



**BC Centre for Disease Control**  
An agency of the Provincial Health Services Authority

655 West 12th Avenue  
Vancouver, BC V5Z 4R4

Tel 604.707.2400  
Fax 604.707.2441

[www.bccdc.ca](http://www.bccdc.ca)

# *Do Bugs Need Drugs?* Annual Report

## 2015/16

Prepared by:

*Do Bugs Need Drugs?*  
May 2016

***Do Bugs Need Drugs?***

**2015/16 Annual Report**

**May 2016**

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

## Table of Contents

---

<b>About this Report</b> .....	<b>vii</b>
Funding.....	ix
<b>Executive Summary</b> .....	<b>x</b>
Program Process Evaluation.....	x
Program Outcome Evaluation.....	xi
<b>Introduction</b> .....	<b>1</b>
Do Bugs Need Drugs? Program.....	1
Knowledge Translation and Dissemination Activities.....	2
Program Logic Model.....	3
<b>Program Process Evaluation</b> .....	<b>4</b>
Media Campaign.....	5
Public Transit Advertisements.....	5
Television Advertisements.....	5
Online Display and Facebook Marketplace Advertisements.....	6
Google Adwords.....	6
Children’s Media Initiative.....	6
Vancouver Film School Collaboration.....	7
Social Media Initiatives.....	7
<i>Facebook</i> .....	7
<i>Twitter</i> .....	7
<i>DBND and Antibiotic Wise Websites</i> .....	7
Health Care Professional and Public Education.....	10
Public Education and National/International Action.....	11
Program Introduction.....	12
Continuing Education.....	12
Train-the-Trainer.....	12
Public Teaching.....	14
Daycare Program.....	14
Grade 2 Program.....	15
Kindergarten to Grade 3 Teacher Resources.....	17
General Teaching.....	18
Older Adult Program.....	20
Print Material Distribution.....	22

Bugs and Drugs Antimicrobial/Infectious Diseases Reference Guide .....	24
<b>Program Outcome Evaluation .....</b>	<b>26</b>
Trends in Antimicrobial Utilization.....	27
Trends in Antimicrobial Resistance .....	30
<b>Conclusions.....</b>	<b>31</b>
<b>Contributions and Acknowledgements .....</b>	<b>32</b>
Team Members .....	32
Contributors to Report .....	32
Acknowledgements .....	33
<b>References .....</b>	<b>34</b>
<b>Appendix.....</b>	<b>35</b>
Transit Advertisements .....	36
Digital Display Advertisements (Audience Targeting and Facebook Marketplace).....	37
Microsite – <a href="http://www.antibioticwise.ca">www.antibioticwise.ca</a> .....	38
Technical Notes .....	39
Data Sources.....	39
Limitations .....	40

## List of Figures

---

<b>Figure 1.</b> Map of regional Health Authorities in BC, including 2015 population estimates .....	viii
<b>Figure 2.</b> Program logic model (revised May 2015) .....	3
<b>Figure 3.</b> Number of sessions per month on the <i>Do Bugs Need Drugs.org</i> website between April 1, 2014 and March 31, 2016 .....	8
<b>Figure 4.</b> Number of sessions per month on the <i>Do Bugs Need Drugs.org</i> website between January 1 and April 30 in 2015 and 2016 .....	9
<b>Figure 5.</b> Number of sessions on the Antibiotic Wise website between February 15 and May 25, 2016 ....	9
<b>Figure 6.</b> Number of education sessions by type of session and fiscal year, 2005/06 to 2015/16 .....	10
<b>Figure 7.</b> Number of participants attending education sessions by type of session and fiscal year, 2005/06 to 2015/16 .....	11
<b>Figure 8.</b> Number of children taught under the Daycare Program by Health Authority and school year, 2006/07 to 2015/16 .....	15
<b>Figure 9.</b> Number of children taught under the Grade 2 Program by Health Authority and school year, 2005/06 to 2015/16 .....	16
<b>Figure 10.</b> Number of children taught under the K-3 Teacher Resource Program by Health Authority and school year, 2010/11 to 2015/16 .....	18
<b>Figure 11.</b> Number of children taught under the General Teaching Program by Health Authority and school year, 2006/07 to 2015/16 .....	19
<b>Figure 12.</b> Number of individuals (includes staff, residents, and other individuals) taught under the Older Adult Program by Health Authority and school year, 2008/09 to 2015/16 .....	21
<b>Figure 13.</b> Print material distribution by type of material and year, 2005/06 to 2016 .....	22
<b>Figure 14.</b> Print material distribution by type of material and Health Authority since 2005/06 .....	24
<b>Figure 15.</b> Proportional use by drug among prescriptions for UTI-related diagnoses, 1996-2013 .....	28
<b>Figure 16.</b> Defined daily doses per 1,000 inhabitants per day among prescriptions for UTI-related diagnoses by age group, 1996 - 2013 .....	29

## List of Tables

---

<b>Table 1.</b> Target audience reach and average viewing times among women aged 25-54 in British Columbia by regional market, February 15 to April 24, 2016 .....	6
<b>Table 2.</b> Number of target audience participants by target audience and year, 2015/16 fiscal year .....	13
<b>Table 3.</b> Number of sessions taught under the Grade 2 Program by designation of person providing teaching and school year, 2015/16 .....	17
<b>Table 4.</b> Number of sessions taught under the General Teaching Program by designation of person providing teaching and school year, 2015/16 .....	20
<b>Table 5.</b> Number of individuals taught under the Older Adult Program by target audience and school year, 2015/16 and overall.....	20
<b>Table 6.</b> Number of sessions taught under the Older Adult Program by designation of person providing teaching and school year, 2015/16 .....	21
<b>Table 7.</b> Number of parent guides distributed by translated language in 2015 and overall .....	23
<b>Table 8.</b> Distribution of the <i>Bugs and Drugs</i> reference by type of material and target group .....	25

## About this Report

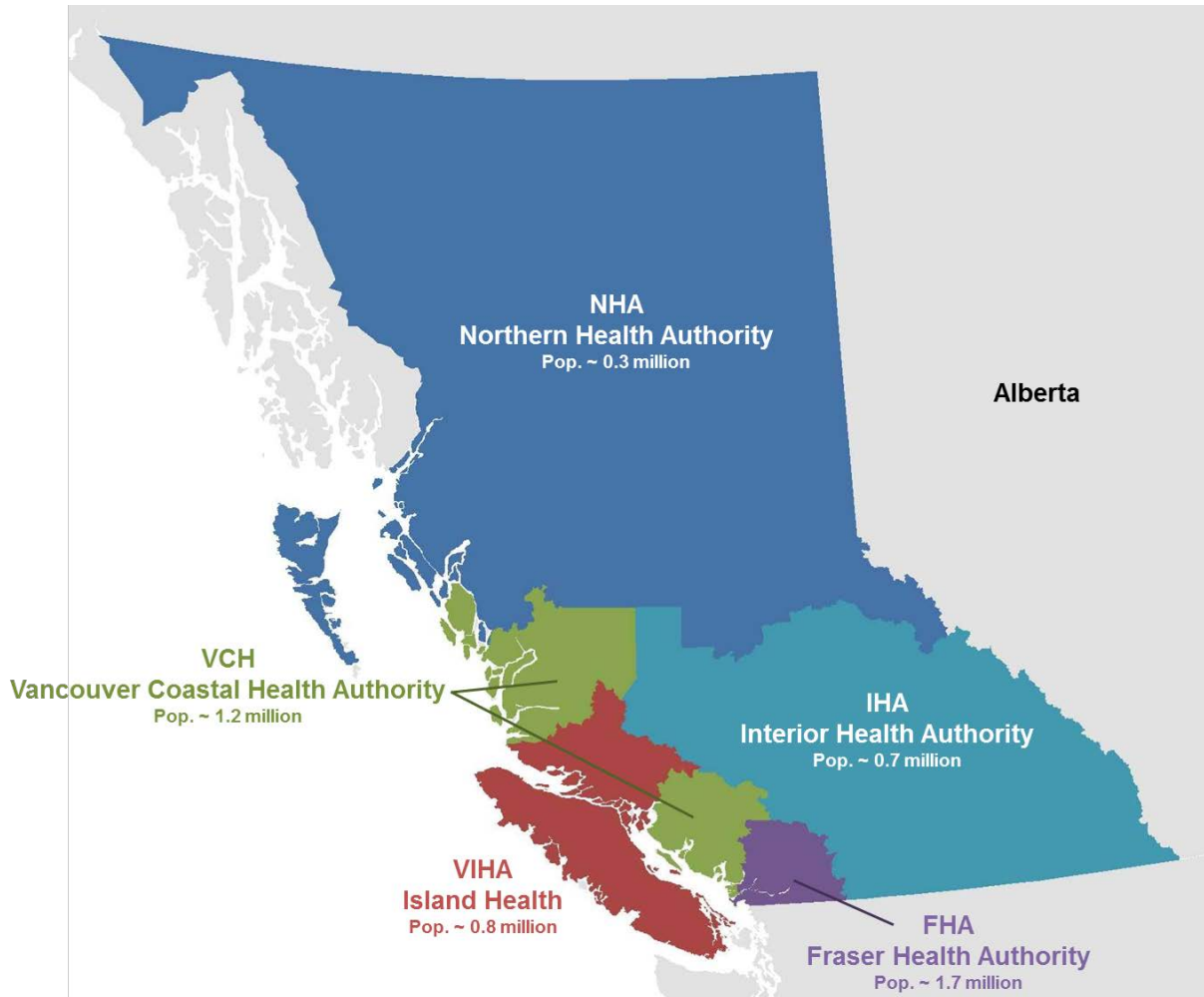
---

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 2015/16 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 (IHA), Fraser Health Authority (FHA), Vancouver Coastal (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 2015 population estimates  
(Source: BC Stats, accessed April 28, 2016)



## 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
IHA	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 Medical Beneficiary and 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

---

This report summarizes the evaluation of the *Do Bugs Need Drugs?* (DBND) program in British Columbia (BC) for the 2015/16 fiscal year. Since its implementation in BC in the fall of 2005, the DBND program has been a key public health initiative addressing the growing problem of antibiotic resistance in the province. 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 21 to October 18, 2015 in Kelowna, Victoria, and the Vancouver Lower Mainland, and was viewed an estimated 29 million times during this period in the 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.
- A **new website**, [www.antibioticwise.ca](http://www.antibioticwise.ca), was created to support the 2016 media campaign initiatives, as well as to direct the public to specific information that aligned with the campaign messages. This new website is user friendly, mobile friendly, and has current, relevant content for the public.
- The **television advertisement campaign** ran for a six to seven week period (depending on the station) between February and March 2016 and featured one new 15-second advertisement focusing on antibiotics being weapons that are used to fight bacterial infections, and if taken when not necessary, subsequent infections may be resistant. The advertisement encouraged people to talk with their doctor the next time they're prescribed antibiotics. Regional market coverage included the Vancouver Lower Mainland, Victoria and province-wide coverage. The number of TV spots **over** delivered by 82% when compared to the number of purchased spots.
- The **digital display campaign** ran for a 10 week period and included behavioural audience targeting and site retargeting, directing users to the antibioticwise.ca website to learn more. These advertisements were viewed an estimated 4.9 million times over the time period.
- Two **Facebook marketplace advertisements** ran between February and April to reach our target demographic of women 25-54 and mothers with children 1 to 17 years of age, directing them to the antibioticwise.ca website to learn more. These advertisements were viewed an estimated 4.0 million times over the time period.
- A Google Adwords campaign had 1,151 clicks and served as a strong awareness tactic, delivering 235,283 impressions – 57% higher than planned numbers and also delivering our key objective of awareness.
- Overall, 91% of women aged 25-54 in British Columbia saw the Antibiotic Wise message an average of 20 times.
- Collaboration with the Vancouver Film School students in digital design generated a 30 second video which is available for view on both the antibioticwise.ca and DBND websites.
- A DBND Facebook page was launched in September 2015. As of April 2016, there have been approximately 100 people "like" the page, with a post reach of 4247 people. The Twitter handle was launched in August 2014 and has 850 followers as of May 25, 2016.

- Collaboration with the Provincial Academic Detailing (PAD) pharmacists in BC on asymptomatic bacteriuria (specifically in the elderly) is in progress, with plans to begin implementation this spring.
- A total of 41 health care professional education sessions were held during the 2015/16 fiscal year, including 21 **Continuing Education** sessions with health care professionals, and 15 **Train-the-Trainer** sessions to teach health care professionals and students how to deliver the DBND public teaching components.
- During the 2015/16 fiscal year, 327 public teaching sessions were taught to over 7,500 individuals across the province. By program component, 45 **Daycare** sessions were taught to 818 children; 219 **Grade 2** sessions were taught to 5,210 children; 21 **General Teaching** sessions were taught to 539 individuals; 30 sessions under the **K-3 Teacher Resources** component were provided to 775 children; and 12 **Older adult** sessions were taught to 131 staff and residents in long-term care.
- In 2015, over 25,000 **print materials**, including activity placements, stickers, signs and posters, parent guides, and pamphlets, were distributed across the province.
- The **Bugs and Drugs iPhone app** has been distributed to 2,870 health care professionals as of May 17, 2016.

## Program Outcome Evaluation

- The DBND program is exploring interactive methods of presenting data on trends on antimicrobial utilization and resistance in BC to allow for better accessibility for healthcare professionals and the public. The latest static reports are available at: [www.bccdc.ca/dbnd](http://www.bccdc.ca/dbnd).
- Preliminary indication-specific analyses suggest that overall utilization rates for UTIs have increased 25% between 1996 and 2013 and remain substantially higher among patients aged 60 years and older (2.3 DID in 2013) compared to all other age groups (< 1.2 DID in 2013). These findings suggest that the increased use in antibiotics overall for UTI treatment, particularly among those 60+, may warrant targeted interventions.
- The DBND evaluation and program implementation components are being assessed against similar programs in Europe (Denmark, the Netherlands) to identify additional activities that may be adopted or modified.
- The DBND team continues to work with the Public Health Agency of Canada/National Microbiology Laboratory in order to address the gap in surveillance of antibiotic resistance in community settings across Canada

## Introduction

---

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. It is estimated that 23,000 people die each year as a direct consequence of antibiotic resistance and resistant infections complicate tens of thousands of routine physician visits each year in BC.<sup>3</sup> 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>4,5,6</sup> public health campaigns to raise awareness about antibiotic resistance and inappropriate antimicrobial therapy,<sup>7</sup> and administrative restrictions and policies such as formulary restrictions.<sup>8,9</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>5</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 2015/16 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 of 2015/16 were 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. **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.
3. **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 at: [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:

- Antibiotic prescribing by dentists has increased: Why?" in *The Journal of the American Dental Association* in February 2016.<sup>10</sup>

Webinar presentations included:

- Collaboration with the BC Dental Association on three online learning modules and quizzes for BC dentists that went live in September 2015. Modules include Antibiotics in Dentistry, Review of Commonly Prescribed Antibiotics in Dentistry, and Prophylactic Use of Antibiotics. As of March 7, 2016, 160 dental professionals had enrolled in course, 83 have completed it, and 14 were in progress. Of those who completed the course, 79 learners have rated the course 5 out of 5 in all ratings categories.

Conference presentations included:

- Two oral presentations delivered at AMMI (Association of Medical Microbiology and Infectious Disease) conference in April 2015: one on differences in prescribing practices among practitioners, and the other on the process used to establish the partnership with community laboratories (LifeLabs) in BC
- Two posters presented at the 2015 Infectious Diseases Society of America (IDSA) conference: Antibiotic Utilization in LTCFs in BC and Prescribing Trends among Dental Surgeons in BC
- St. Paul's Hospital CME Conference on Current Trends in Antibiotic Use & Misuse - Implications for Primary Care to 1600 physicians
- Two oral presentations delivered at AMMI (March 30-April 2) – One presentation outlined differences in crude and age-adjusted rates of antibiotic utilization and the second outlined drug trends in UTI treatment between 1996 and 2013 in BC.

News/Forums with DBND contribution:

- Interview by the Vancouver Sun regarding researchers at UBC who have discovered that a rare clay used for medicinal purposes by aboriginal communities in northern B.C. contains antibacterial properties that could be used to treat antibiotic-resistant bacteria
- CBC News Vancouver interview on Pets and Antibiotics, which aired March 17, 2015.
- National forum on The Law and Antibiotic Resistance – with a view to considering new policy and legal tools to addressing the problem

**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
		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
		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	Bugs and Drugs book, parent guides, pamphlets, posters, stickers	Number and locations of community partners taught to deliver the program	Decrease in public requesting antibiotics	Assessment of public response to program activities
		Training and delivery of: Daycare Program, Grade 2 Program, K – Grade 3 Teacher Resources, General Teaching, Older Adult Program			
Collaboration with external groups	Healthcare Professional Education	Community events	Number and region of children and older adults taught	Increased awareness and practice of proper hand-washing	Assessment of public response to program activities
		Continuing Education for Physicians, Pharmacists, and others	Number and locations of healthcare professional education sessions and participants	Integration of antimicrobial stewardship in community practice	Health Care Professional Knowledge and Attitude Change Surveys
Collaboration with external groups	Surveillance, Research, Intervention, Evaluation, Collaborations	Train-the-Trainer, Education for Daycare, Grade 2, and Older Adult programs	Annual Antibiotic Resistance and Utilization Surveillance Reports	Decrease in physicians prescribing antibiotics for suspected viral infections	Health Care Professional Knowledge and Attitude Change Surveys
		Annual Report	Annual Antibiotic Resistance and Utilization Surveillance Reports	Increased use of first line antibiotic agents	Antibiotic Resistance Analyses
			Change in prescription patterns for antibiotics	Linked PharmaNet, MSP, and DAD Data Analysis	Reduction in morbidity associated with antibiotic resistant infections
				PharmaNet Data Analysis	

**Figure 2.** Program logic model (revised May 2015)

# Program Process Evaluation

## Media Campaign

---

The DBND media campaign is composed of several advertisement components: 1) public transit, 2) television, 3) children's media initiative, 4) digital display and Facebook marketplace advertisements, 5) Google Adwords, and 6) social media (Twitter, Facebook, the DBND website and the newly launched antibioticwise.ca website). Since implementation in 2006 (television) and 2007 (public transit), 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 initiative is targeted toward young children aged 2-11 and their parents through co-viewing.

### Public Transit Advertisements

As the shift in media as a mode of communications occurs, more resources will be directed from transit advertisements towards digital activities. The 2015 public transit advertising campaign ran for 6 weeks between September 21 to October 18, 2015 in Victoria, Kelowna, 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 79 advertisements were posted during this year's campaign: 10 advertisements on the Skytrain in the Vancouver Lower Mainland, 6 advertisements on the Canada Line in Metro Vancouver, and 63 advertisements on buses in the Vancouver Lower Mainland (n=43), Victoria (n=12), and Kelowna (n=8).<sup>11</sup> Platform posters and interior bus cards were not purchased during the 2015 transit campaign. The 2013/14 advertisements, designed by students from the Vancouver Film School, were used during the fall 2015 campaign (see Appendix); however, new graphics are currently being designed in collaboration with communications specialists for use during the fall 2016 campaign.

Ridership was estimated at 10.9 million people on the Expo Skytrain line and 2.7 million people on the Millennium Skytrain line for the months of September and October in 2015; ridership on the Canada Line during the same time period was 6.3 million people.<sup>11</sup> Average ridership for buses in Vancouver totalled 7.9 million people per month in 2015.

### Television Advertisements

The television advertisement campaign ran for a six to seven week period (depending on the station) between February and March, 2016. The 2016 campaign featured a new 15-second television advertisement, developed in collaboration with Latitude Agency, focusing on antibiotics being weapons that are used to fight bacterial infections, and if taken when not necessary, subsequent infections may be resistant. The advertisement also encouraged people to talk with their doctor the next time they're prescribed antibiotics. Regional market coverage included the Vancouver Lower Mainland, Victoria and province-wide coverage.

Target audience reach and average viewing times among women in British Columbia aged 25-54 by regional market are provided in **Table 1**.<sup>12</sup> The number of TV spots over delivered by 82% when compared to the number of spots purchased. This includes Public Service Announcements (PSA) spots, as well as bonus spots, both delivered at no cost to the program. An estimated 16.6 million television advertisement views occurred by BC women aged 25-54.



## Online Display and Facebook Marketplace Advertisements

Three online banners were created and used for the Online Display campaign to target behaviours and the audience of interest and re-direct users to the Antibiotic Wise website. 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 groups based on demographics or context (e.g. women 25-54, mothers with children aged 1-17, searches for antibiotic awareness). People with similar online behavior were grouped together into one segment and shown advertisements that cater to their interests (e.g. Be antibiotic wise banners). The Online Display ads delivered 4.9 million impressions over the ten weeks that the campaign ran.

Similarly, Facebook marketplace ads were purchased and were targeted to the audience of interest. The two ads were designed to drive users to the Antibiotic Wise website. Overall the Facebook marketplace ads delivered 4.0 million impressions over the ten week campaign.

**Table 1.** Target audience reach and average viewing times among women aged 25-54 in British Columbia by regional market, February 15 to April 24, 2016

Media	Percent of Target Audience Reached	Average Number of Times Viewed / Campaign Period
Digital	63%	6.6 views / 8 weeks
Television	81%	16.5 views / 7 weeks
Vancouver / Victoria (Global, CTV, CTV2, CITY, Omni)	81%	16.5 views / 7 weeks
BC wide coverage (Knowledge Network, US Specialty spill)	68%	7 views / 6 weeks
<b>Digital and television initiatives combined</b>	<b>91%</b>	<b>20 views / 10 weeks</b>

## Google Adwords

Search Engine Marketing was used to build awareness and drive clicks to [www.antibioticwise.ca](http://www.antibioticwise.ca). The 10 week campaign served as a strong awareness tactic, delivering 235,283 impressions, 57% higher than planned, and resulting in 1,151 clicks to the Antibiotic Wise website.

## Children's Media Initiative

As part of the children's media initiative, television coverage was purchased on the province-wide Knowledge Network for an eight-week period from February to March 2016. As with the general television advertisement campaign, this year's campaign featured a new 15-second advertisement focusing on antibiotics being weapons that are used to fight bacterial infections, and if taken when not necessary, subsequent infections may be resistant. The advertisement also encouraged people to talk with their doctor the next time they're prescribed antibiotics. 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.

## **Vancouver Film School Collaboration**

Collaboration with the Vancouver Film School students in digital design generated a 30 second video called "A World Without Antibiotics", which is available for view on both the Antibiotic Wise and DBND websites.

## **Social Media Initiatives**

This *The Do Bugs Need Drugs?* program has continued 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.

### ***Facebook***

September 11, 2015 marked the launch of the DBND Facebook page. The Facebook page features videos, links and news articles related to antibiotic use or resistance, and is updated frequently, as relevant information becomes available. By the end of the 2015, the page had a potential reach of 3345 people and 78 likes.

### ***Twitter***

Since DBND began its Twitter feed in August 2014, a steady increase in followers has been noted. As of May 23, 2016, the DBND Twitter handle had 849 followers with a total lifetime potential reach of 443,723 (i.e. the cumulative number of followers of those following the DBND Twitter handle). Tweets were viewed an estimated 86,600 times between January 1 and December 31, 2015.<sup>13</sup> 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.

### ***DBND and Antibiotic Wise Websites***

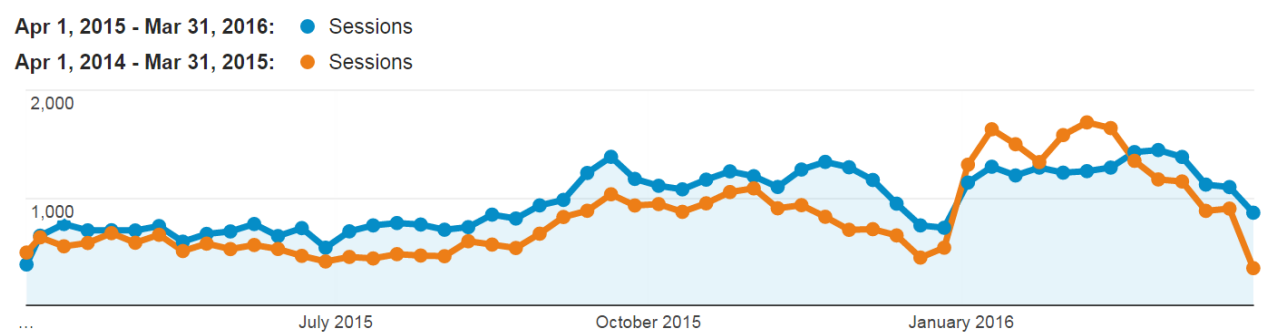
The DBND website ([www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)) was originally created by the Alberta DBND program in 1998 and updated in 2012. The website contains information for healthcare professionals, teachers, childcare workers and the public. The grade 2 and daycare program material, translated material, and links to other relevant websites are provided; games and puzzles are also featured for children. In addition, a tutorial slide show is available for training sessions for nursing students and childcare workers. During the 2015/16 fiscal year, the DBND program saw an increase in traffic to the website compared to the previous year; a 19% increase in the number of sessions and a 17% increase in users were noted.<sup>14</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.

In 2016, a BC-specific website was developed in collaboration with communications specialists in order to fulfill funding requirements to better align the BC campaign with the website. The new website was launched February 15, 2016 and supports the BC media campaign initiatives, as well as directing the public to specific information that aligns with campaign messaging. The new website, ([www.antibioticwise.ca](http://www.antibioticwise.ca)) is designed to be user friendly, mobile friendly, and contains current and relevant content for the public including: information about antibiotics – what they are; common uses; when to use/not to use; safety; what the public can do; an antibiotic checklist with questions to ask the physician; a quiz; a frequently asked question page; information about what antibiotic resistance is; current issues; statistics; a prevention page; and a resource page for the public and for professionals with links to the DBND website ([www.dobugsneeddrugs.org](http://www.dobugsneeddrugs.org)).

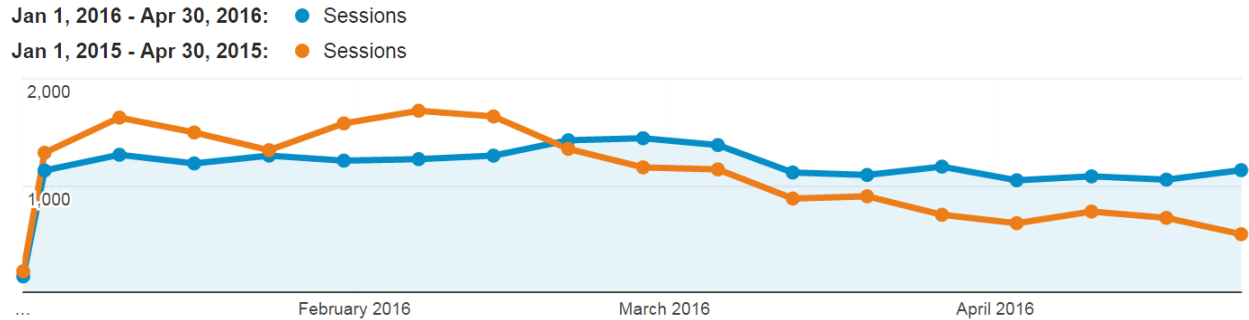
Due to a shift in media campaign timing (February 15 – April 24, 2016 versus January 1 – February 28, 2015) and strategies (e.g. introduction of the Antibiotic Wise website), direct comparison to the media campaign implemented in 2015 was not feasible. However, when comparing January 1 - April 30 of both years, sessions increased by 6% and users by 5% in 2016 compared to the same time period in 2015 (**Figure 4**).<sup>14</sup> The small increase in number of sessions and users during this time frame in 2016 may be due to the introduction of the antibioticwise.ca website and efforts to direct BC traffic to this site, which was launched on February 15.

During the media campaign, 8,115 users visited the Antibiotic Wise website (93% of them were new users) which resulted in 12,512 page views; the highest number of sessions occurred on April 14 (251 sessions). As seen in **Figure 5**, traffic to the microsite decreased drastically following the end of the campaign, highlighting the impact of media campaigns on site traffic and potential knowledge dissemination.



**Figure 3.** Number of sessions\* per month on the *Do Bugs Need Drugs.org* website between April 1, 2014 and March 31, 2016

\* A session is defined as any active engagement with the website (screen views, events, etc.) until a 30 minute window of inactivity occurs



**Figure 4.** Number of sessions\* per month on the *Do Bugs Need Drugs.org* website between January 1 and April 30 in 2015 and 2016

\* A session is defined as any active engagement with the website (screen views, events, etc.) until a 30 minute window of inactivity occurs



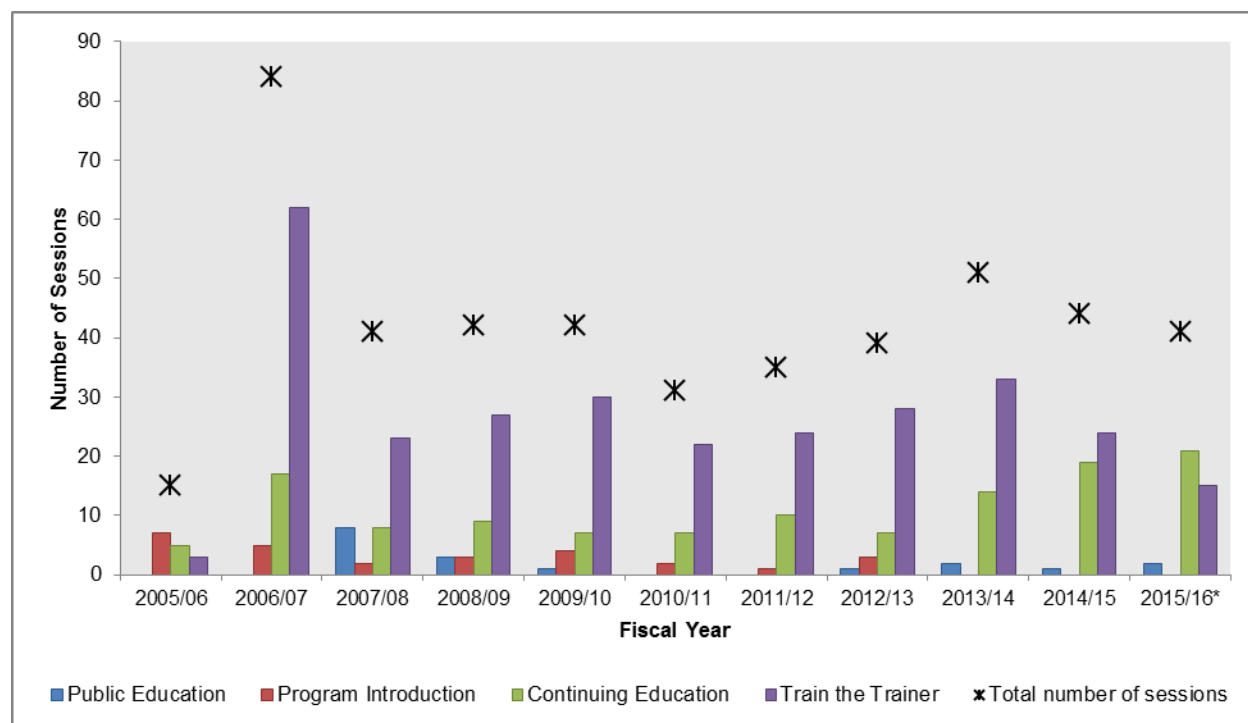
**Figure 5.** Number of sessions\* on the Antibiotic Wise website between February 15 and May 25, 2016

\* A session is defined as any active engagement with the website (screen views, events, etc.) during the campaign period (February 15 – April 24, 2016) until a 30 minute window of inactivity occurs

## 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.

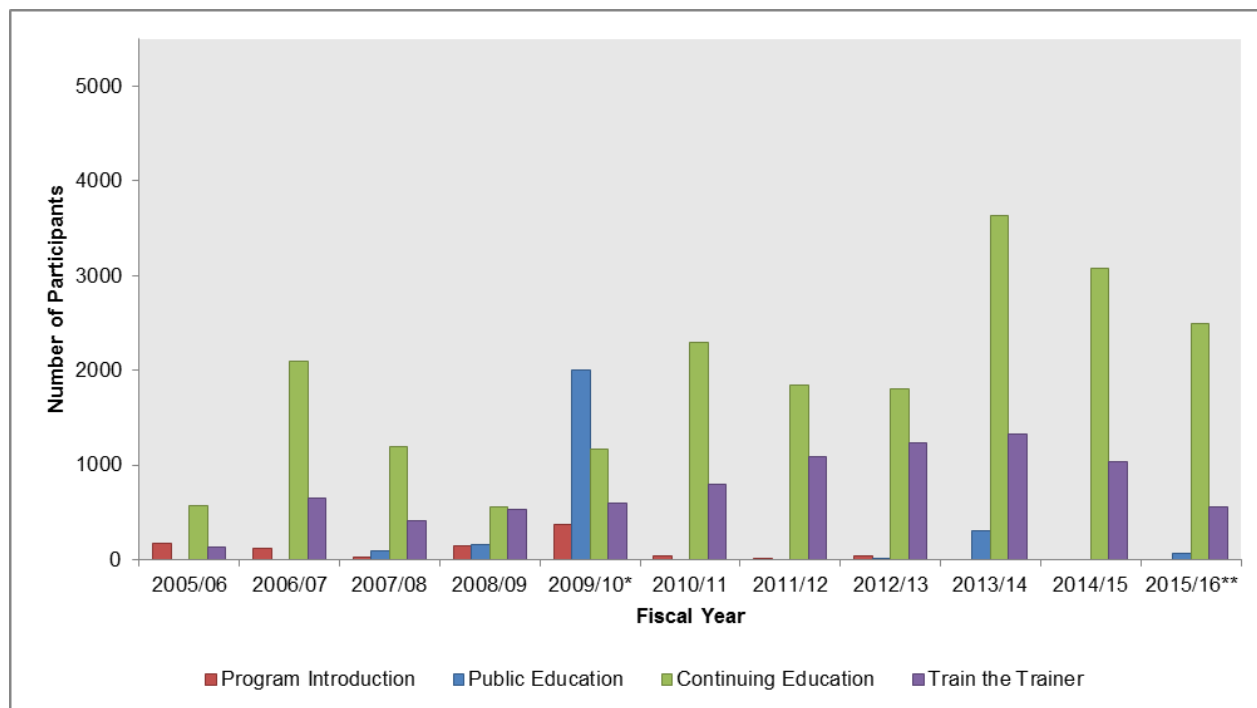
Education sessions are often attended by various types of audiences. Individuals considered target audience members for the DBND program and its key messages are included in the results presented below. Estimated attendance numbers for other audience members are included as footnotes to the tables or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



**Figure 6.** Number of education sessions by type of session and fiscal year, 2005/06 to 2015/16<sup>†</sup>

\* Fiscal year 2015/16 numbers are accurate as of May 19, 2016.

<sup>†</sup>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. In 2016, other sessions included a Public Health Meeting on antimicrobial stewardship attended by 150 international physicians and healthcare students in Washington State and a Panel Discussion Meeting involving 35 physicians and 35 lawyers on antimicrobial stewardship in Ottawa



**Figure 7.** Number of participants attending education sessions by type of session and fiscal year, 2005/06 to 2015/16<sup>†</sup>

\* The large number of public education participants during the 2009/10 fiscal year represents educational activities provided as part of the Vancouver International Children’s Festival.

\*\*Fiscal year 2015/16 numbers are accurate as of May 19, 2016.

<sup>†</sup>Only target audience participants are included in the figure; a total estimate of 1597 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 provided by DBND team members, in conjunction with media initiatives, and are targeted towards members of the general public throughout the entire year. These sessions are a means of providing an overview of the DBND program and its three key messages as well as distributing print materials. Since implementation of the DBND program during the 2005/06 fiscal year, 18 Public Education sessions have been held (Figure 6). These sessions were attended by a total of 2,635 participants to date (Figure 7).

National activities during the 2015/16 fiscal year included a panel discussion hosted by the Ottawa Law Society and represented an opportunity to discuss both legal and public health approaches to antibiotic resistance in society. In addition, DBND members participated in discussions among academics, practitioners, and students from BC, Washington, and Oregon, on tracking antibiotic utilization and the rise in antibiotic prescriptions related to dentistry were held in Washington State and brought together academics

## 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 6**). These sessions were attended by a total of 909 participants (**Figure 7**). No Program Introduction sessions were held since 2013/14 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 124 Continuing Education sessions (**Figure 6**). An estimated 20,700 health care professionals attended these sessions or were potentially exposed to components of the DBND program since 2005/06 (**Figure 7**). Due to an identified need to address antibiotic prescribing practices among dental surgeons, continuing education sessions were offered to dentists and dental students during the 2015/16 fiscal year for the first time since program implementation. Overall, DBND team members presented at 21 Continuing Education sessions with an estimated attendance of 2,417 health care professionals, the majority (75%) of whom were physicians (**Table 2**).

Collaboration with the Provincial Academic Detailing (PAD) pharmacists in BC on asymptomatic bacteriuria (specifically in the elderly) is underway, with plans to begin implementation in the spring of 2016. PAD pharmacists have been engaged with educational initiatives to prepare them in providing education to healthcare professionals in the community.

## 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, 291 Train-the-Trainer sessions have been held (**Figure 6**). 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, 8,364 participants have attended Train-the-Trainer sessions (**Figure 7**). During the 2015/16 fiscal year, 151 Train-the-Trainer sessions were provided to 552 participants. The majority of these participants were nursing students or instructors (96 %) (**Table 2**).

**Table 2.** Number of target audience participants by target audience and year, 2015/16 fiscal year\*

<b>Target Audience**</b>	<b>Continuing Education n (%)</b>	<b>Train the Trainer n (%)</b>
Public	-	-
Assisted Living Staff	-	-
Dentists or Dental Students	105 (4)	
Early Childhood Educators		
ECE Students or Instructors		20 (4)
Medical Students	300 (12)	
Nursing Students or Instructors	85 (4)	532 (96)
Pharmacists	16 (1)	
Pharmacy Students		
Physicians	1,811 (75)	
More than one main target audience†	100 (4)	
<b>TOTAL</b>	<b>2,417 (100)</b>	<b>552 (100)</b>

\*Fiscal year 2015/16 numbers are accurate as of May 19, 2016.

\*\*Only target audience participants are included in the table; a total of 152 individuals have participated in health care professional and public education sessions as other audience members during the 2015/16 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

---

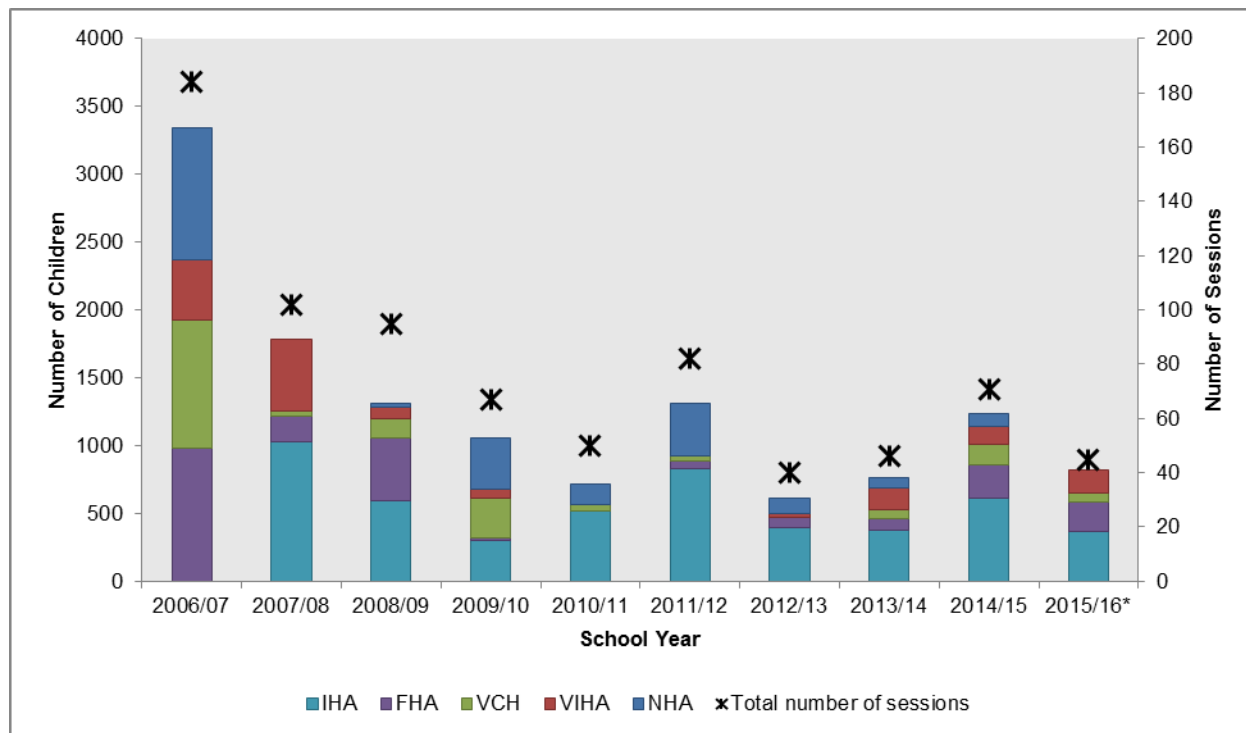
Public teaching within the DBND program is comprised of several components, including a Daycare Program, a Grade 2 Program, and an Older Adult Program. DBND also provides support for adaptation of the standard program under our General Teaching Program as well as for use of DBND-approved teacher resources 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 school year has decreased compared to previous years. 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 number of sessions delivered.

### 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 783 sessions have been taught to 12,961 children across the province (**Figure 8**). During the 2015/16 school year, 45 Daycare sessions were taught to 818 children across the province, including 363 (44%) children in IHA, 200 (27%) in FHA, 69 (8%) in VCH, and 166 (20%) in VIHA; NHA did not report any sessions during the 2015/16 school year.



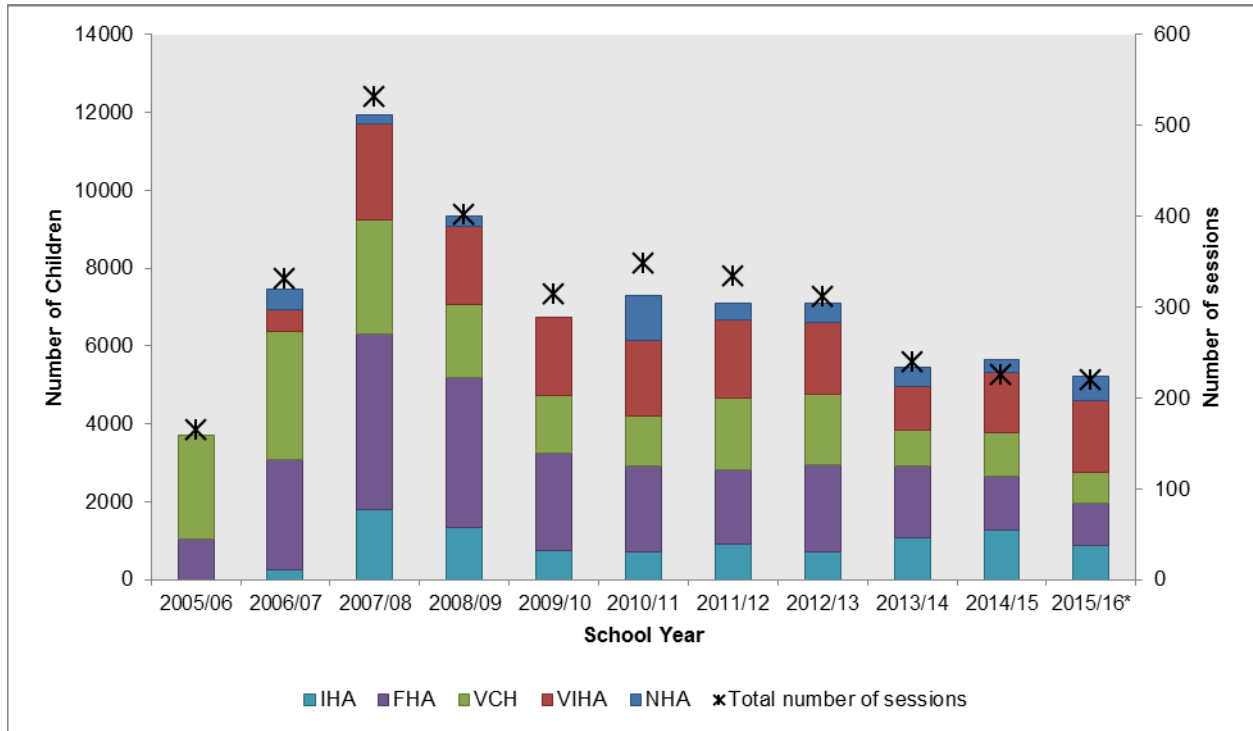
**Figure 8.** Number of children taught under the Daycare Program by Health Authority and school year, 2006/07 to 2015/16<sup>†</sup>

\*School year 2015/16 numbers are accurate as of May 19, 2016.

<sup>†</sup>One Daycare session (consisting of 4 children) was taught during the 2005/06 school year in FHA (data not shown).

## 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 IHA in the spring of 2007.



**Figure 9.** Number of children taught under the Grade 2 Program by Health Authority and school year, 2005/06 to 2015/16

\*School year 2015/16 numbers are accurate as of May 20, 2016.

During the 2015/16 school year, 219 Grade 2 sessions were taught to 5,210 children across the province. By Health Authority, the majority of children were taught in VIHA (n=1,831; 35%), followed by FHA (n=1,106; 21%), IHA (n=868; 17%), and VCH (n=778; 15%). Although NHA reported the lowest number of children taught during the 2015/16 school year (n=617; 11%), this represents approximately an 80% increase compared to last year. Most of these sessions for 2015/16 were taught by nursing students or medical students (**Table 3**).

**Table 3.** Number of sessions taught under the Grade 2 Program by designation of person providing teaching and school year, 2015/16

Designation of Person Providing Teaching	2015/16 School Year n (%)	All Years n (%)
Nursing Student	117 (53)	2136 (62)
Medical Student	55 (25)	254 (7)
Pharmacist/Pharmacy Technician	2 (1)	256 (7)
Nurse	17 (8)	674 (20)
Teacher	13 (6)	43 (1)
Other**	15 (0)	55 (2)
<b>TOTAL<sup>†</sup></b>	<b>219 (100)</b>	<b>3,419 (100)</b>

\*School year 2015/16 numbers are accurate as of May 20, 2016.

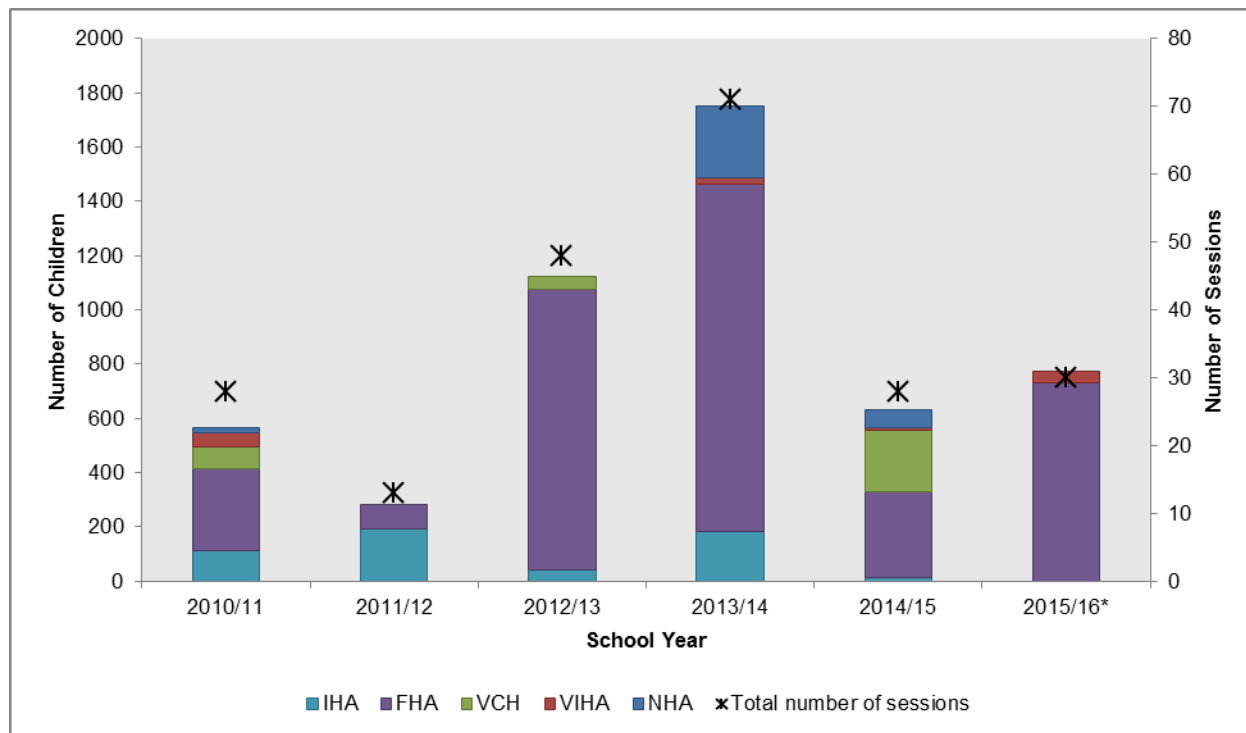
\*\*Other includes high school students, nursing instructors, physicians, and early childhood educators

<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 218 sessions have been taught to 5,134 children across the province (**Figure 10**). During the 2015/16 school year, 30 sessions were taught to 775 children in FHA (n=730, 94%) and VIHA (n=45, 6%).



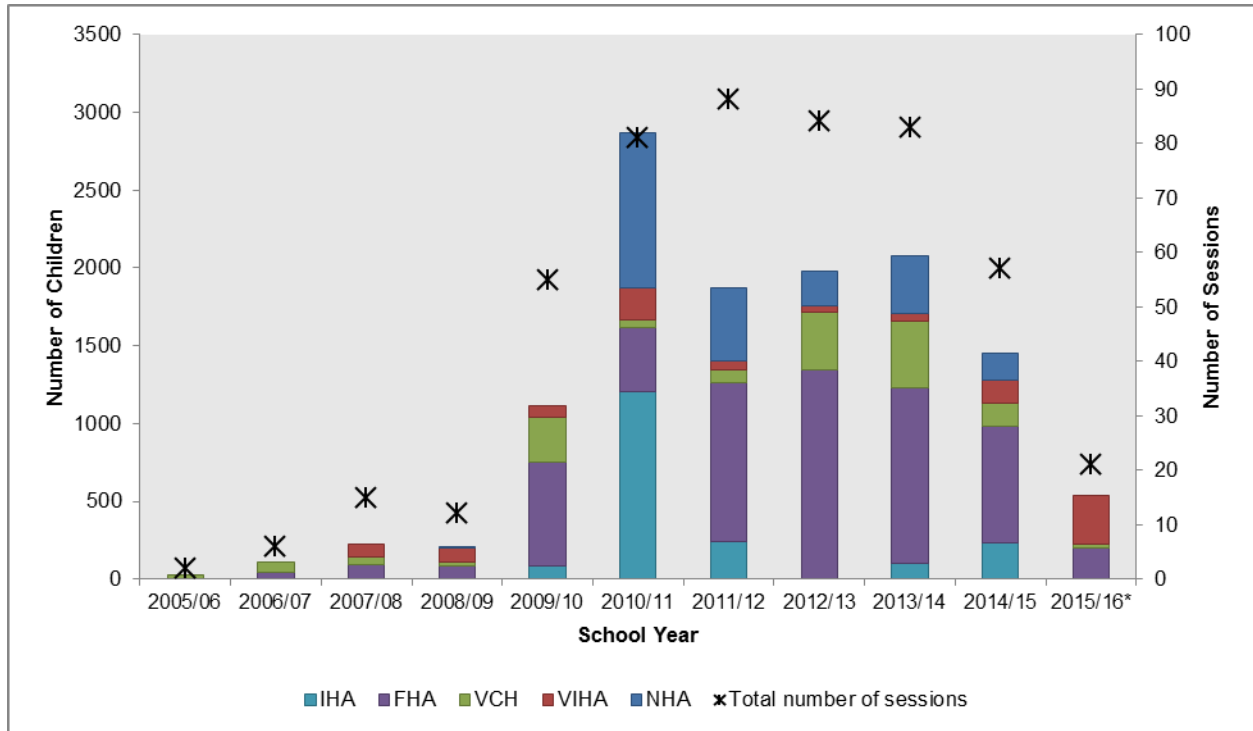
**Figure 10.** Number of children taught under the K-3 Teacher Resource Program by Health Authority and school year, 2010/11 to 2015/16

\*School year 2015/16 numbers are accurate as of May 20, 2016.

## 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 504 sessions have been taught to 12, 484 children across the province under the General Teaching Program (**Figure 11**). 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 11.** Number of children taught under the General Teaching Program by Health Authority and school year, 2006/07 to 2015/16<sup>†</sup>

\*School year 2015/16 numbers are accurate as of May 20, 2016.

<sup>†</sup>An additional two General Teaching sessions (28 children total) were taught in VCH during the 2005/06 school year (data not shown)

During the 2015/16 school year, 21 General Teaching sessions were taught to 539 children in VIHA (59%), FHA (37%) and VCH (4%). Nursing students taught the majority of these sessions (90%) during the 2014/15 school year (**Table 4**).

**Table 4.** Number of sessions taught under the General Teaching Program by designation of person providing teaching and school year, 2015/16

Designation of Person Providing Teaching	2015/16 School Year* n (%)	All Years n (%)
Nursing Student	19 (90)	420 (87)
Medical Student	0 (0)	3 (1)
Nurse	1 (5)	27 (6)
Pharmacist/Pharmacy Technician	0 (0)	10 (2)
Teacher	0 (0)	3 (1)
Other <sup>†</sup>	1 (5)	22 (5)
<b>TOTAL</b>	<b>21 (100)</b>	<b>485 (100)</b>

\*School year 2015/16 numbers are accurate as of May 20, 2016.

<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.

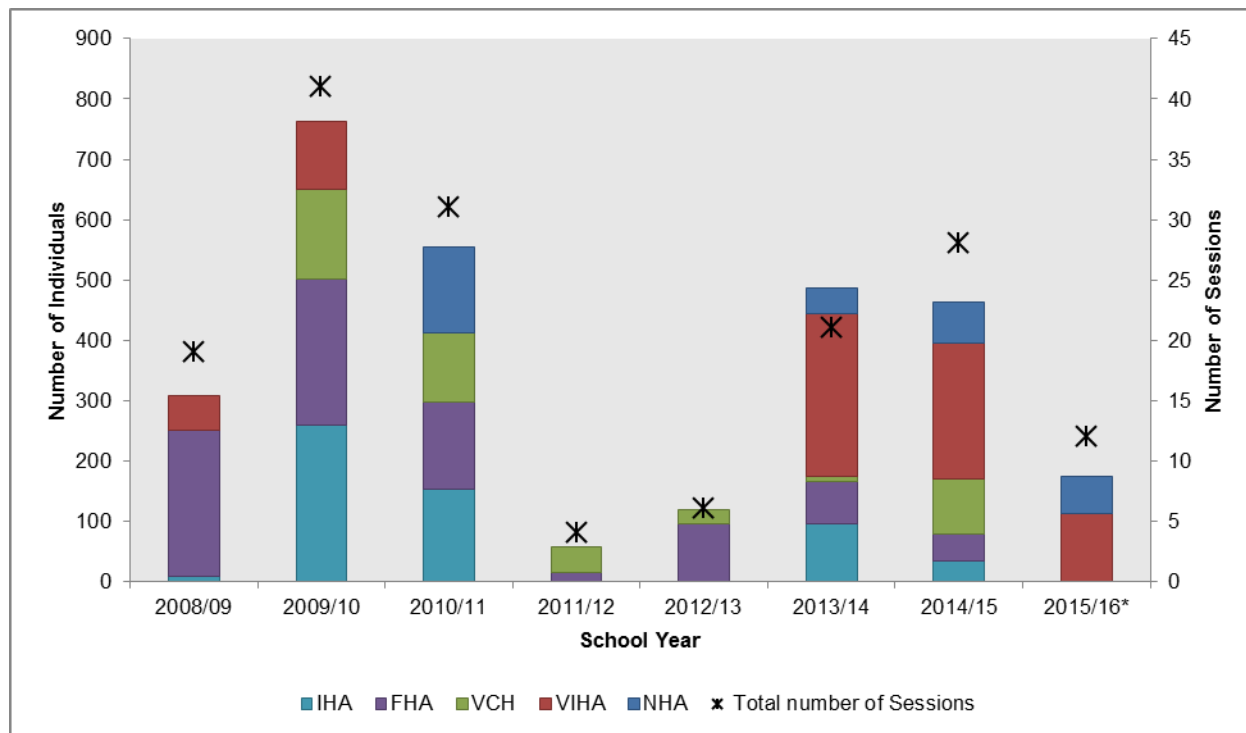
Since implementation of the Older Adult Program in 2008, a total of 162 sessions have been taught to 2,932 individuals across the province, including 621 staff, 2,107 residents, and 204 other individuals, (**Figure 12; Table 5**). Teaching numbers for the Older Adult program fluctuate from year-to-year based on the capacity of community partners to participate in program implementation.

**Table 5.** Number of individuals taught under the Older Adult Program by target audience and school year, 2015/16 and overall

Target Audience	2015/16 School Year* n (%)	All Years n (%)
Staff	11 (6)	621 (21)
Residents	120 (69)	2107 (72)
Other	42 (24)	204 (7)
<b>TOTAL</b>	<b>173 (100)</b>	<b>2925 (100)</b>

\*School year 2015/16 numbers are accurate as of May 20, 2016.

During the 2015/16 school year, a total of 12 Older Adult sessions were held in VIHA and NHA . Audience members during these sessions included 11 staff (8%), 120 residents (82%), and 42 other individuals (e.g. residents' family members or visitors). (**Figure 12**). These 12 sessions were taught by nursing student or teachers (**Table 6**).



**Figure 12.** Number of individuals (includes staff, residents, and other individuals) taught under the Older Adult Program by Health Authority and school year, 2008/09 to 2015/16

\*School year 2015/16 numbers are accurate as of May 20, 2016.

**Table 6.** Number of sessions taught under the Older Adult Program by designation of person providing teaching and school year, 2015/16

Designation of Person Providing Teaching	2015/16 School Year* n (%)	All Years, n (%)
Nursing Student	8 (67)	54 (33)
Nurse	0 (0)	50 (31)
Pharmacist/Pharmacy Technician/Pharmacy students	0 (0)	10 (6)
Teacher	4 (33)	7 (4)
Care aide/Healthcare assistants	0 (0)	7 (4)
Recreational Therapist	0 (0)	4 (2)
Director or manager	0 (0)	16 (10)
Site Leader	0 (0)	3 (2)
Other†	0 (0)	11 (7)
<b>TOTAL</b>	<b>12 (100)</b>	<b>162 (100)</b>

\* School year 2015/16 numbers are accurate as of May 20, 2016.

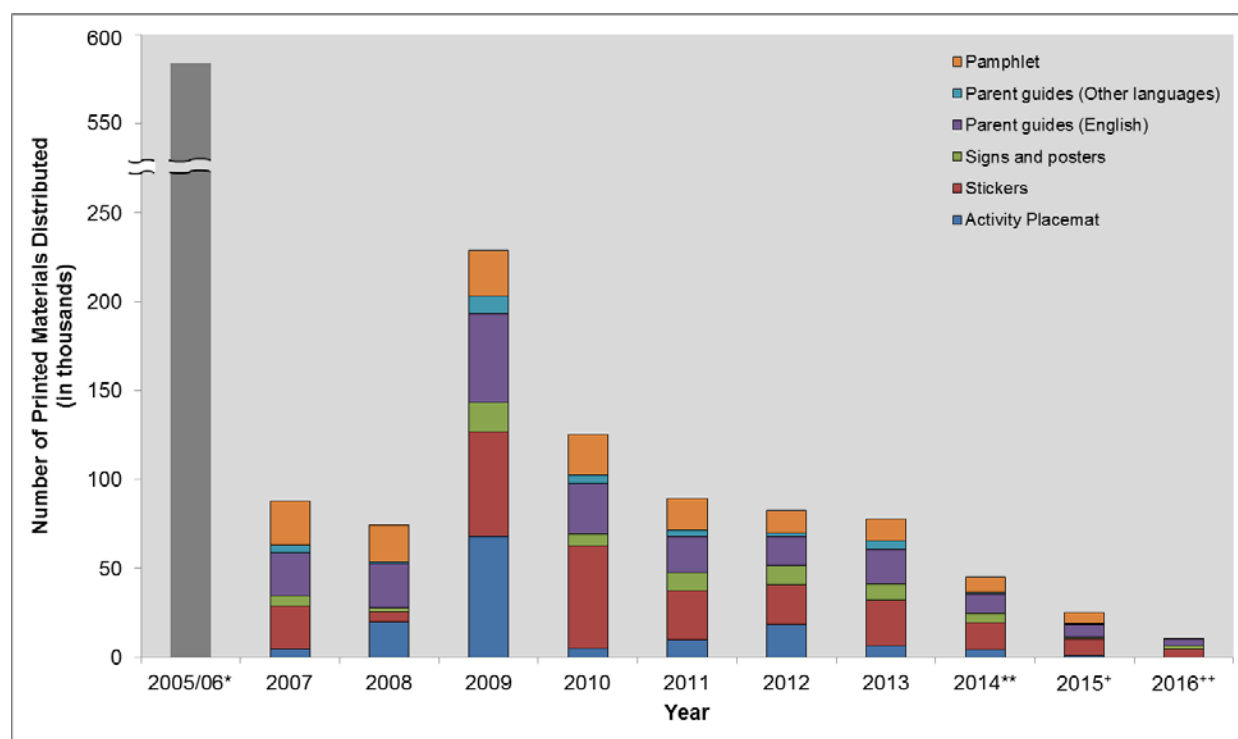
† Other includes coordinators, support workers, advisors, ECE students or unknown



## 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 13**). Since then, print material distribution numbers have decreased to more sustainable levels. By type of material, 155,017 activity placemats, 287,009 stickers, 88,963 signs and posters, 466, 604 parent guides in English, 45,195 parent guides in other languages, and 387,938 pamphlets have been distributed since 2005/06. In recent years, the program has reduced the numbers of printed material available and has increased its digital presence as a more efficient means of distributing information.



**Figure 13.** Print material distribution by type of material and year, 2005/06 to 2016\*

\*In 2005/6, over 580,000 printed material was distributed: 18,354 Activity Placemats, 36,140 Stickers, 19,307 Signs and posters, 261,293 Parent guides (English), 13,680 Parent guides (Other languages), 235,585 Pamphlets

\*\* As of 2014, employer and worker handbooks were developed with Alberta (not included in the graph); approximately 1300 workbooks have been distributed to March 31, 2016.

+ During the 2014/15 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.

\*\*Includes print material distribution up to end of fiscal year (March 31, 2016). Prior to this date, the 6 3/4" x 17" poster with three key messages, the 3 3/8" x 8 1/2" pamphlet, and the 11" x 17" activity placemat had run out and were not re-ordered due to implementation changes.

In 2015, over 25,000 print materials were distributed across the province: 845 activity placemats, 9,626 stickers, 867 signs and posters, 6,871 parent guides in English, 388 parent guides in other languages (**Table 7**), and 6,306 pamphlets were distributed across the province. In addition, 288 employer and worker handbooks were distributed in 2015; over 1000 handbooks have been distributed provincially since the 2014/15 fiscal year with a particular focus on industrial camps (e.g. mining, forestry). Although handbooks were mainly distributed among industrial camps (e.g. mining, forestry) the transport and tourism industries, as well as port authorities, were also targeted in 2015.

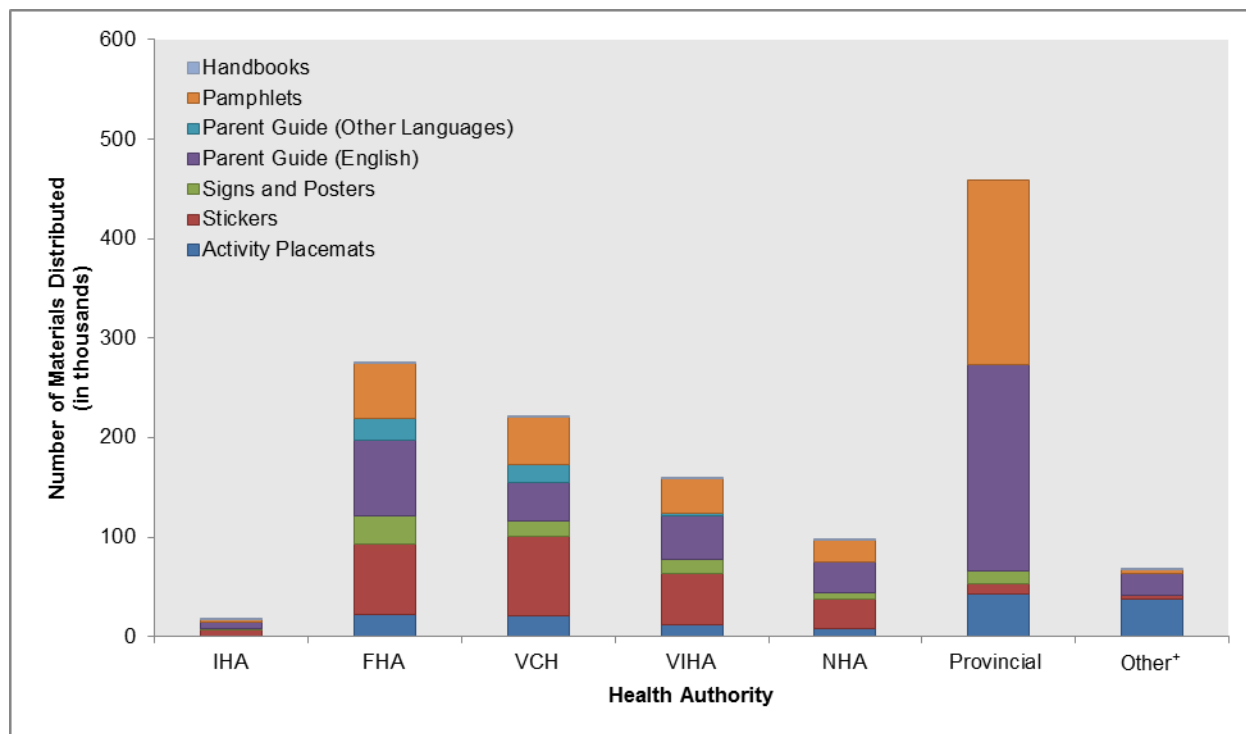
**Table 7.** Number of parent guides distributed by translated language in 2015 and overall

Language	2015 Year n (%)	All Years* n (%)
Punjabi	64 (17)	3668 (32)
French	62 (16)	2558 (22)
Chinese simplified	1 (<1)	1315 (12)
Chinese tradition	2 (<1)	901 (8)
Persian	61 (16)	789 (7)
Vietnamese	2 (< 1)	565 (5)
Korean	2 (< 1)	541 (5)
Spanish	128 (33)	502 (4)
Somali	2 (< 1)	293 (3)
Arabic	64 (17)	292 (3)
<b>TOTAL†</b>	<b>388 (100)</b>	<b>11,426 (100)</b>

\*All years column includes data from 2011 to 2016 as of May 24, 2016

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 14**).



**Figure 14.** 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, 2016).

† Other includes print material distribution to Providence, and to out-of-province, national, and international jurisdictions.

## Bugs and Drugs Antimicrobial/Infectious Diseases Reference Guide

The distribution of the *Bugs and Drugs* antimicrobial/infectious diseases reference guide continued this year, targeting physicians, medical residents and nurse practitioners,<sup>15</sup>. The *Bugs and Drugs* reference was available as a hardcopy book until July, 2015 in BC. All 14,005 hardcopies have now been distributed. The *Bugs and Drugs* reference is also available as an iPhone or Android App. Only the iPhone App is being provided as complimentary by the DBND program through funding from the Medical Beneficiary and Pharmaceutical Services Division of the BC Ministry of Health. The remaining iPhone Apps are being distributed to physicians and medical residents. The iPhone App can be purchased through the iTunes store; and the Android App can be purchased through Google Play.

As of April 1, 2016, over 16,808 copies of the *Bugs and Drugs* resource had been distributed: 14,005 hardcopies and 2,803 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\*

<b>Target Group</b>	<b>Hardcopy Books</b>	<b>iPhone Apps</b>	<b>TOTAL</b>
Physicians	2,416	1,627	4043
Nurse practitioners	223	62	285
Medical residents and students	2,287	1,160	3447
Other health care professional residents and students <sup>†</sup>	2,294	27	2321
Pharmacists participating in academic detailing program <sup>‡</sup>	817	8	825
Pharmacists and pharmacies	2,179	8	2,187
Infection control practice sites	49	0	49
Dentists	3,090	0	3,090
Naturopaths	420	0	420
Midwives	205	0	205
Other	25	1	25
<b>TOTAL</b>	<b>14,005</b>	<b>2,893</b>	<b>16,897</b>

\* Includes Bugs and Drugs book distribution up to May 25, 2016. 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.

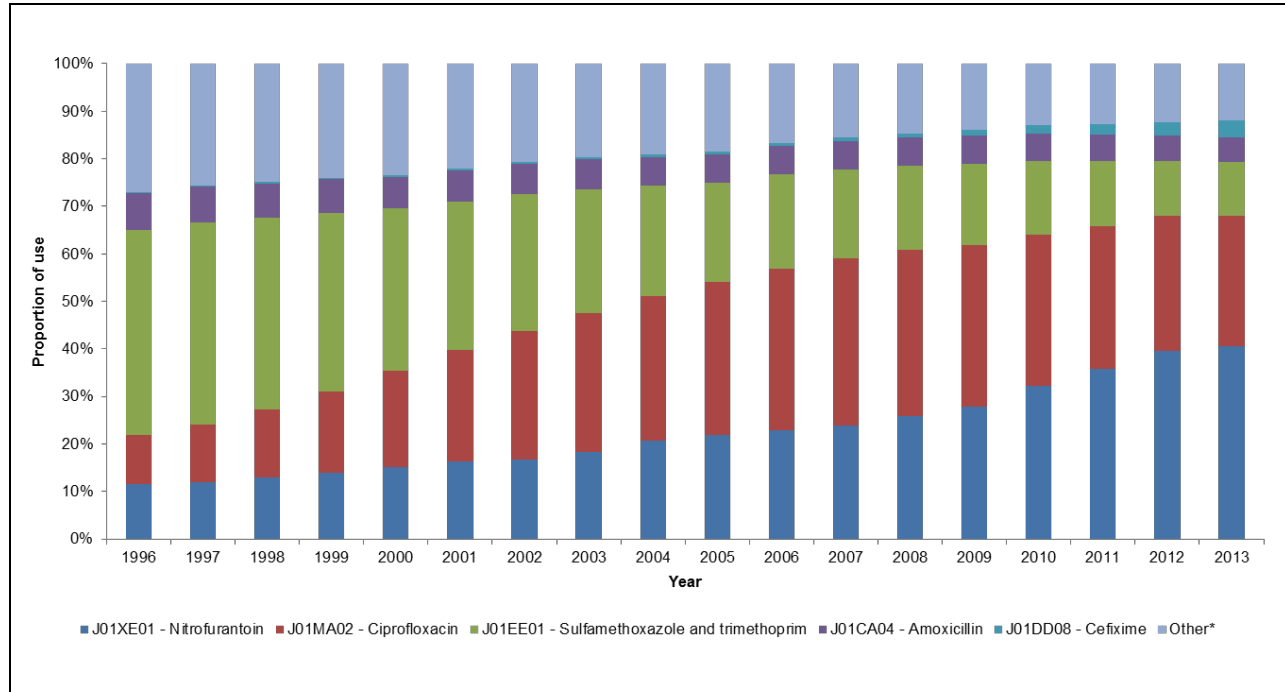
These surveillance activities allow for the evaluation of the potential impact of the DBND program implementation on overall, class-specific, and indication-specific antimicrobial utilization in BC. Data for these surveillance activities are obtained from the PharmaNet database of outpatient prescriptions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

Traditionally, a comprehensive summary of antimicrobial utilization trends in the province of BC is compiled in a report entitled "British Columbia Annual Summary of Antibiotics Utilization." The most recent version of this report (2013) is available from the BCCDC DBND website (<http://www.bccdc.ca/prevention/AntibioticResistance/ReportsandPublications/default.htm>). The DBND program has begun exploring interactive methods of presenting these data for healthcare professionals and the public.

In addition, indication-specific analyses will be conducted this year using new algorithms for assigning indications to prescription records. Preliminary results presented at AMMI 2016<sup>16</sup> suggest that the proportionate use of specific drugs to treat UTIs has changed substantially since 1996. Among UTIs overall, a 338% increase in nitrofurantoin use and a 67% decrease in sulfamethoxazole and trimethoprim use since 1996 have been observed (**Figure 15**). Ciprofloxacin use decreased 17% between its peak year in 2007 and 2013. Although representing little proportional use, cefixime use has risen substantially since 2010. Similar trends in nitrofurantoin, ciprofloxacin, and SMX-TMP use were noted for cystitis alone; however, ciprofloxacin use for pyelonephritis remains proportionally high.

Overall utilization rates for UTIs have increased 25% between 1996 and 2013 and remain substantially higher among patients aged 60 years and older (2.3 DID in 2013) compared to all other age groups (< 1.2 DID in 2013) (**Figure 16**). These findings suggest that although favourable shifts in treatment of UTIs have been observed, increased use in antibiotics overall, particularly among those 60+, may warrant targeted interventions.

The DBND outcome evaluation and program implementation components are being assessed against similar programs in Europe (Denmark, the Netherlands) to identify additional activities that may be adopted or modified. Comparisons between the BC program and those in Europe may highlight opportunities for more precise outcome evaluation or implementation targets.



**Figure 15.** Proportional use by drug among oral antibiotic prescriptions for UTI-related diagnoses, 1996-2013

Source:PharmaNet

\* Other includes drugs not in the top five used: J01DC02 – Cefuroxime, J01FA09 – Clarithromycin, J01XD01 – Metronidazole, J01MA06 – Norfloxacin, J01AA08 – Minocycline, J01FA10 – Azithromycin, J01MA12 – Levofloxacin, J01AA07 – Tetracycline, J01EA01 – Trimethoprim, J01MA14 – Moxifloxacin, J01XX01 – Fosfomycin, J01FF01 – Clindamycin, J01CA01 – Ampicillin, J01MA01 – Ofloxacin, J01CE02 – Phenoxymethylpenicillin, J01FA01 – Erythromycin, J01CF02 – Cloxacillin, J01XX05 – Methenamine, J01DC10 – Cefprozil, J01XX08 – Linezolid, J01DC04 – Cefaclor, J01DB05 – Cefadroxil, J01FA02 – Spiramycin, J01MA16 – Gatifloxacin, J01MA13 – Trovafloxacin, J01FA15 – Telithromycin, J01CA06 – Bacampicillin, J01CF05 – Flucloxacillin, J01CA02 – Pivampicillin, J01GB05 – Neomycin, J01AA01 – Demeclocycline, J01CA08 – Pivmecillinam, J01MB02 – Nalidixic acid, J01XC01 – Fusidic acid, J01EE02 – Sulfadiazine and trimethoprim, J01EB04 – Sulfapyridine, J01CE10 – Benzathine phenoxymethylpenicillin, J01EB05 – Sulfafurazole, J01MA11 – Grepafloxacin, J01EC01 – Sulfamethoxazole, J01EC02 – Sulfadiazine

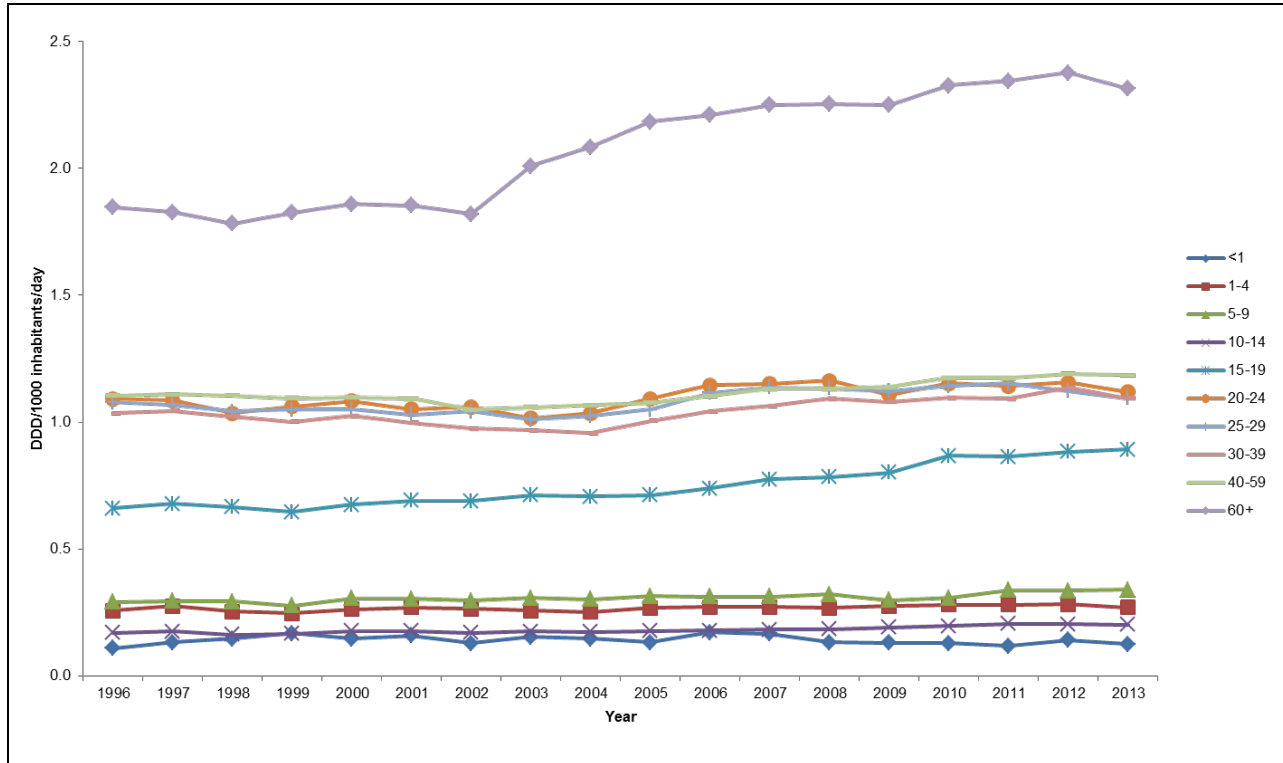


Figure 16. Oral antibiotic utilization rate for UTI-related diagnoses by age group, 1996 - 2013



## Trends in Antimicrobial Resistance

---

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 report entitled "Antimicrobial Resistance Trends in the Province of British Columbia."

The most recent version of this report (2014) is available from the DBND website (<http://www.bccdc.ca/prevention/AntibioticResistance/ReportsandPublications/default.htm>).

Since 2013, both BC Biomedical Services (BC Biomed) and LifeLabs Medical Laboratory Services (LifeLabs) data from 2007/2008 to 2013 were analyzed. Combined, BC Biomed and LifeLabs account for 90% of all community laboratories in BC. An updated report including data up to 2015 is currently being prepared. Similar to the utilization report, interactive means of data visualization are being explored to allow increased accessibility and flexibility of resistance data.

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) was 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 study of the system, in collaboration with the National Microbiology Laboratory, aims to assess the feasibility of surveillance at the national level. Preliminary reports suggest that the system could meet some annual reporting requirements for antimicrobial resistance in community settings, but may be limited with regards to: real-time reporting of resistance trends, representativeness of data, completeness of organism-drug combinations, and the possible inclusion of some healthcare setting data.

## Conclusions

---

As Canada continues to address antibiotic resistance, stewardship advocates in other Canadian jurisdictions reference the strong example of stewardship efforts delivered through the *Do Bugs Need Drugs?* program as guidance for the rest of the country.

After eleven 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 implemented. An increased social media presence allows the program to disseminate key messaging to a wider audience. 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. Social media provides the DBND program with the opportunity to not only educate the public but to enlist the audience in spreading the message.

The ongoing collaboration with the PAD pharmacists enables the DBND program to expand the reach of educational initiatives to healthcare professionals in BC.

DBND, in its eleventh year of implementation, is showing positive achievements in addressing antibiotic resistance. The continued collaboration with community providers 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.

The increased levels of antibiotic use being observed among dental surgeons highlight the importance of engaging all prescribing professions when attempting to control antibiotic use in the province. Although favourable shifts in UTI treatments have been observed, increased use of antibiotics to treat UTIs, particularly among BC residents aged 60 or older, requires further investigation. Additional indication-specific analyses are integral to outcome evaluation and will be presented once 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

---

### Team Members

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

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

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

**Diana George**, MSc, Epidemiologist, DBND Program, BC Centre for Disease Control

**Victor Leung**, MD FRCPC, Infection Prevention and Control Physician, Providence Health Care and Physician Lead, Antimicrobial Stewardship, Providence Health Care and Infectious Diseases Consultant and Medical Microbiologist, St. Paul's Hospital and Clinical Assistant Professor, Pathology and Laboratory Medicine, University of British Columbia

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

**Laura O'Neill**, Administrative Assistant, DBND Program, BC Centre for Disease Control

**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

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

**Romina Reyes**, MD, FRCPC, MSc, Medical Microbiologist, LifeLabs

**Stuart Shepherd** Social Media Analyst, DBND Program, BC Centre for Disease Control

### Contributors to Report

Edith Blondel-Hill, Kim Dreher, Diana George, Latitude/Mediacom, David Patrick, Stuart Shepherd

## **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 eleven 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, Sooke Family Resource Society, medical students and faculty from various colleges/universities (see list below); pharmacists/pharmacy technicians from various Overwaitea Food Group stores as well as a pharmacist from Nordlys Pharmacy in Dawson Creek; the BC PAD pharmacists; child care resource and referral centre staff; childcare providers; healthcare workers caring for older adults; Lamar Transit Advertising; Latitude Agency; MediaCom; 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 eleven 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)
- 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
- Stenberg College (Surrey)

## References

---

- <sup>1</sup> Bronzwaer SL, Cars O, Buchholz U, et al. A European study on the relationship between antimicrobial use and antimicrobial resistance. *Emerg Infect Dis* 2002; 8(3):278-282.
- <sup>2</sup> Goossens H, Ferech M, Vander SR, Elseviers M. Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. *Lancet* 2005; 365(9459):579-587.
- <sup>3</sup> Centers for Disease Control and Prevention. ANTIBIOTIC RESISTANCE THREATS in the United States, 2013 [Internet]. USA: U.S. Department of Health and Human Services; 2013.
- <sup>4</sup> Ranji SR, Steinman MA, Shojania KG, et al. *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies (Vol. 4: Antibiotic Prescribing Behavior)*. Report No. 04(06)-0051-4. Rockville: Agency for Healthcare Research and Quality; 2006.
- <sup>5</sup> Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev* 2005;(4):CD003539.
- <sup>6</sup> Ranji SR, Steinman MA, Shojania KG, Gonzales R. Interventions to reduce unnecessary antibiotic prescribing: a systematic review and quantitative analysis. *Med Care* 2008; 46(8):847-862.
- <sup>7</sup> Huttner B, Goossens H, Verheij T, Harbarth S. Characteristics and outcomes of public campaigns aimed at improving the use of antibiotics in outpatients in high-income countries. *Lancet Infect Dis* 2010; 10(1):17-31.
- <sup>8</sup> Mamdani M, McNeely D, Evans G, et al. Impact of a fluoroquinolone restriction policy in an elderly population. *Am J Med* 2007; 120(10):893-900.
- <sup>9</sup> Marra F, Patrick DM, White R, Ng H, Bowie WR, Hutchinson JM. Effect of formulary policy decisions on antimicrobial drug utilization in British Columbia. *J Antimicrob Chemother* 2005; 55(1):95-101.
- <sup>10</sup> Marra F, George D, Chong M, Sutherland S, Patrick DM. Antibiotic prescribing by dentists has increased: Why? *J Am Dent Assoc* [Internet]. 2016 May [cited 2016 May 24];147(5):320–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26857041>
- <sup>11</sup> Lamar Advertising. Email Communication, March 8, 2016
- <sup>12</sup> Media Post Buy Summary. Latitude Agency. Email Communication, May 9, 2016.
- <sup>13</sup> DBND Twitter and Facebook Summary Report. Shepard, S. Email Communication, May 25, 2015.
- <sup>14</sup> Google Analytics Report. Accessed, May 29, 2015.
- <sup>15</sup> Blondel-Hill E, Fryters S. *Bugs and Drugs: An Antimicrobial/Infectious Disease Reference*. Edmonton: Alberta Health Services; 2012.
- <sup>16</sup> DM Patrick, D George, M Chong, E Blondel-Hill, F Marra. Trends in antibiotic utilization for urinary tract infections in the province of British Columbia, Canada [abstract]. In: Annual Conference of the Association of Medical Microbiology and Infectious Disease Canada; 2016 Mar 30–April 1; Vancouver, BC. Ottawa (ON): J Assoc Med Microbiol Infect Dis Can Vol 1 No 1; March/April 2016. Abstract C01.

# Appendix

## Transit Advertisements

---

**Example 1.** Skystrip advertisements on Skytrains



**Example 2.** Advertisement on Side of Bus (King)




## Digital Display Advertisements (Audience Targeting and Facebook Marketplace)





---





**antibiotic**  
*wise*.ca


SEARCH  

CONTACT    

[ABOUT ANTIBIOTICS](#) [ANTIBIOTIC RESISTANCE](#) [PREVENTION](#) [RESOURCES](#) [ABOUT US](#)

If you take antibiotics when you don't need to, they may not work the next time you really need them.

[READ MORE](#)



What you need to know about Antibiotics

[READ MORE](#)



What are superbugs?

[READ MORE](#)

**ANTIBIOTIC RESISTANCE • A GLOBAL ISSUE** [READ MORE](#)

**22.8M** antibiotic PRESCRIPTIONS were dispensed by **CANADIAN** pharmacies in 2013.  
Public Health Agency of Canada

Over the last 30 years, **NO** major types of ANTIBIOTICS have been DEVELOPED.  
World Health Organization, 2014

At least **23,000** people **DIE EACH YEAR** from antibiotic resistant infections.  
Be SMART Campaign

## Technical Notes

---

### 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.

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 underestimate 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 systemic use for years 1996 to 2014. The PharmaNet database includes records of all outpatient prescriptions dispensed from community pharmacies in BC. 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

Previously, 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 are typically used to assess changes in trend over time.

As the DBND program continues to increase its online presence, new means of data visualization are being explored to report on resistance patterns based on isolate-level data obtained from community laboratories.

## Limitations

- Digital/television and transit advertising numbers are estimates provided to the DBND program by external contractors and represent the estimated viewer numbers and transit ridership numbers, respectively. However, the true uptake by our primary target audience group, women in BC 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 shipment deliveries and intended receipt type are documented, 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 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 differed between the laboratories until mid-2015; different antimicrobials panels were used and different cascading algorithms were implemented for testing based on specimen type, age of patient and resistance to other antibiotics. 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.