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# *Do Bugs Need Drugs?* Annual Report

2014/15

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*Do Bugs Need Drugs?*  
May 2015

***Do Bugs Need Drugs?***

**2014/15 Annual Report**

**May 2015**

**Prepared for the  
British Columbia Ministry of Health,  
Medical Beneficiary & Pharmaceutical Services Division  
Drug Intelligence & Optimization Branch**

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## About this Report

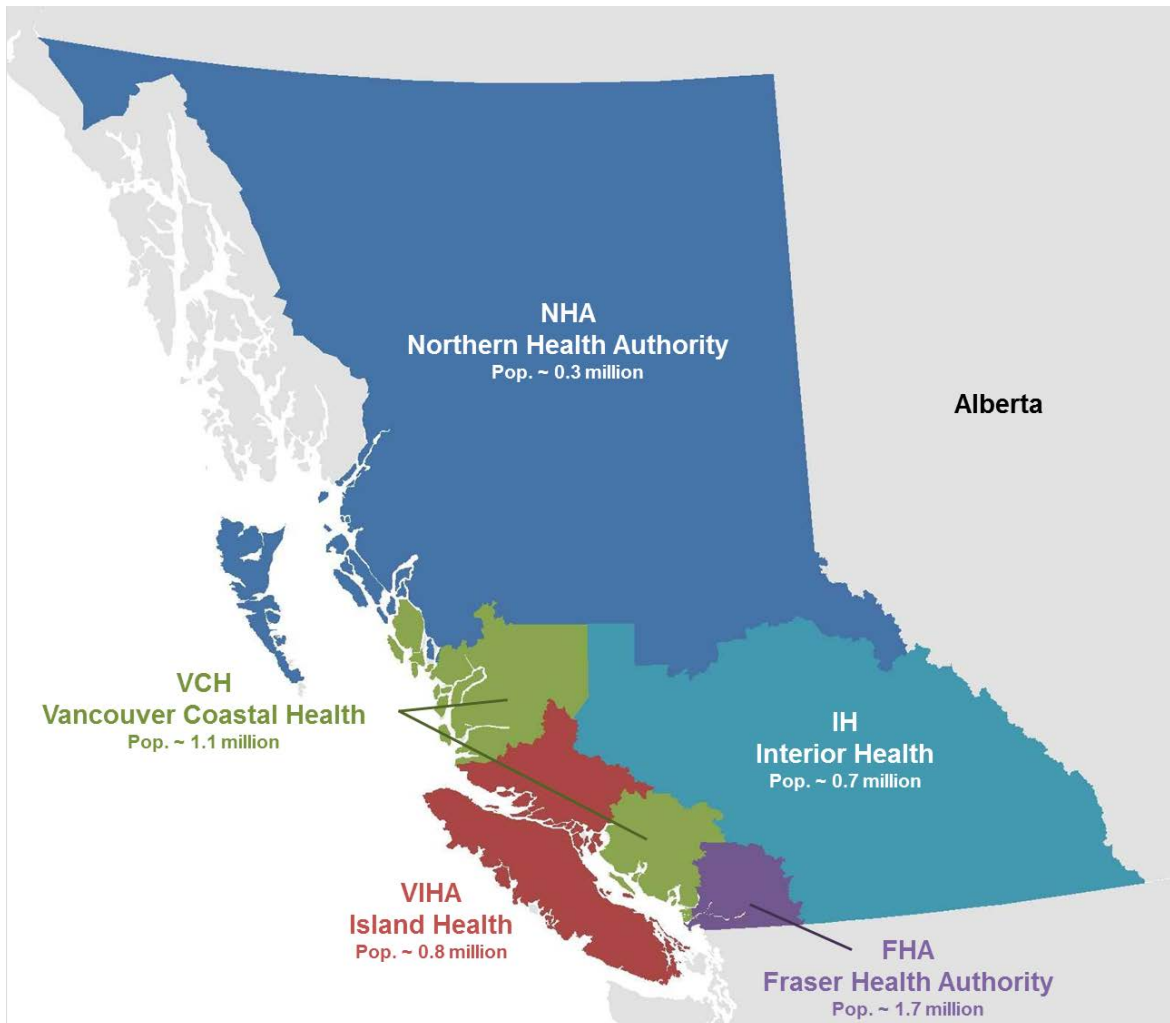
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The *Do Bugs Need Drugs?* (DBND) program is a multifaceted public and health care professional education program geared towards decreasing antibiotic overuse and misuse and the spread of resistant organisms. The DBND program was initially implemented 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 data collected around media campaigns, health care professional and public education programs, public teaching programs, print material distribution as well as indicators from social media outlets. Program Outcome Evaluation includes surveillance of trends in antimicrobial utilization and resistance in BC.

This report highlights program implementation and evaluation activities for the DBND program in BC for the 2014/15 fiscal year. Historical data from previous years' reports are presented to examine longer-term trends over time. Public teaching numbers are presented by school year (September to August) to correspond to the peak teaching periods for the DBND program, all other education activity numbers are presented by fiscal year (April to March). 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 (IH), Fraser Health Authority (FHA), Vancouver Coastal Health (VCH), Island Health (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 2014 population estimates (P.E.O.P.L.E. 2014)



## Acronyms

ATC	Anatomical Therapeutic Chemical
BC	British Columbia
DBND	<i>Do Bugs Need Drugs?</i>
DDD	Defined Daily Doses
DID	Defined Daily Doses per 1000 inhabitants per day
ECE	Early Childhood Educator
FHA	Fraser Health Authority
HA	Health Authority
IH	Interior Health
K-3	Kindergarten to Grade 3
NHA	Northern Health Authority
PSA	Public Service Announcement
VCH	Vancouver Coastal Health
VIHA	Island Health (formerly 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 March 2017.

## 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 2014/15 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 and outcome evaluation components.

### Program Process Evaluation

- This year's paid **public transit advertising campaign** ran from September 22 to October 19, 2014 in Kelowna, and from August 25 to September 21, 2014, in Victoria and the Vancouver Lower Mainland, and was viewed an estimated 30 million times during this period in the Metro Vancouver area. An additional two weeks of bonus advertising ran at no charge to the DBND program; several advertisements remained up past the bonus time until the space was re-allocated.
- The **television advertisement campaign** ran for a three to eight week period (depending on the station) in January and February 2015 and featured two 15-second advertisements focusing on antimicrobial resistance and appropriate antimicrobial use. Regional market coverage included Metro Vancouver, Vancouver Island, Kelowna, and province-wide coverage. Target audience reached or exceeded 70% in all regional markets.
- The **digital display campaign** ran for an 8 week period and included behavioural audience targeting and site retargeting, directing users to the DBND website to learn more. These advertisements were viewed an estimated 1.4 million times over the time period.
- The **Facebook marketplace advertisements** ran between January and February to reach our target demographic of women 25-54 and mothers with children 1 to 17 years of age, directing them to the DBND website to learn more. These advertisements were viewed an estimated 8.6 million times over the time period.
- The **washroom posters and wall decals** were displayed for an 8 week period in 11 recreational community centres in the Lower Mainland. These materials were viewed an estimated 1.3 million times over the period.
- An increased presence in **Social media** was initiated this year. A Twitter handle was launched in August 2014 and has over 500 followers as of the end of April 2015. In addition, an increase in traffic to the DBND website has been noted compared to last year.
- A total of 40 health care professional education sessions were held during the 2014/15 fiscal year, including 19 **Continuing Education** sessions with health care professionals, and 21 **Train-the-Trainer** sessions to teach health care professionals and students how to deliver the DBND public teaching components.
- During the 2014/15 fiscal year, 353 public teaching sessions were taught to over 8,400 individuals across the province. By program component, 42 **Daycare** sessions were taught to 820 children; 211 **Grade 2** sessions were taught to 5357 children; 50 **General Teaching** sessions were taught to 1280 individuals; 26 sessions under the **K-3 Teacher Resources** component were provided to 591 children; and 24 **Older adult** sessions were taught to 409 staff and residents in long-term care.
- In 2015, over 20,000 **print materials**, including activity placements, stickers, signs and posters, parent guides, and pamphlets, were distributed across the province.

- The 2012 edition of the ***Bugs and Drugs*** book has been distributed to 16,467 health care professionals (13,975 hardcopies and 2,492 iPhone Apps), as of April 1, 2015.

## Program Outcome Evaluation

- A comprehensive summary of antimicrobial utilization trends in the province of BC is currently being compiled in a separate report entitled “British Columbia Annual Summary of Antibiotics Utilization.” The most recent version of this report (2013) is available from our website: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd).
- During a practitioner-specific analysis, it was noted that physicians and surgeons comprised 88% of oral antibiotic prescriptions from retail pharmacies in BC (in 2013) and have decreased their antibiotic utilization by 18% by since 1996. In contrast, dentists, who comprised 11% of prescriptions in 2013, have increased their usage by 63% over the same time period. DBND will continue to engage multiple stakeholders from the various professional colleges in BC in an effort to reduce the use of antibiotics in the community.
- A comprehensive summary of antimicrobial resistance trends in the province of BC is currently being compiled in a separate report entitled “Antimicrobial Resistance Trends in the Province of British Columbia.” The most recent version of this report (2013) is available from our website: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd).
- The DBND team continues to work with the Public Health Agency of Canada to address the gap in surveillance of antibiotic resistance in the community across Canada

## 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 antibiotics. As such, concerted effort is needed 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.dobugsneeedrugs.org](http://www.dobugsneeedrugs.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 2014/15 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 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 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.

### Knowledge Translation and Dissemination Activities

Each year, the DBND program prepares annual surveillance reports to monitor trends in antimicrobial utilization and 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.

Peer-reviewed publications related to the DBND program included the following:

- Longitudinal surveillance of outpatient quinolone antimicrobial use in Canada in the *Canadian Journal of Infectious Diseases and Medical Microbiology* in March 2014<sup>9</sup>
- Provincial and temporal variation in macrolide and lincosamide antimicrobial use by outpatients in Canada, 1995 to 2010 in the *Canadian Journal of Infectious Diseases and Medical Microbiology* in March 2014<sup>10</sup>
- Variation in outpatient oral antimicrobial use patterns among Canadian provinces, 2000 to 2010 in the *Canadian Journal of Infectious Diseases and Medical Microbiology* in March 2014<sup>11</sup>
- Value of an aggregate index in describing the impact of trends in antimicrobial resistance for *Escherichia coli* in the *Canadian Journal of Medical Microbiology* in January/February 2015<sup>12</sup>

Other publications included:

- Antibiotic resistance: A global threat to public health, highlighting key bacteria causing common infections and their antibacterial resistance globally which was adapted from 2014 WHO report in the *BC Medical Journal* July/August 2014<sup>13</sup>
- Do Bugs Need Drugs? Program: Keeping the Magic in the Bullet in the Science Borealis Blog Post, December 2014<sup>14</sup>

Webinar presentations included:

- Canadian Dental Association – Antibiotics in Dentistry
- National Collaborating Centre for Infectious Diseases – What Do Public Health Physicians Need to Know about AMR?
- BC Dental Association – CE course – completion expected in spring of 2015

Television Documentary with DBND contribution:

- CBC’s *The Nature of Things*, documentary called, **The Antibiotic Hunters**, which aired on March 5, 2015.
- CBC News Vancouver interview on Pets and Antibiotics, which aired March 17, 2015.

## 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.

Resources	Program Processes	Process Outputs	Program Outcomes	Outcome Measures	Impact	
Funds and endorsement for the program from the Ministry of Health	Coordinate delivery of program key messages and components					
Educational materials from Alberta Health Services	Media Campaign	Television Advertisement(s)	Timing and reach of media campaigns	Increased public knowledge that viral infections do not require antibiotic therapy	Assessment of public response to program activities	Stabilization of or decrease in antimicrobial resistance in BC
		Children's initiatives				
Contribution from health care professionals, health care students, and ECE staff	Print Materials Distribution	Transit Advertisement(s)	Amount of print material distributed	Decrease in public requesting antibiotics	Assessment of public response to program activities	Reduction in overall use of antibiotics by 1 DDD per 1000 inhabitant days in BC
		Social media (websites, Twitter, digital ads)				
Program committee consisting of: physicians (e.g. medical lead), microbiologists, nurse (program coordinator), epidemiologist, pharmacist, administrative assistant, infectious disease specialists	Public Education	Washroom posters	Number and locations of community partners taught to deliver the program	Increased awareness and practice of proper hand-washing	Assessment of public response to program activities	Reduction in use of newer macrolides and fluoroquinolones by 20% in BC
		Bugs and Drugs book, parent guides, pamphlets, posters, stickers				
Collaboration with external groups	Healthcare Professional Education	Training and delivery of Daycare Program, Grade 2 Program, K – Grade 3 Teacher Resources, General Teaching, Older Adult Program	Number and region of children and older adults taught	Integration of antimicrobial stewardship in community practice	Health Care Professional Knowledge and Attitude Change Surveys	Reduction in prescriptions for bronchitis and otitis media by 15% in BC
		Community events				
	Surveillance, Research, Intervention, Evaluation, Collaborations	Continuing Education for Physicians, Pharmacists, and others	Number and locations of healthcare professional education sessions and participants	Decrease in physicians prescribing antibiotics for suspected viral infections	Antibiotic Resistance Analyses	Reduction in morbidity associated with antibiotic resistant infections
		Train-the-Trainer, Education for Daycare, Grade 2, and Older Adult programs				
		Annual Antibiotic Resistance and Utilization Surveillance Reports	Annual Report	Increased use of first line antibiotic agents	Linked PharmaNet, MSP, and DAD Data Analysis	
		Annual Report				

Figure 2. Program logic model (revised May 2015)

# Program Process Evaluation

## Media Campaign

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The DBND media campaign is composed of several advertisement campaigns: 1) public transit, 2) television, 3) children's initiatives, 4) digital display and Facebook marketplace advertisements, 5) washroom posters and 7) social media (Twitter and the DBND website). 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, as well as 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.

The same media campaign material used last year, included transit advertising posters (see Appendix) and television advertisement, which was developed in collaboration with the Vancouver Film School (VFS) students and graduates. These advertisements ran during the fall 2014 transit advertising campaign and the 2015 television advertising campaign. In addition, the 2014/15 media campaign implemented online advertising and extended material placement to community washroom facilities.

### Public Transit Advertisement Campaign

This year's paid public transit advertising campaign ran from September 22 to October 19, 2014 in Kelowna and from August 25 to September 21, 2014 in Victoria and the Vancouver Lower Mainland. Two additional weeks of advertising ran after those dates at no charge to the DBND program with many advertisements remaining in use until the space was re-allocated to another client. A total of 309 advertisements were posted during this year's campaign: 25 advertisements on the Skytrain in Metro Vancouver, 16 advertisements on the Canada Line in Metro Vancouver, and 268 advertisements on buses in Metro Vancouver, Victoria, and Kelowna (**Table 1**). Headliners (advertisements on the upper side of the bus) were also included to the exterior of the buses.

Ridership was estimated at 10.7 million people on the Expo Skytrain line and 2.9 million people on the Millennium Skytrain line for the months of September and October in 2014; ridership on the Canada Line during the same time period was 6.2 million people.<sup>15</sup> Average ridership for buses in Oakridge/Vancouver totalled 6.4 thousand people per month in 2014.



**Table 1.** Number of public transit advertisements posted by type of transit and type of advertisement, fall 2014

Type of Transit	Type of Advertisement				TOTAL
	Platform Posters	Exterior Cards (Trains)	Interior Cards (Buses)	Exterior Cards (Buses)	
Skytrain (Vancouver)	17	8	-	-	25
Canada Line (Vancouver)	12	4	-	-	16
Buses (Vancouver)	-	-	200	44	244
Buses (Victoria)	-	-	150	16	166
Buses (Kelowna)	-	-	47	8	55
<b>TOTAL</b>	<b>29</b>	<b>12</b>	<b>397</b>	<b>68</b>	<b>506</b>

\* Skytrain platform posters are 70.75" x 45" and are placed on Skytrain and Canada Line platforms. Exterior cards (trains) are 36" x 44" 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. Interior cards in Victoria and Kelowna remained up all year at no charge from the 2013/14 campaign. Exterior cards (buses) are 39" x 140" and are placed on the exterior of buses; exterior cards in the 2014/15 fiscal year include both upper and lower sides of the bus, exterior cards of all previous years used the lower side only.

## Washroom Advertising Campaign

During the media campaign, 30 washroom posters were placed in six recreational community centres in the Lower Mainland between January and March 2015, as a new initiative, to promote the importance of handwashing. It is estimated that approximately 792,000 viewings of the poster occurred during this time. In addition, 20 wall decals were placed in five Vancouver recreational community centres over the same time period which resulted in an estimated 528,000 viewings.<sup>16</sup>

## Television Advertisement Campaign

The television advertisement campaign ran for a three to eight week period (depending on the station) in January and February, 2015. This year's campaign featured the two 15-second television advertisements from the 2013 year focusing on antimicrobial resistance and appropriate antimicrobial use, which was based on the VFS students' design.

A television campaign Post Buy Summary was provided by Latitude Agency and Mediacom.<sup>16</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, Kelowna, and BC wide coverage. Target audience reached or exceeded 70% in all regional markets.

## Online Display Campaign

Online banners were created and used to target behaviours and the audience of interest and re-direct users to the [www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org) page. Online user activities were collected anonymously with no personally identifiable information to create user personas or profiles that were used to segment the audience into certain types (e.g. women 25-54, mothers with children aged 1-17). People with similar online behavior were grouped together into one segment and shown advertisements that cater to their interests (e.g. DBND banners).

This campaign ran for eight weeks and resulted in nearly 1.4 million views during this time. In addition, Facebook marketplace advertisements were purchased and resulted in an estimated 8.6 million views from the target demographic.<sup>16</sup>

**Table 2.** Target audience reach and average viewing times among women aged 25-54 by regional market, 5 January to 1 March 2015

Media	Percent of Target Audience Reached	Average Number of Times Viewed / Campaign Period
Washroom advertising	Not available	Not available
Online advertising	70%	12 views / 8 weeks
Television	86%	24 views / 8 weeks
Vancouver / Vancouver Island (CTV, CTV2 Global, CITY, Omni)	85%	20 views / 6 weeks
Kelowna (CHAN, CHBC-TV)	70%	7 views / 3 weeks
BC wide coverage (BC1, Knowledge network, Shaw Specialty networks)	75%	15 views / 8 weeks
<b>All media initiatives combined</b>	<b>94%</b>	<b>33 views / 8 weeks</b>

### 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 an eight-week period from January to February 2015. As with the general television advertisement campaign, this year's campaign featured two 15-second advertisements focusing on antimicrobial resistance and appropriate antimicrobial use. 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.

### Social Media Initiatives

This *The Do Bugs Need Drugs?* program has begun enhancing its presence in social media to connect with online audiences and increase awareness of the program, its initiatives, and materials.

Social media provides the DBND program with the opportunity to educate the public and enlist the audience in disseminating key messages. The messages of DBND are amplified and endorsed through the social sharing of content and information within the network. Online media consumption has increased over the years with a substantial portion of this consumption occurring within social networks or involving a social media component (which facilitates easy sharing through social media). Social media has the unique ability to facilitate direct engagement with the audience and moves away from the exclusive use of push messaging employed by traditional media such as television, radio, and print.

#### *Twitter*

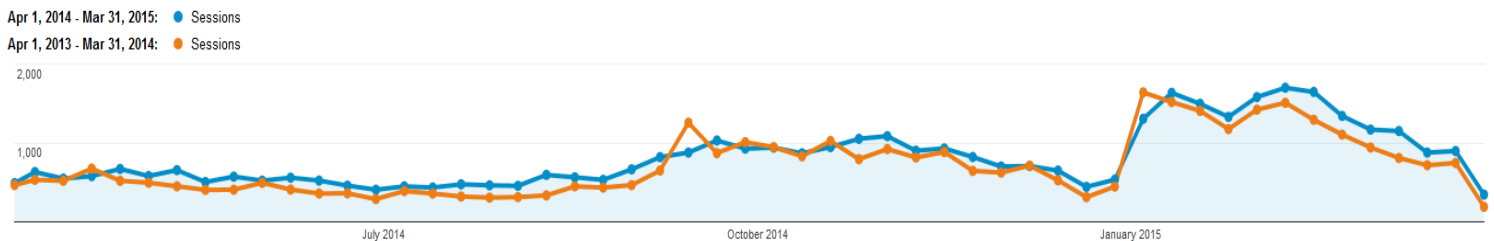
DBND began its social media launch with Twitter in August 2014. Twitter has become an important tool for connecting people interested in specific health and safety information. Along with being a platform to disseminate information, Twitter also provides opportunities to listen to conversations and to gather information in real time. The DBND program Tweets on average twice a week and includes content from the DBND website as well as related content from other sources. As of April 29, 2015, the DBND Twitter

handle had over 500 followers and was following approximately 1,500 handles. The majority of followers seem to be individuals and members of the public as opposed to larger organizations. Tweets were viewed a total of 6496 times with a potential reach of 142,500 (i.e. the cumulative number of followers of those following the DBND Twitter handle).<sup>17</sup>

### DBND Website

The DBND website ([www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)) was created by the Alberta DBND program in 1998 originally, and was updated in 2012 and includes information for healthcare professionals, teachers, childcare workers and the public. Games and puzzles are also featured for children. The grade 2 and daycare program material, translated material, and links to other relevant websites are provided. In addition, a tutorial slide show is available for training sessions for nursing students and childcare workers

During the 2014/15 fiscal year, the DBND program saw an increase in traffic to the website compared to the previous year; a 15% increase in the number of sessions and a 20% increase in users were noted.<sup>18</sup> Typically, traffic subsides during the summer months when schools are closed and thus public teaching sessions are not commonly held (**Figure 3**). In contrast, a gradual increase can be observed starting September as both public teaching and healthcare professional education sessions resume. When focussing on the active media campaign (from January 1 to February 28), sessions increased by 9% and users by 13% in 2015 compared to the same time period in 2014.<sup>18</sup> With a focus on increasing the program’s social media presence, increased traffic to the site is anticipated over the next few years (**Figure 3**).



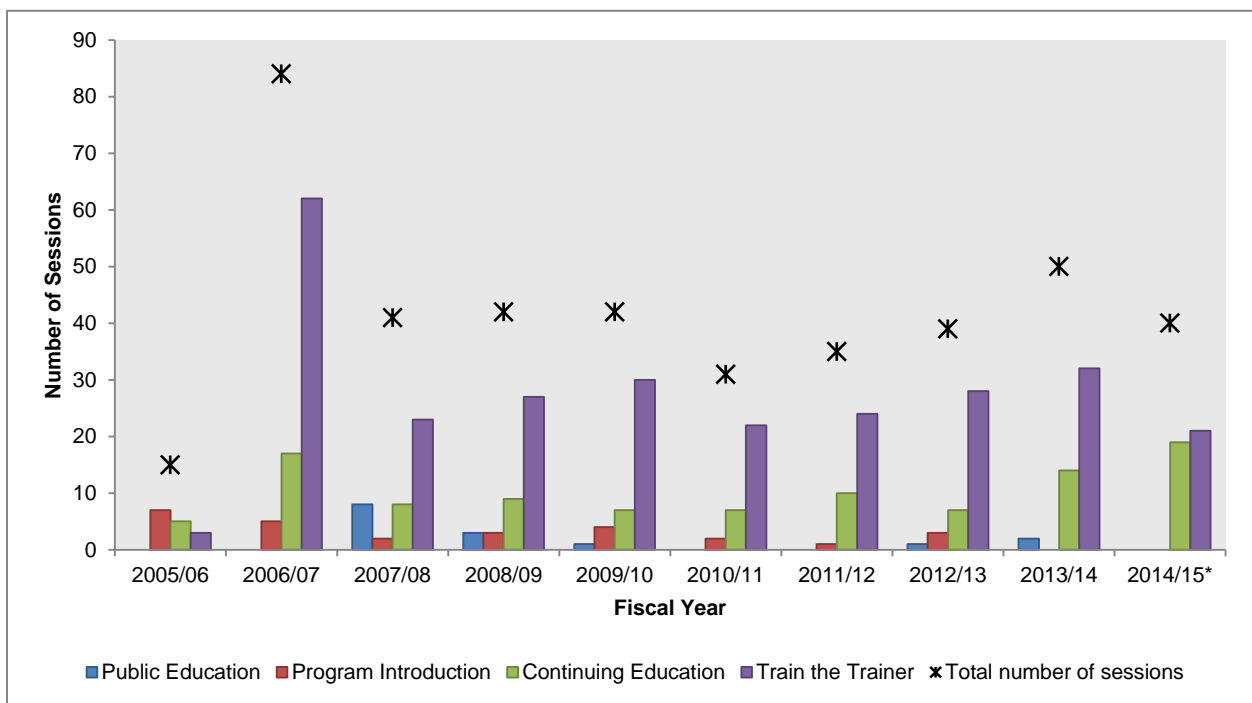
**Figure 3.** Number of sessions\* per month on the DBND website between April 1, 2013 and March 31, 2015

\* A session is defined as one or more visits to the website within a 30 minute window

## Health Care Professional and Public Education

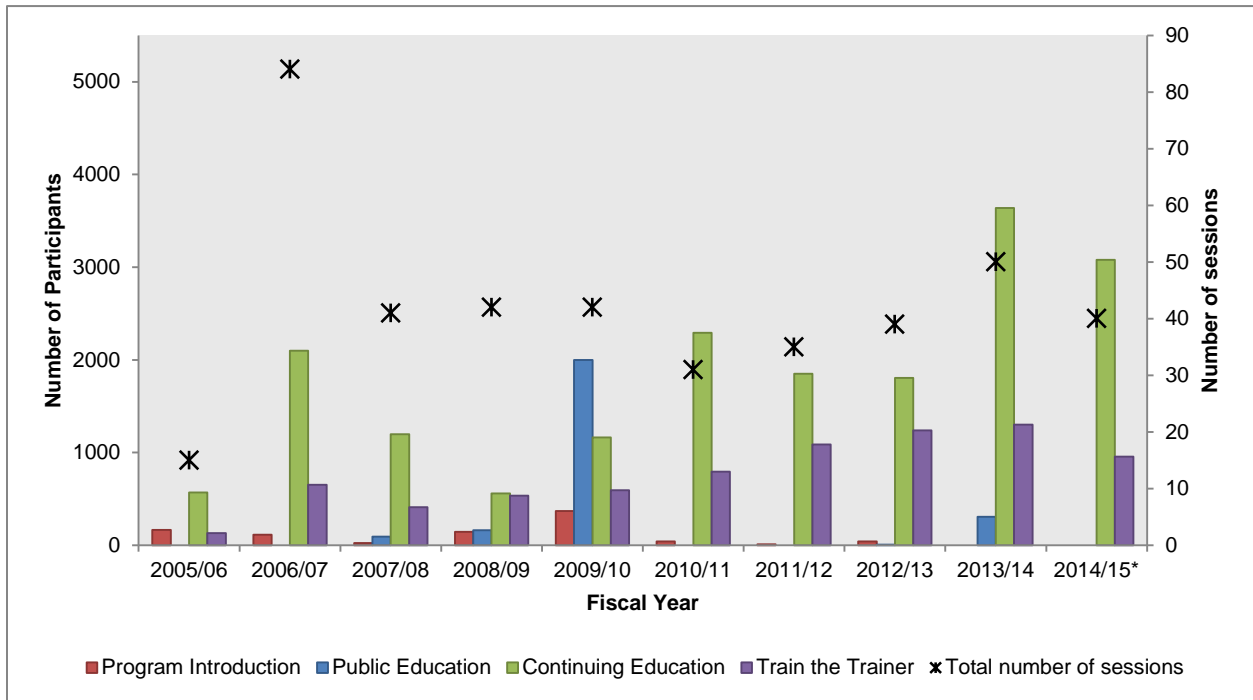
Health care professional and public education within the DBND program is comprised of several components, including Public Education, Program Introduction, Continuing Education, and Train-the-Trainer. These components are described in more detail below.

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 where relevant.



**Figure 4.** Number of education sessions by type of session and fiscal year, 2005/06 to 2014/15

\*In 2015, other sessions (not presented) include participation in CBC's The Nature of Things documentary entitled The Antibiotic Hunters, which was broadcast across Canada with an estimated 500,000 viewers.



**Figure 5.** Number of participants attending education sessions by type of session and fiscal year, 2005/06 to 2014/15<sup>†</sup>

\*Fiscal year 2014/15 numbers are accurate as of April 29, 2015.

<sup>†</sup>Only target audience participants are included in the figure; a total estimate of 1352 individuals have participated in sessions as other audience members since program inception in BC.

## Public Education and National/International Action

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, 15 Public Education sessions have been held (Figure 4). These sessions were attended by a total of 2,571 participants to date (Figure 5). 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 2014/15 fiscal year, no Public Education sessions were held, however, DBND team members participated in CBC's The Nature of Things documentary entitled The Antibiotic Hunters which followed drug researchers as part of the urgent hunt to find the building blocks of new antibiotics and was broadcast across Canada with an estimated 500,000 viewers.

The team has been active across the country in promoting better standards of antibiotic stewardship. This included testifying at a Senate hearing to galvanize national action on resistance, participation in a broadly watched discussion of key issues sponsored by the Royal Society of Canada and the UK High Commission, and participation in two national committees striving to improve surveillance and stewardship across the country.

In July 2014, the DBND team had the opportunity to meet with a representative of the World Health Organization (WHO) to foster dialogue and feedback on antimicrobial stewardship programs at the WHO

and in British Columbia. The DBND team provided input into the WHO Antimicrobial Resistance (AMR) Task Force, as well as the Global AMR Action Plan for 2015.

## 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 4**). These sessions were attended by a total of 909 participants (**Figure 5**). No Program Introduction sessions were held during the 2013/14 or 2014/15 fiscal year as the program has become well established in the province.

## 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 103 Continuing Education sessions (**Figure 4**). The estimated number of health care professionals at these sessions, and who potentially were exposed to components of the DBND program, is 18,254 individuals (**Figure 5**). During the 2014/15 fiscal year, DBND team members presented at 19 Continuing Education sessions. The estimated number of health care professionals was 3,080 individuals, the majority (76%) 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, 272 Train-the-Trainer sessions have been held (**Figure 4**). 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, 7,700 participants have attended Train-the-Trainer sessions (**Figure 5**). During the 2014/15 fiscal year, 21 Train-the-Trainer sessions were provided to 955 participants. The majority of these participants were either nursing students (64%) or medical students (30%) (**Table 3**).

**Table 3.** Number of target audience participants by target audience and year, 2014/15 fiscal year\*

<b>Target Audience**</b>	<b>Train the Trainer n (%)</b>	<b>Continuing Education n (%)</b>
Public	-	-
Assisted Living Staff	-	-
Early Childhood Educators	6 (1)	-
ECE Students	29 (3)	-
Medical Students	288 (30)	576 (19)
Nursing Students or Instructors	612 (64)	122 (4)
Pharmacists	-	-
Pharmacy Students	-	-
Physicians	-	2,354 (76)
More than one main target audience†	20 (2)	28 (1)
<b>TOTAL</b>	<b>955 (100)</b>	<b>3,080 (100)</b>

\*Fiscal year 2014/15 numbers are accurate as of April 29, 2015.

\*\*Only target audience participants are included on figure; a total of 175 individuals have participated in health care professional and public education sessions as other audience members during the 2014/15 fiscal year.

†At certain events, a variety of healthcare professionals (i.e. a combination of professionals listed) were in attendance as target audience members

ECE = Early Childhood Education.

## Public Teaching

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Public teaching within the DBND program is comprised of several components, including a Daycare Program, a Grade 2 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.

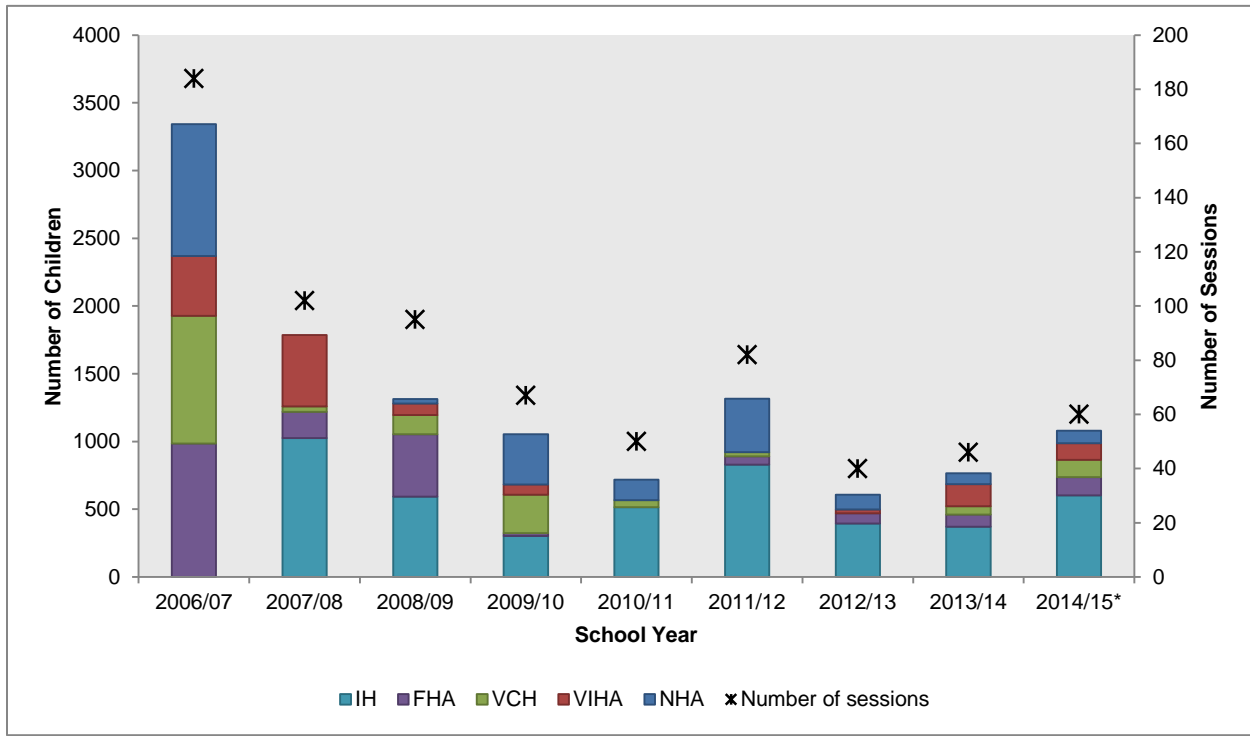
In general, the number of public teaching session provided this year has decreased compared to previous years. This is likely due to the BC teacher's strike which occurred in September 2014. This strike may have reduced the time allotted for DBND public teaching sessions. In addition, challenges remain regarding the voluntary completion of teaching documentation forms by healthcare professionals providing the sessions and submission of these forms to the DBND program in a timely fashion. These limitations likely results in an underestimation of sessions delivered. In an effort to encourage compliance, individuals and facilities who had not maintained on-going contact, and had email or postal information available, were invited in the fall of 2014 to order educational print material and provide information on programs taught recently in order to credit their contribution to the program.

### Daycare Program

The Daycare Program is taught to pre-school children aged two to five years and emphasizes the importance of teaching young children how proper hand washing can prevent the spread of disease and reduce the need for antibiotics. The program also 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 727 sessions have been taught to 11,988 children across the province (**Figure 6**). During the 2014/15 school year, 60 Daycare sessions were taught to 1080 children across the province, including 603 (56%) children in IH, 133 (12%) in FHA, 128 (12%) in VCH, 124 (11%) in VIHA, and 92 (9%) in NHA.





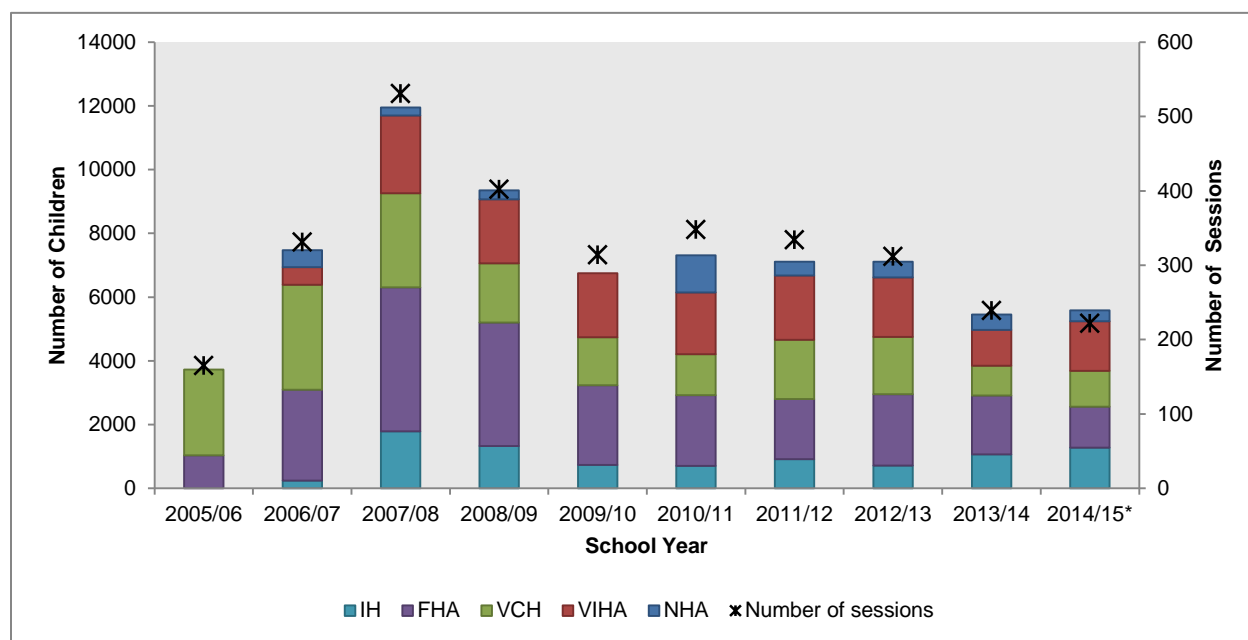
**Figure 6.** Number of children taught under the Daycare Program by Health Authority and school year, 2006/07 to 2014/15<sup>†</sup>

\*School year 2014/15 numbers are accurate as of May 26, 2015.

<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.

## 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 throughout the province, with the first sessions taking place in VCH 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 IH in the spring of 2007.



**Figure 7.** Number of children taught under the Grade 2 Program by Health Authority and school year, 2005/06 to 2014/15

\*School year 2014/15 numbers are accurate as of May 26, 2015.

During the 2014/15 school year, 222 Grade 2 sessions were taught to 5,581 children across the province. By Health Authority, the majority of children were taught in VIHA (n=1,557; 28%), FHA (n=1,132; 23%), IH (n=1279; 23%), and VCH (n=1118; 20%), with smaller numbers of children being reported in NHA (n=340; 6%). Most of these sessions for 2014/15 were taught by nursing students or medical students (Table 4).

**Table 4.** Number of sessions taught under the Grade 2 Program by designation of person providing teaching and school year, 2014/15

Designation of Person Providing Teaching	2014/15 School Year n (%)	All Years n (%)
Nursing Student	141 (64)	2016 (63)
Medical Student	53 (24)	199 (6)
Pharmacist/Pharmacy Technician	18 (8)	657 (21)
Nurse	10 (5)	254 (8)
Teacher	0 (0)	30 (1)
Other**	0 (0)	41 (1)
<b>TOTAL<sup>†</sup></b>	<b>222 (100)</b>	<b>3197 (100)</b>

\*School year 2014/15 numbers are accurate as of May 26, 2015.

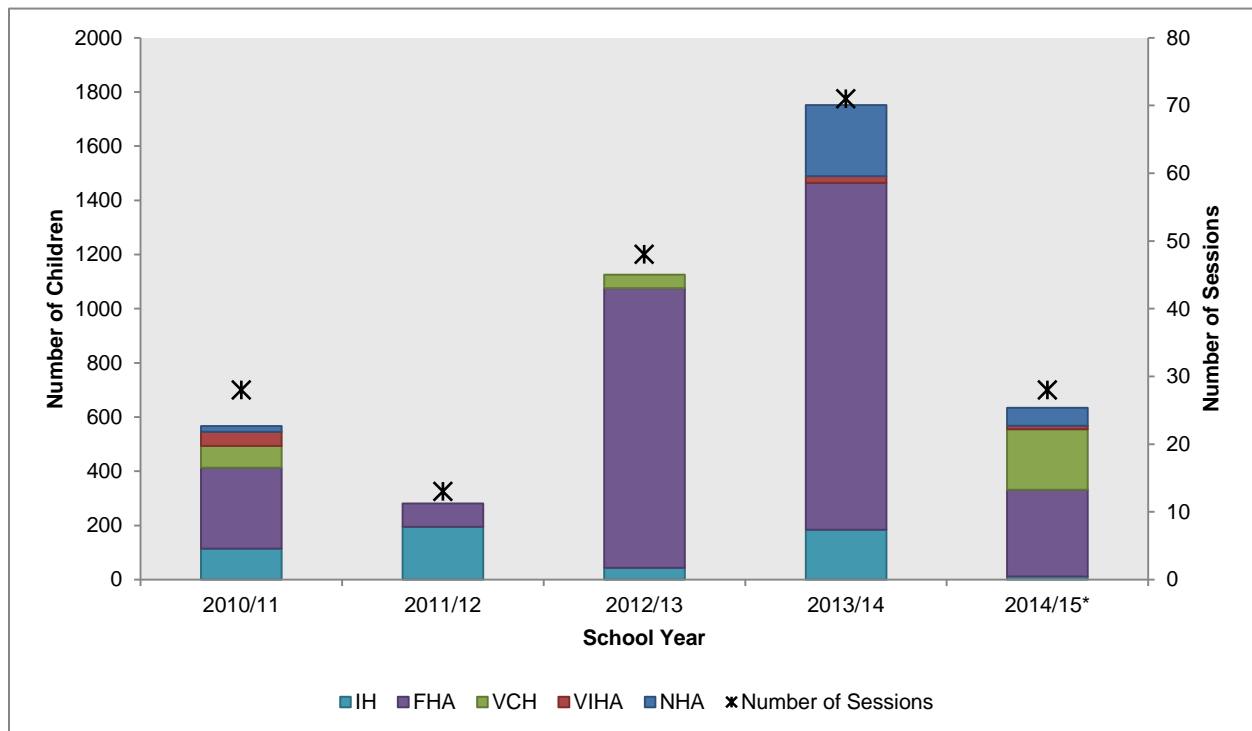
\*\*Other includes high school students, nursing instructors, physicians, and early childhood educators

<sup>†</sup>Designation of an individual providing teaching was missing for one Grade 2 teaching session in 2008/09.

## 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 188 sessions have been taught to 4,359 children across the province (**Figure 8**). During the 2014/15 school year, 28 sessions were taught to 634 children in all health authorities for the first time since this program was introduced. Most of these children taught were in FHA (n=320; 51%); followed by VCH (n=223; 35%) which represents a substantial increase in children taught in VCH compared to previous years. Smaller numbers of children were taught in NHA (n=66; 10%), VIHA (n=13, 2%), and IH (n=12; 2%).



**Figure 8.** Number of children taught under the K-3 Teacher Resource Program by Health Authority and school year, 2010/11 to 2014/15

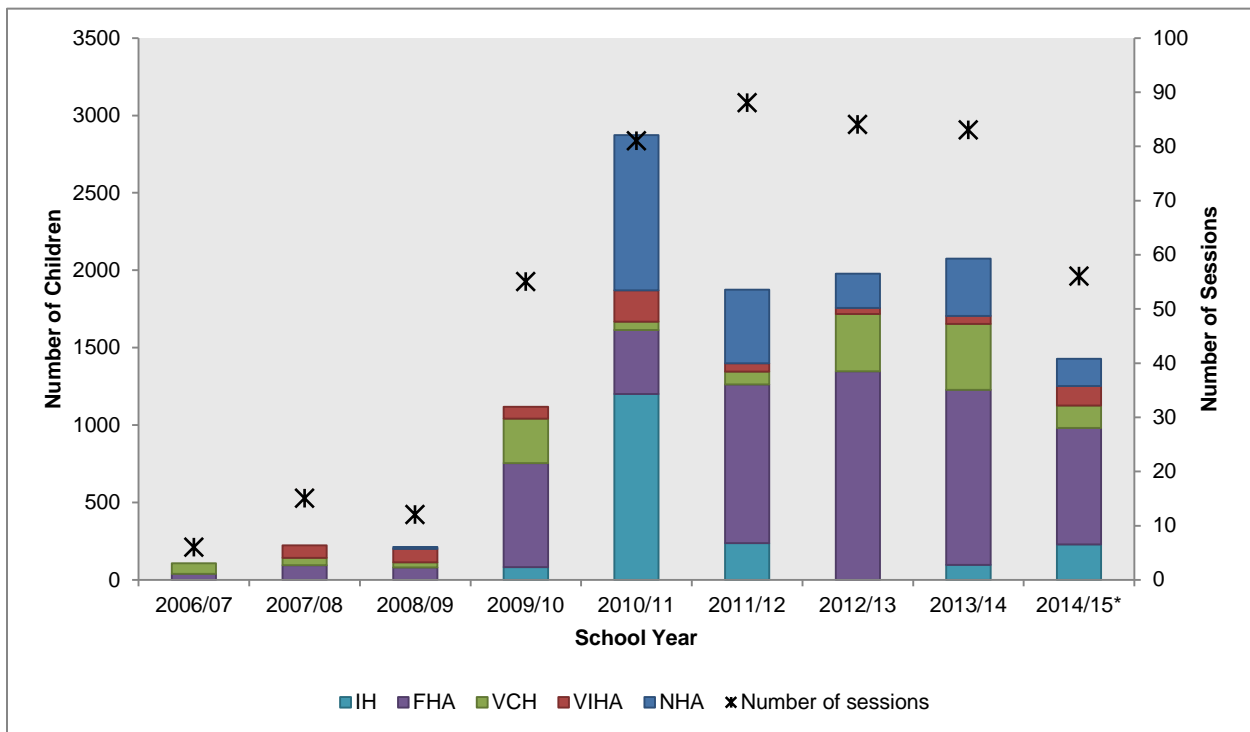
\*School year 2014/15 numbers are accurate as of May 26, 2015.

## 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 482 sessions have been taught to 11,918 children across the province under the General Teaching Program (**Figure 9**). The General Teaching Program was initiated during the 2009/10 school year after becoming aware of instructors adapting the DBND Daycare, Grade 2, and Older Adult program components to meet the 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 9.** Number of children taught under the General Teaching Program by Health Authority and school year, 2006/07 to 2014/15<sup>†</sup>

\*School year 2014/15 numbers are accurate as of May 26, 2015.

<sup>†</sup>An additional two General Teaching sessions (28 children total) were taught in school year 2005/06 both in VCH; these numbers are not included in the figure.

During the 2014/15 school year, 56 General Teaching sessions were taught to 1,429 children. By Health Authority, General Teaching sessions were taught to 751 children in FHA (53%), 146 (10%) in VCH, 230 (16%) in IH, 126 (9%) in VIHA, and 176 (12%) in NHA. Nursing students taught the majority of these sessions (90%) during the 2014/15 school year (**Table 5**).

**Table 5.** Number of sessions taught under the General Teaching Program by designation of person providing teaching and school year, 2014/15

Designation of Person Providing Teaching	2014/15 School Year*	All Years
	n (%)	n (%)
Nursing Student	50 (89)	401 (87)
Nurse	6 (11)	26 (6)
Pharmacist/Pharmacy Technician	0 (0)	10 (2)
Teacher	0 (0)	3 (1)
Medical Student	0 (0)	3 (1)
Other <sup>†</sup>	0 (0)	20 (4)
<b>TOTAL</b>	<b>56 (100)</b>	<b>463 (100)</b>

\*School year 2014/15 numbers are accurate as of May 26, 2015.

<sup>†</sup>Other includes managers, directors, coordinators, pre-medical students, parents, and nursing instructors

## 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.

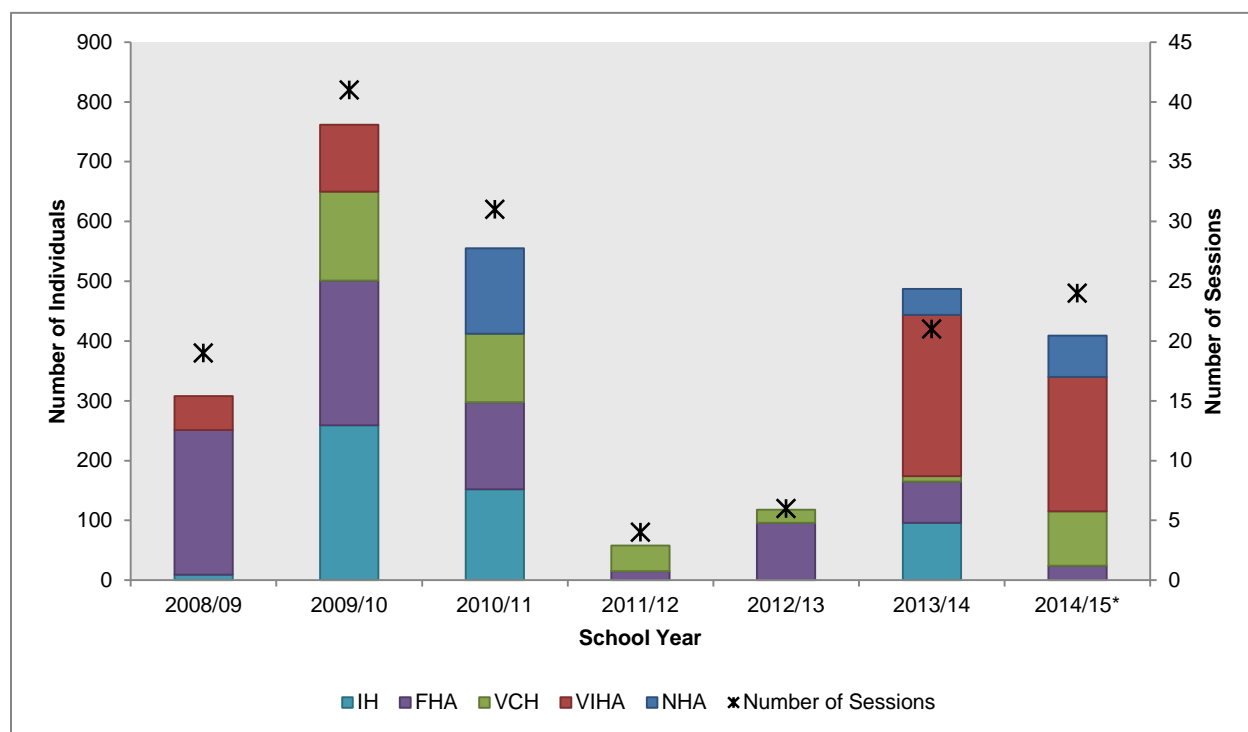
Since implementation of the Older Adult Program in 2008, a total of 146 sessions have been taught to 2,697 individuals across the province, including 607 staff, 1,928 residents, and 162 other individuals, (**Figure 10; Table 6**). Teaching numbers for the Older Adult program fluctuate from year-to-year based on the capacity of community partners to participate in program implementation.

**Table 6.** Number of individuals taught under the Older Adult Program by target audience and school year, 2008/09 to 2014/15

Target Audience	School Year							All Years
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15*	
Staff	105	229	88	17	48	85	35	607
Residents	179	461	454	39	67	400	328	1928
Other	24	72	13	2	3	2	46	162
<b>TOTAL</b>	<b>308</b>	<b>762</b>	<b>555</b>	<b>58</b>	<b>118</b>	<b>487</b>	<b>409</b>	<b>2697</b>

\*School year 2014/15 numbers are accurate as of May 19, 2015.

During the 2014/15 school year, a total of 24 Older Adult sessions were held across all Health Authorities with the exception on IH. Audience members during these sessions included 35 staff (9%), 328 residents (80%), and 46 other individuals (e.g. residents family members or visitors). Increases in numbers taught were noted in both VCH and NHA compared to the previous year. By Health Authority, the Older Adult Program was taught to 2250 (55%) individuals in VIHA, 24 (6%) individuals in FHA, 69 (17%) at NHA, and 91 (22%) in VCH (**Figure 10**). Most of these sessions during the 2014/15 school year were taught by nurses or nursing students (20 sessions) (**Table 7**).



**Figure 10.** Number of individuals (includes staff, residents, and other individuals) taught under the Older Adult Program by Health Authority and school year, 2008/09 to 2014/15

\*School year 2014/15 numbers are accurate as of May 19, 2015.

**Table 7.** Number of sessions taught under the Older Adult Program by designation of person providing teaching and school year, 2014/15

Designation of Person Providing Teaching	2014/15 School Year <sup>*</sup> n (%)	All Years, n (%)
Nurse	2 (8)	50 (34)
Nursing Student	17 (71)	44 (30)
Care aide/Healthcare assistants	2 (8)	7 (5)
Recreational Therapist	0 (0)	4 (3)
Teacher	0 (0)	3 (2)
Director	0 (0)	8 (5)
Manager	0 (0)	8 (5)
Site Leader	0 (0)	3 (2)
Pharmacist/Pharmacy Technician/Pharmacy students	0 (0)	10 (7)
Other <sup>†</sup>	3 (13)	10 (7)
<b>TOTAL</b>	<b>24 (100)</b>	<b>147 (100)</b>

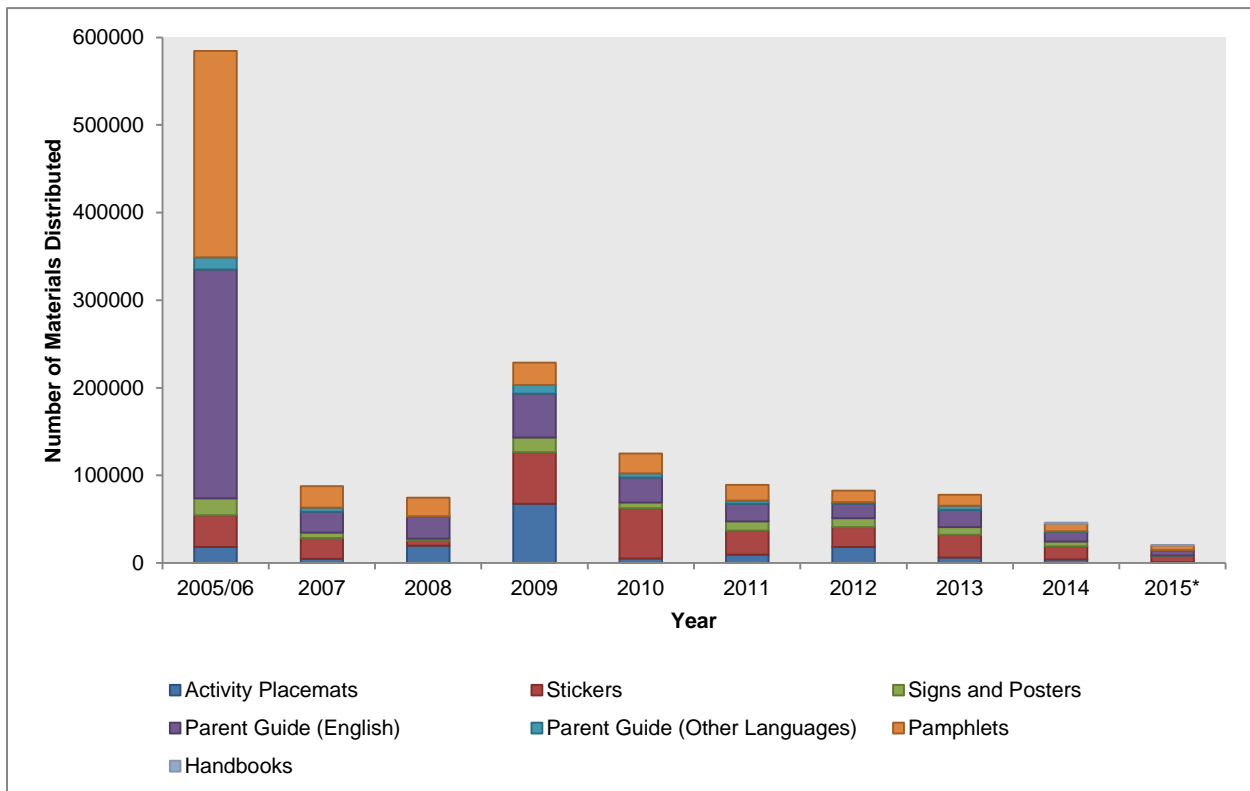
\* School year 2014/15 numbers are accurate as of May 19, 2015.

<sup>†</sup> Other includes coordinators, support workers, and advisors; please note, *Other* designations for 2014/15 were not specified on some returned forms (n=3) and 1 return form did not accurately record the date of teaching but was delivered in 2014 by an LPN to 6 residents and 1 staff (accounted for in all years but not in 2014/15).

## 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 1.4 million print materials have been distributed across the province and elsewhere. The largest number of print materials was distributed in 2005/06, as the DBND program was fully implemented across the province (**Figure 11**). Since then, print material distribution numbers have decreased to more sustainable levels. By type of material, 155,000 activity placemats, 279,917 stickers, 86,938 signs and posters, 461,938 parent guides in English, 45,059 parent guides in other languages, and 387,026 pamphlets have been distributed since 2005/06.



**Figure 11.** Print material distribution by type of material and year, 2005/06 to 2015\*

\* Includes print material distribution up to end of fiscal year (March 31, 2015). During this fiscal year, an inventory update was performed: 515 stickers and one older adult kit were unaccounted for due to either dissemination or incorrect documentation provided upon retrieval.

In 2014, over 45,000 print materials were distributed across the province: 3,954 activity placemats, 15,242 stickers, 5,327 signs and posters, 10,823 parent guides in English, 1,072 parent guides in other languages (**Table 8**), and 8,668 pamphlets were distributed across the province. In addition, new employer and worker handbooks were developed in conjunction with Alberta to address issues around workplace infection prevention and control. Approximately 1000 handbooks were distributed provincially during the 2014/15 fiscal year with a particular focus on industrial camps (e.g. mining, forestry). DVDs

covering similar material were also developed and distributed during this time frame (n=3). Future dissemination of the handbooks will include targeting the transport and tourism industries as well as port authorities among others.

**Table 8.** Number of parent guides distributed by translated language in 2014 and overall

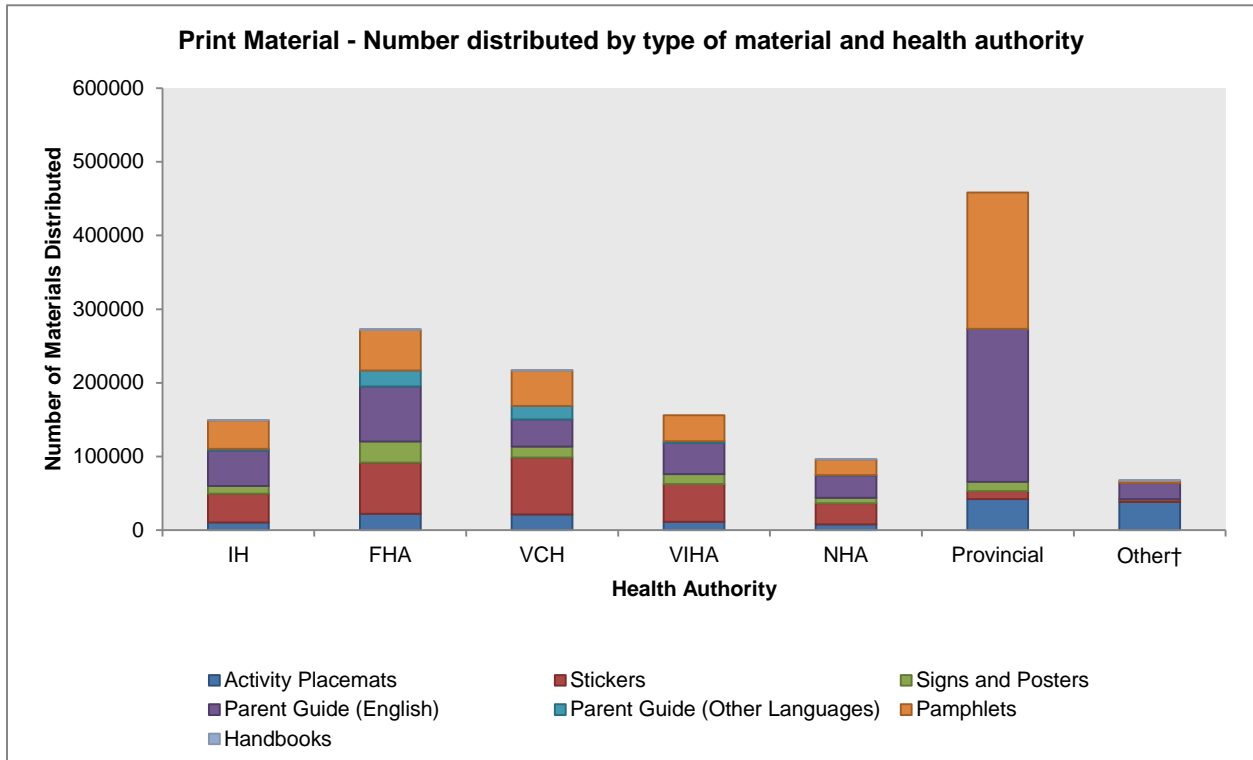
<b>Language</b>	<b>2014 Year n (%)</b>	<b>All Years* n (%)</b>
Punjabi	278 (26)	3542 (31)
French	59 (6)	2556 (23)
Chinese simplified	171 (16)	1314 (12)
Chinese tradition	219 (20)	900 (8)
Persian	54 (5)	788 (7)
Vietnamese	89 (8)	565 (5)
Korean	83 (8)	540 (5)
Spanish	58 (5)	501 (4)
Somali	29 (3)	292 (3)
Arabic	32 (3)	291 (3)
<b>TOTAL<sup>†</sup></b>	<b>1072 (100)</b>	<b>11289 (100)</b>

\*All years column includes data from 2015 as of May 26, 2015

A decrease in material distribution can be noted compared to previous years which may be attributed to sites having adequate material from previous orders to sustain demand.

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, 19% of total print materials were distributed in FHA, 15% in VCH, 11% in VIHA, 11% in IH, and 7% in NHA, with the remaining 37% distributed either provincially or to other national or international organizations (**Figure 12**).





**Figure 12.** Print material distribution by type of material and Health Authority since 2005/06\*

\* Includes print material distribution up to end of fiscal year (March 31, 2015).

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

## Bugs and Drugs Book

The distribution of the fifth edition (2012) of the *Bugs and Drugs* antimicrobial/infectious diseases reference book continued this year, targeting physicians, medical residents, nurse practitioners, naturopaths, midwives, infection control sites, independent pharmacies, First Nations nursing stations, and healthcare students in medicine, dentistry, pharmacy, naturopathic medicine, midwifery, and the nurse practitioner program.<sup>19</sup> In the latest 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 as an iPhone or Android App. Only the hardcopy book and iPhone App are being provided complimentary by the DBND program 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; and the Android App can be purchased through Google Play.

As of April 1, 2015, over 16,467 copies of the *Bugs and Drugs* resource had been distributed: 13,975 hardcopies and 2,492 iPhone apps. A breakdown of the distribution numbers by target group is provided in **Table 9**.

**Table 9.** Distribution of the *Bugs and Drugs* reference by type of material and target group\*

Target Group	Hardcopy Books	iPhone Apps	TOTAL
Physicians	2404	1,478	3,882
Nurse practitioners	221	50	271
Medical residents and students	2238	926	3,164
Other health care professional residents and students <sup>†</sup>	2286	27	2,313
Pharmacists participating in academic detailing program <sup>‡</sup>	860	8	868
Pharmacists and pharmacies	2,178	4	2,182
Infection control practice sites	49	0	49
Dentists	3,090	0	3,090
Naturopaths	420	0	420
Midwives	205	0	205
Other	24	1	25
<b>TOTAL</b>	<b>13,975</b>	<b>2,494</b>	<b>16,469</b>

\* Includes Bugs and Drugs book distribution up to April 1, 2015. Numbers may have decreased in comparison to previous years' reports due to the return of books not distributed.

<sup>†</sup> Includes residents and students in dentistry, pharmacy, and nurse practitioner programs.

<sup>‡</sup> 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

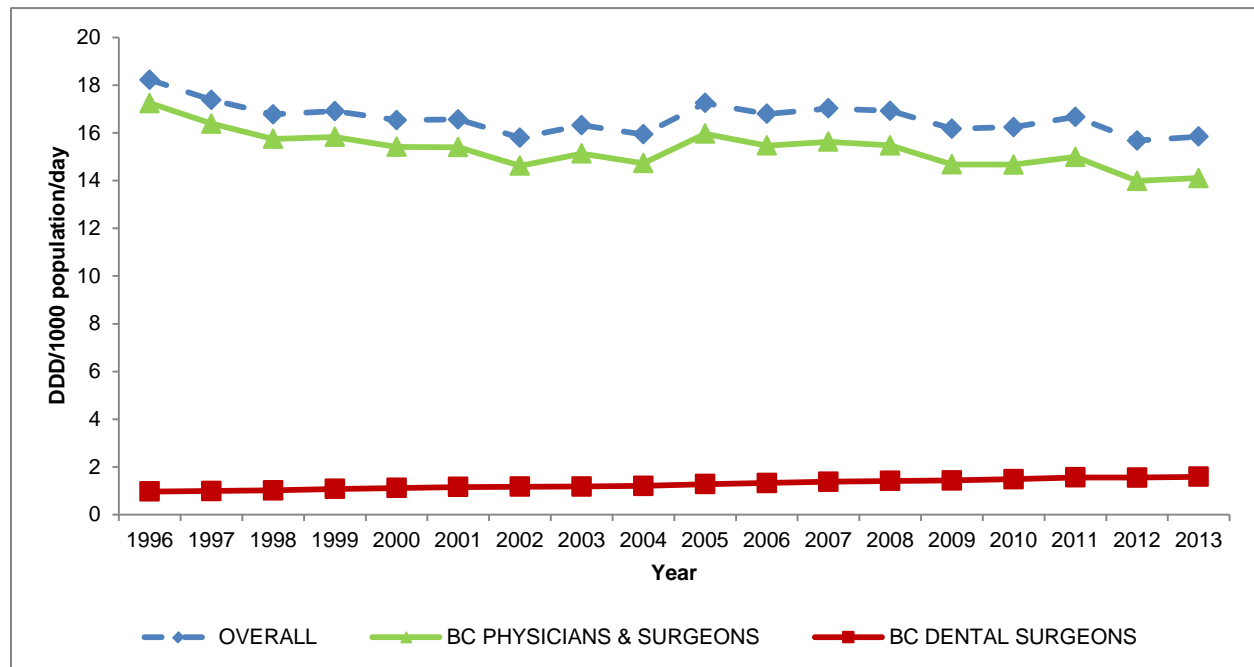
Trends in antimicrobial utilization in BC are monitored to:

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 and the Medical Services Plan (MSP) payment files which contain claim records for all medically billable services provided by healthcare practitioners and remunerated under fee-for-service schedule to individuals covered under the provincial insurance plan.

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 (2013) is available from our website (<http://www.bccdc.ca/prevention/AntibioticResistance/ReportsandPublications/default.htm>). An updated report potentially including data up to 2014 and indication-specific data is currently being prepared.

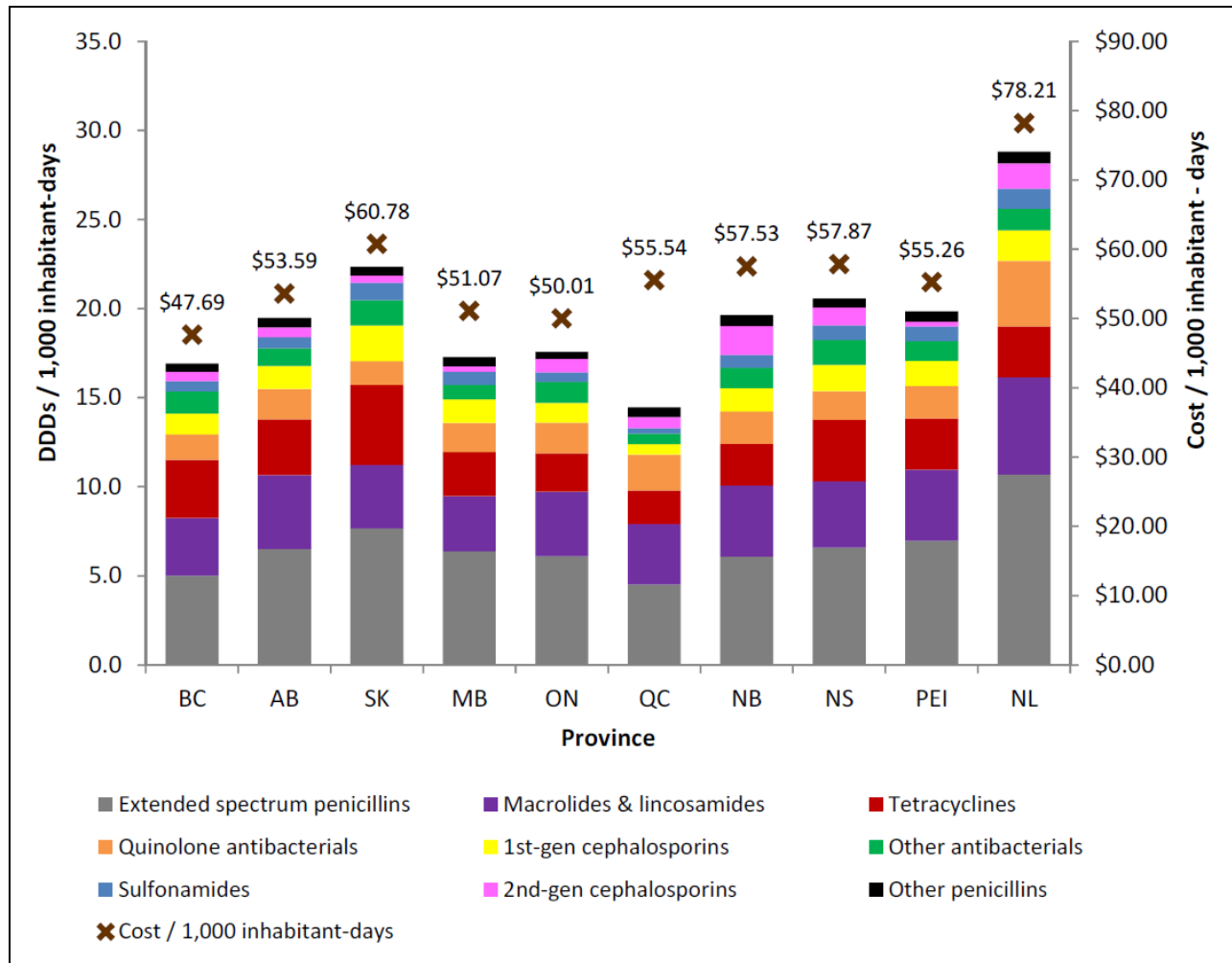
This year, however, DBND was able to analyze the drug utilization data based on the licensing body of the practitioner responsible for prescribing. In 2013, physicians and surgeons accounted for 88% of prescriptions, dental surgeons accounted for 11% and the remainder of prescriptions were from midwives, registered nurses, optometrists, naturopathic physicians, pharmacists and podiatrists. Utilization rates were converted into a standardized measure of daily defined dose per 1000 inhabitants per day (DID).



**Figure 13.** Antibiotic daily utilization rates from 1996 to 2013 by practitioner type

Overall, antibiotic utilization decreased from 18.2 DID in 1996 to 15.9 DID in 2013 (**Figure 13**). This was mainly driven by the 18% decrease in DID by physicians and surgeons over this time period. In contrast, it was noted that dental surgeons had increased their antibiotic utilization by 63% over this time (0.98 DID in 1996 to 1.59 DID in 2013). In response to these observations, an online course for the BC Dental Association was developed in an effort to address this increase in antibiotic utilization within the practice. In addition, a discussion video was prepared and posted through the Canadian Dental Association in March which outlined the results and solicited feedback from viewers. A thematic analysis of responses from dental viewers is currently underway to identify underlying reasons for this increase. In the near future, DBND plans to arrange presentations at dental meetings and or publish in dental literature as a means to disseminate these results farther and raise awareness.

A national report on human antimicrobial drug use was also been completed by PHAC in November 2014 and included trends in costs associated with antimicrobial drug use. According to PHAC, the cost of antimicrobial prescribing in Canada has declined since 2000.<sup>20</sup> In 2013, approximately \$19.20 was spent per inhabitant in Canada which is a \$0.90 decrease from 2012 and a \$2.40 decrease from 2011.<sup>20</sup> BC has the lowest cost per 1000 inhabitant-days compared to all the Canadian provinces in 2013 (**Figure 14**).<sup>20</sup>



**Figure 14.** Defined daily doses and cost per 1,000 inhabitant-days, by antimicrobial class and province, 2013

## 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 (2013) is available from our website (<http://www.bccdc.ca/prevention/AntibioticResistance/ReportsandPublications/default.htm>).

In the 2013 report, LifeLabs Medical Laboratory Services (LifeLabs) data from 2008 to 2013 was included for the first time, in addition to BC Biomedical Services (BC Biomed) data provided and analyzed previously. LifeLabs provides services primarily to Vancouver Mainland and the Island whereas BC Biomed provides services primarily in Fraser. Combined, BC Biomed and LifeLabs account for 90% of all community laboratories in BC. An updated report including data up to 2014 is currently being prepared.

With the introduction of the *Federal initiative: Antimicrobial Resistance and Use in Canada: A Federal Framework for Action* announced in November 2014, the gap in community surveillance of antimicrobial resistance was highlighted and addressed. The Canadian Antimicrobial Resistance Surveillance System (CARSS) will be established in an effort to integrate the multiple systems collecting data on resistance in Canada as well as expand the system to include more sources of community data. DBND and BC community laboratory members have been actively engaged in the discussions with regards to the current surveillance system in BC and how other provinces may be able to use a similar framework. A report was prepared which outlined the data sources, organism-antibiotic combinations and indicators of interest under the BC surveillance system managed by DBND. A pilot of the system at the national level is currently being conducted to assess feasibility.

## Conclusions

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After ten years of delivering the DBND program in BC, program components have been implemented to various degrees within all of the health authorities in BC and continue to expand. A large number of children and adults, including health care professionals, continue to receive DBND teaching. Development of new material continues for different target populations and distribution of all materials has been extensive. Alternative approaches of reaching target audiences with the three key messages are being explored and implemented. An increased social media presence may allow the program to disseminate key messaging to a wider audience.

In addition to the documented progress in process evaluation indicators, the DBND program has shown excellent progress in outcome evaluation indicators.

DBND, in its tenth year of implementation, is showing positive achievements in addressing antibiotic resistance. The newly established collaboration with a large community provider of laboratory testing services in BC has allowed for better geographical representation of resistance data. These data will enhance provincial estimates and better inform practices and recommendations.

A continued decrease in overall antibiotic use has been observed since 2005, especially among prescriptions in the paediatric population. However, increased levels of antibiotic use are being observed among dental surgeons. This observation highlights the importance of engaging all prescribing professions when attempting to control antibiotic use in the province. Indication-specific analyses are integral to outcome evaluation and will be presented once the data becomes available.

The indicators reflected in this report will continue to inform program planning. 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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## **Acknowledgements**

The DBND program originated in Alberta in 1998 and was adapted for use in BC in 2005. The authors would like to thank the DBND program and executive committee in Alberta for their support and collaboration over the past ten years.

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; child care resource and referral centre staff; healthcare workers caring for older adults; Lamar Transit Advertising; Latitude Agency; Mr. Walton Pang and Mr. Patrick Crawford for being strong advocates of the program and the British Columbia Ministry of Health, Medical Beneficiary & 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 ten years.

Antimicrobial data were provided by LifeLabs Medical Laboratory Services and BC Biomedical Laboratories to the DBND program for the purposes of assessing changes in trends over time.

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:

- 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) Vancouver Island University (Nanaimo)
- UBC (Vancouver)
- UBC Okanagan (Kelowna)
- UNBC (Prince George)
- University of the Fraser Valley (Chilliwack)
- University of Victoria
- College of New Caledonia (Prince George)
- Sprott Shaw Community College
- Thompson Rivers University (Williams Lake)

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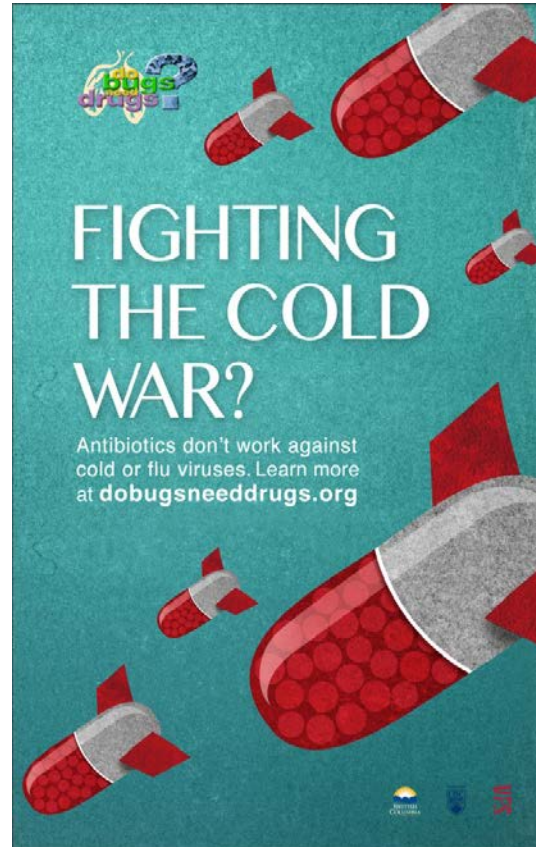
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# Appendix

## Transit Advertisements

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Example 1. Platform posters at Skytrain Stations



**Example 2.** Skystrip advertisements on Skytrains



**Example 3.** Advertisement on Side of Bus (King) and Interior advertisement on Buses



## 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 Latitude Agency. The figures are based on Numeris audience data, formerly Broadcast Bureau of Measurement (BBM) audience data, for the period of January 5 to February 28, 2015.

Transit ridership numbers were provided by Lamar Advertising. For the Canada Line, estimates are recorded using counters at each station for people entering and exiting. For the SkyTrain, 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 calculated similarly to the SkyTrain by municipality.

#### 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%. In an effort to encourage compliance, individuals and facilities who had not maintained on-going contact, and had email or postal information available, were invited in the late fall of 2014 to order educational print material and provide information on programs taught recently in order to credit their contribution to the program.

#### 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 2013. 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 inhabitants per day (DID), 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 (BC Biomed), LifeLabs Medical Laboratory Services (LifeLabs), 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. Spearman rank tests were used to assess changes in trend over time.

## 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 and LifeLabs Medical Services Laboratories are limited to isolates submitted to outpatient laboratories, however, certain health authorities may be under-represented in these data. The methods used for testing bacterial isolates differ between the laboratories; different antibiotics are used and different cascading testing algorithms are implemented. 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.