dispensed from community-based pharmacies in BC.

A comprehensive summary of antimicrobial utilization trends in the province of BC is compiled in a separate report entitled “British Columbia Annual Summary of Antibiotics Utilization.” The most recent version of this report (2010) is available from our website (<http://www.bccdc.ca/prevention/AntibioticResistance/Surveillance/default.htm>). Highlights from this report are summarized here:

- Since implementation of the DBND program, overall antibiotic consumption decreased by 4.2% from 17.4 DDD/1000 population/day in 2005 to 16.7 DDD/1000 population/day in 2010.
- In 2010, antibiotic consumption by class was highest for penicillins, followed by macrolides, tetracyclines, quinolones, cephalosporins and lastly the sulfonamides and trimethoprim.
- By drug class, overall consumption rates remained relatively stable for tetracyclines, penicillins, and quinolones between 2005 and 2010. In contrast, consumption rates for cephalosporins, the sulfonamides and trimethoprim, and macrolides decreased slightly over the same time period.
- The rate of antibiotic prescriptions decreased among children 0 to 15 years of age, while the rate of consumption remained fairly stable among most adult age groups between 2005 and 2010, with declining trends observed among adults 15 to 29 years of age.
- Among children, those 1 to 4 years of age had the highest rate of prescriptions in all HAs during 2010. Among adults, those 60 years and older were the greatest consumers of antimicrobial therapy in the outpatient setting in all health authorities during 2010.
- Antibiotic consumption among females consistently exceeded consumption among males by approximately 21%.
- In 2010, antibiotic consumption rates in BC were highest in NHA and FHA (8.9% and 1.6% above the provincial average, respectively). Consumption rates in VIHA, IHA and VCHA were all below the provincial average by 0.2%, 2.0% and 8.4%, respectively.
- In 2010, lowest antibiotic consumption was in Richmond (13.8 DDD/1000 population/day), while the highest rate was in Northwest (21.7 DDD/1000 population/day).
- In 2010, the highest rate of antibiotic consumption for acute bronchitis was in FHA (1.5 DDD/1000 population/day), as compared to the other health authorities where rates ranged from 1.0 to 1.1 DDD/1000 population/day.

# Trends in Antimicrobial Resistance

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Trends in antimicrobial resistance in BC are monitored to:

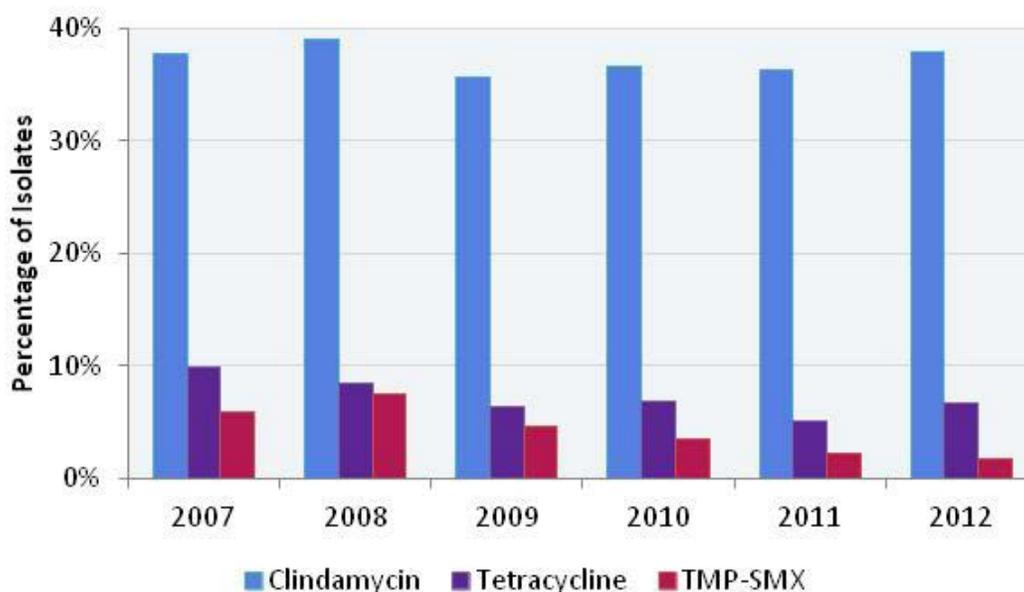
1. Provide a comprehensive overview of antimicrobial resistance trends in BC; and
2. Correlate these trends with trends in antimicrobial utilization in BC.

These surveillance activities allow for the evaluation of the potential impact of the DBND program implementation on changes in antimicrobial resistance rates among relevant pathogens and for particular drug classes of interest. Data on antimicrobial resistance rates are compiled each year from a variety of regional, provincial and national sources.

A comprehensive summary of antimicrobial resistance trends in the province of BC is compiled in a separate report entitled “Antimicrobial Resistance Trends in the Province of British Columbia.” The most recent version of this report (2011) is available from our website (<http://www.bccdc.ca/prevention/AntibioticResistance/Surveillance/default.htm>). An updated reporting including data up to 2012 is currently being prepared. Highlights from this forthcoming report are summarized here:

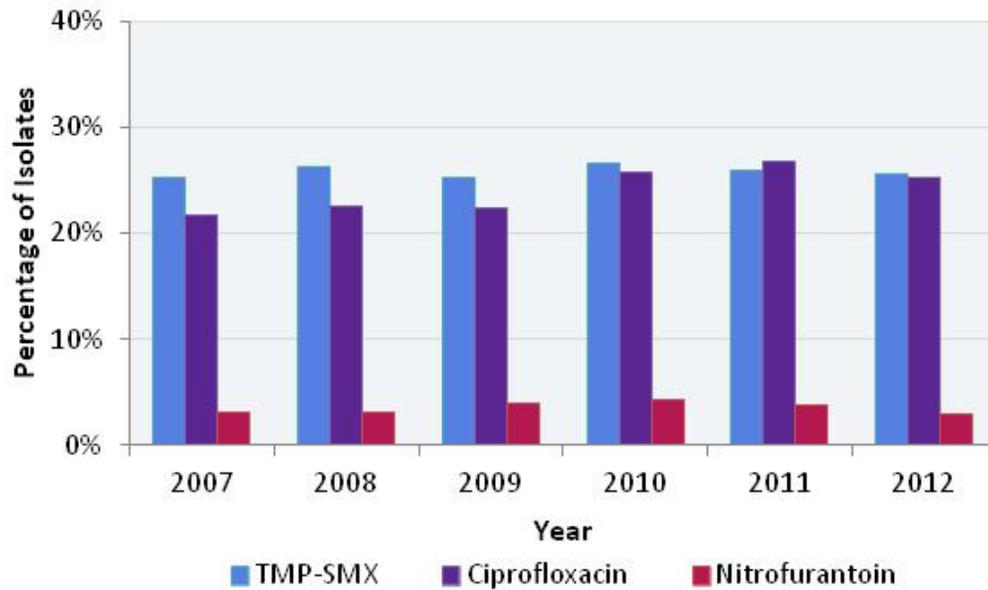
- The proportion of *Staphylococcus aureus* isolates that were methicillin resistant (MRSA) ranged from 16.1 % to 23.9% from 2008 to 2012, but remained below the peak rate observed in 2007 (30.5%). In 2012, MRSA isolates were resistant to clindamycin, doxycycline (tetracyclines) and trimethoprim-sulfamethoxazole (TMP-SMX) at rates of 38.0%, 6.7% and 1.8%, respectively (Figure 12). This implies that clindamycin may not be an optimal choice for empirical treatment of suspected community-acquired MRSA when antibiotics are needed to treat complicated infections.
- *Streptococcus pneumoniae* isolates have demonstrated a stable rate of resistance to all antibiotics tested since 2007, with the exception of levofloxacin, which demonstrated a decreasing trend. In 2012, 33.7% of all tested isolates demonstrated non-susceptibility against erythromycin. *S. pneumoniae* isolates were also non-susceptible to penicillin and TMP-SMX at rates of 17.2% and 21.9%, respectively.
- From 2007 to 2010, non-susceptibility rates to erythromycin and clindamycin decreased in *Streptococcus pyogenes* isolates. However, as of 2012, non-susceptibility rates had increased to 22.7% and 22.3%, respectively. *S. pyogenes* isolates remain highly susceptible to penicillin, cephalothin and vancomycin, but fully resistant to TMP-SMX and ciprofloxacin.
- In 2012, *Enterococcus* spp. isolates remained highly susceptible to ampicillin (98.6%) and nitrofurantoin (98.8%). However, one quarter of all isolates tested were non-susceptible to ciprofloxacin (24.7%), largely due to increased resistance in individuals older than 70 years of age ( $p < 0.01$ ). Less than 1% of all *Enterococcus* spp. isolates were identified as vancomycin resistant *Enterococcus* (VRE).
- In 2012, *Escherichia coli* resistance to ciprofloxacin was 25.3% (Figure 13). These resistance rates increase with age, being highest in those aged 70 years or more. *E. coli* isolates have demonstrated moderate levels of resistance to TMP-SMX with 25.6% of isolates being resistant in 2012. Nitrofurantoin remains a highly effective empiric treatment for *E. coli* isolates with approximately 97.1% of isolates exhibiting susceptibility. This trend is reassuring as the majority of uncomplicated UTI infections are caused by *E. coli*.

- Data from 2012 suggest that ciprofloxacin resistance in *Klebsiella pneumoniae* remains low at 3.9%. Additionally, resistance to TMP-SMX for *K. pneumoniae* appears to be decreasing from 10.8% in 2007 to 8.2% in 2012.
- In 2012, 20.5% of *Proteus mirabilis* isolates were non-susceptible to ciprofloxacin. Additionally, isolates demonstrated moderate levels (31.3%) of resistance to TMP-SMX.
- Despite a slight increase in non-susceptibility to ciprofloxacin from 10.1% in 2011 to 11.7% in 2012 for *Pseudomonas aeruginosa* isolates, the non-susceptibility trend appears to be relatively stable. Isolates remain highly susceptible (>95%) to tobramycin, piperacillin, ceftazidime, meropenem and gentamicin.
- The percent of *Haemophilus influenzae* isolates resistant to ampicillin has remained between 15-20% since 2007, with the lowest resistance reported in 2011 (14.3%). Resistance to ampicillin peaked in 2012 at 19.4%.



**Figure 12.** Resistance to clindamycin, tetracycline, and trimethoprim-sulfamethoxazole (TMP-SMX) among community methicillin-resistant *Staphylococcus aureus* (MRSA) isolates in BC, 2007-2012

Source: BC Biomedical Laboratories



**Figure 13.** Resistance to trimethoprim-sulfamethoxazole (TMP-SMX), ciprofloxacin, and nitrofurantoin among community *Escherichia coli* isolates in BC, 2007-2012

Source: BC Biomedical Laboratories

## Conclusions

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The DBND program has shown excellent progress in both its process and outcome evaluation indicators. After eight years of delivering the DBND program in BC, the program has been implemented to various degrees within all of the health authorities in BC and continues to expand. A large number of children and adults continue to receive DBND teaching. The distribution of materials has been extensive, and new ways of reaching target audiences with the three key messages are being implemented with great success.

Outcome evaluation has demonstrated positive changes for health care professional knowledge and attitude. Results from previous years have suggested that public knowledge is also positively changed as a product of participation in the program. Public focus group participants indicated very strong support for the messaging of DBND; advertising materials can be designed and adapted to provide simple, clear, actionable messages.

DBND, in its eighth year of implementation, is showing positive achievements in addressing antibiotic resistance; however, there is still progress to be made in reducing overall use of antibiotics. Antimicrobial utilization in BC had declined overall since 2005. The DDD rate for acute otitis media has achieved our goal of a 15% reduction since 2005, and improvements have been made with other upper respiratory tract infections. The use of macrolides for acute bronchitis declined in 2009 and 2010 and for acute sinusitis in 2009, but the use increased somewhat in 2010. Macrolide use continues to comprise a large proportion of use in both indications.

There is an expected time lag between decreasing antimicrobial utilization and antimicrobial resistance outcomes, which is reflected in the observed resistance trends. Important trends are showing age differences in resistance, with the elderly more affected. This will continue to inform program planning as we move forward. With continued program growth and concerted effort, further strides can be made to stabilize trends in antibiotic resistance and reduce the impact on health.

## Contributions and Acknowledgements

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### Team Members

**Edith Blondel-Hill, MD**, Medical Director, DBND Program, and Medical Director, Infection Prevention and Control, Interior Health Authority, and Microbiologist/Infectious Diseases Specialist, Interior Health Authority

**David Patrick, MD, MHSc**, Medical Epidemiology Lead for Antimicrobial Resistance, BC Centre for Disease Control, and Professor and Director, School of Population and Public Health, University of British Columbia

**Fawziah Marra, PharmD**, Professor, Faculty of Pharmaceutical Services, University of British Columbia

**Bonnie Henry, MD, MPH**, Medical Director, Communicable Disease Prevention and Control Services, BC Centre for Disease Control, and Assistant Professor, School of Population and Public Health, University of British Columbia

**Dale Purych, MD**, Medical Microbiologist, BC Biomedical Laboratories, and Clinical Assistant Professor, Pathology and Laboratory Medicine, Faculty of Medicine, University of British Columbia

**Kim Dreher, RN, BScN**, Program Coordinator, DBND Program, BC Centre for Disease Control

**Catharine Chambers, MSc**, Epidemiologist, DBND Program, BC Centre for Disease Control

**Rachel McKay, MSc**, Epidemiologist, DBND Program, BC Centre for Disease Control, PhD Candidate, School of Population and Public Health, University of British Columbia

**Mei Chong, MSc**, Biostatistician, Public Health Analytics, BC Centre for Disease Control

**John Mulder**, Administrative Assistant, DBND Program, BC Centre for Disease Control

**Danielle Hachborn**, MPH Student, School of Population and Public Health, University of British Columbia

### Contributors to Report

Catharine Chambers, Danielle Hachborn, Kim Dreher, David Patrick, Edith Blondel-Hill, Rachel McKay, Sunny Mak

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The authors would also like to thank the following community partners and champions for the program: British Columbia's health authorities; nursing students, early childhood education students, medical students and faculty from various colleges/universities (see list below); pharmacists/pharmacy technicians from various Overwaitea Food Group stores as well as pharmacists from other pharmacy chain stores; students and instructors at the Vancouver Film School; child care resource and referral centre staff; healthcare workers caring for older adults; Dr. Suzanne Taylor and Dr. Anne Nguyen for being strong advocates of the program; Lamar Transit Advertising; Alex Hill of Imagine Grafx; Karen Hallam of Hallamedia; and the British Columbia Ministry of Health, Pharmaceutical Services Division. Finally, we would like to thank Dr. Perry Kendall, Provincial Health Officer for BC, who has championed the program over the past eight years.

PharmaNet data were provided as part of a data sharing agreement between the BC Centre for Disease Control and the BC Ministry of Health for the purposes of evaluating the DBND program.

Colleges and Universities participating in the program:

- BCIT (Burnaby)
- Camosun College (Victoria)
- College of the Rockies (Cranbrook)
- Langara College (Vancouver)
- North Island College (Courtenay)
- Okanagan College (Kelowna)
- Selkirk College (Castlegar)
- Trinity Western University (Langley)
- University of Vancouver Island (Nanaimo)
- UBC (Vancouver)
- UBC Okanagan (Kelowna)
- UNBC (Prince George)
- University of the Fraser Valley (Chilliwack)
- University of Victoria

## References

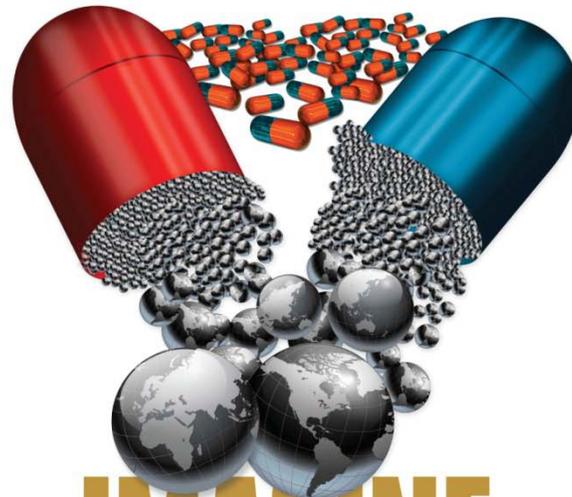
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- <sup>13</sup> Lamar Advertising. Email Communication, April 23, 2013.
- <sup>14</sup> Television Post Buy Summary. Hallamedia Inc., May 24, 2013.
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# Appendix

# Transit Advertisements

Example 1. Platform poster (train)



**IMAGINE  
A WORLD WHERE  
ANTIBIOTICS  
DON'T WORK ANYMORE**

**Use antibiotics wisely so  
they continue to save lives**

[www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)



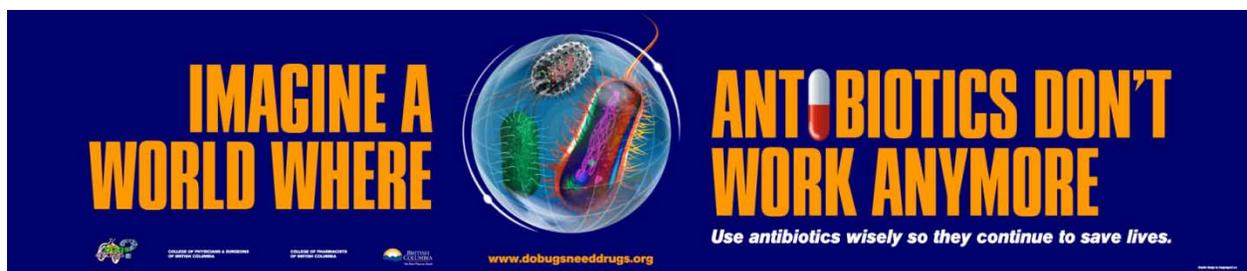
COLLEGE OF PHYSICIANS & SURGEONS  
OF BRITISH COLUMBIA

COLLEGE OF PHARMACISTS  
OF BRITISH COLUMBIA



Health Design by Imaginative

Example 2. Exterior card (train)



# Technical Notes

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## Data Sources

### Media Campaign

Target audience numbers and viewing times for the television advertisement were obtained from a Television Post Buy Summary prepared for the DBND Program by Hallamedia Inc. The figures are based on Broadcast Bureau of Measurement (BBM) audience data for the period of January 7, 2013 to February 24, 2013 for the Vancouver/Vancouver Island region for one-week periods in February and March, 2013, for other regions. Reported BBM audience numbers are likely underestimates, as percentages do not include public service announcement (PSA) time that may have occurred when the television advertisements ran over and above the negotiated contracts.

Transit ridership numbers were provided by Lamar Advertising. For trains, these estimates are based on transit rider entry and exits from train stations or from individual ticket purchases at a train station plus an adjustment for monthly pass holders. For buses, estimates are based on the average number of boardings separated by city within the Metro Vancouver area.

### Education Program

Health care professional education sessions are tracked internally following delivery of any DBND education activities that are directed toward health care professionals (including physicians, pharmacists, nurses, and infection control practitioners) or other individuals (including other care providers, educators, students, and the public). Teaching numbers and target audience groups are estimated based on expected audience attendance and composition. Health care professional education also encompasses train-the-trainer sessions offered to health care professionals and students who then deliver the DBND program under the public teaching components.

Public teaching numbers are submitted by health care professionals and students who deliver DBND program components under the Daycare, Grade 2, General Teaching, Older Adult, or K-3 Teacher Resource programs. Documentation forms are submitted to the DBND program on a voluntary basis. Accordingly, the public teaching numbers presented in this report likely represent underestimates of our true program reach, as compliance is likely less than 100%.

### Print Material Distribution

Print material distribution numbers are tracked internally following shipment of DBND program materials to various health institutions (e.g., health clinics, health units, hospitals) or through distribution of materials in conjunction with implementation of program components. Print materials can be requested free of charge by BC residents through the DBND website.

### Antimicrobial Utilization Data

Antimicrobial utilization data were obtained from the BC PharmaNet database of outpatient prescriptions for oral antimicrobials for systematic use for years 1996 to 2010. The PharmaNet database includes records of all outpatient prescriptions dispensed from community pharmacies to BC residents. It excludes over-the-counter medications, medications administered to inpatients in acute care hospitals, medication samples dispensed at a physician's office, and medications

administered for veterinary or agricultural use. Antimicrobial utilization data were classified according to the World Health Organization's Anatomical Therapeutic Chemical (ATC) classification system. Antimicrobial utilization rates were calculated as the defined daily dose (DDD) per 1000 population per day, where DDD represents that average maintenance dose per day for a drug used in its main indication in adults.

### **Antimicrobial Resistance Data**

Data on antimicrobial resistance rates are compiled each year from a variety of regional, provincial and national sources including BC Biomedical Laboratories, the BC Association of Medical Microbiologists (BCAMM), the Canadian Bacterial Surveillance Network (CBSN), the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), and the BC Public Health Microbiology Reference Laboratory (BC PHMRL). Each of these organizations produces aggregate reports of antimicrobial resistance trends that are regional/provincial/national in scope. As these data primarily represent isolates collected in the community, antimicrobial resistance trends reported here may differ from those reported for institutions. Non-susceptibility rates include both full resistance and intermediate resistance.

### **Limitations**

- Television and transit advertising numbers are estimates provided to the DBND program by external contractors and represent the estimated television viewer numbers and transit ridership numbers, respectively. However, the true uptake by our primary target audience group, women aged 25-54, is unknown and the numbers reported here are likely conservative estimates.
- Teaching numbers and target audience groups for educational activities are estimated based on expected audience attendance and composition. Documentation forms for public teaching activities are submitted on a voluntary basis and likely represent underestimates of our true program reach.
- Print material distribution is tracked following shipment to health institutions. While we track where shipments are sent and the intended receipt type, the final end-user of these materials is unknown.
- For antimicrobial utilization, PharmaNet data are restricted to oral antimicrobials dispensed in outpatient settings. While these data comprehensively measure antimicrobial use in the community – the main focus of the DBND program – utilization rates for agents that are administered parenterally and/or primarily used in inpatient settings are likely underestimated.
- For antimicrobial resistance, susceptibility testing data from BC Biomedical Laboratories are limited to isolates submitted to outpatient laboratories primarily in the Fraser Health Authority; other health authorities are under-represented in these data. Testing of bacterial isolates is limited to certain antibiotics or may be performed using cascading testing algorithms; as such, antibiograms may be incomplete. While some susceptibility data are obtained from hospital-based laboratories through other partner organizations, these data are limited to select pathogens and do not offer a complete picture of antimicrobial resistance in inpatient settings.