ENVIRONICS
ANALYTICS

TECHNICAL DOCUMENTATION
HOUSEHOLDSPEND & FOODSPEND 2018

JULY 2018

WHAT THEY ARE

HouseholdSpend provides current estimates of annual expenditures for 480 variables spanning 18 categories of goods and services used by Canadian households—everything from fashion apparel and household furnishings to cell phones and charitable donations. While HouseholdSpend includes a general food category, FoodSpend provides a more detailed breakdown of food-related purchases made by Canadian households, with current estimates of annual expenditures for 284 variables of food related purchases. With FoodSpend, users can gain valuable insights into what Canadian households are buying from grocery stores and restaurants—everything from specific vegetables, meat and fish products to meal types like lunches and dinners. Both databases also include basic variables describing number of households and household income from DemoStats, which are based on Statistics Canada's Survey of Household Spending (SHS).

Both wide-ranging databases let users analyze potential expenditures by average dollars spent per household and total dollars spent for any geographical level—from all of Canada to small custom-defined trade areas—regardless of where the consumer made the purchase.
Table 1 shows counts of variables by category for HouseholdSpend and FoodSpend.

Table 1: HouseholdSpend 2016 and FoodSpend 2016 categories by count of variables

Category	Count	Product
Code	1	HouseholdSpend and FoodSpend
Basics*	4	HouseholdSpend and FoodSpend
Food Purchases (Category Summary)	11	FoodSpend
Bakery products	15	FoodSpend
Cereal grains and cereal products	17	FoodSpend
Dairy products and eggs	30	FoodSpend
Fish and Seafood	21	FoodSpend
Food purchased from restaurants	6	FoodSpend
Fruit, fruit preparations and nuts	36	FoodSpend
Meat	20	FoodSpend
Non-alcoholic beverages and other food products	81	FoodSpend
Vegetables and vegetable preparations	42	FoodSpend
Household Expenditures (Category Summary)	26	HouseholdSpend
Clothing	43	HouseholdSpend
Education	10	HouseholdSpend
Food	8	HouseholdSpend
Games of chance	7	HouseholdSpend
Gifts of money and contributions	8	HouseholdSpend
Goods and services by purchase method**	4	HouseholdSpend
Health care	23	HouseholdSpend
Household furnishings and equipment	31	HouseholdSpend
Household operation	37	HouseholdSpend
Miscellaneous expenditures	20	HouseholdSpend
Personal care	17	HouseholdSpend
Personal insurance and pensions	8	HouseholdSpend
Reading materials and other printed matter	6	HouseholdSpend
Real estate	32	HouseholdSpend

Recreation	76	HouseholdSpend
Shelter	69	HouseholdSpend
Tobacco and alcohol	8	HouseholdSpend
Transportation	38	HouseholdSpend

*Total expenditure is categorized as "Basics" in FoodSpend, but "Household Expenditures (Category Summary)" in HouseholdSpend.
**Goods and services by purchase method reflects a different hierarchy from other categories (such as Clothing, Education, etc.) listed here. It offers purchase methods such as sales over the Internet or other types of direct sales, but does not include detailed categories.

HOW THEY WERE BUILT - KEY DATA SOURCES

The primary data source for HouseholdSpend 2018 and FoodSpend 2018 is the SHS. Since 2010, the SHS has also tracked food purchased from stores in greater detail than before, effectively measuring what had been captured in the now-discontinued Food Expenditure Survey (FES). While the SHS has generally expanded in size and improved over time, we have modelled relationships using multiple vintages of SHS to capture category sub-divisions no longer measured in the current version. A series of models is calibrated on the SHS, and these models are used to score a multi-dimensional cross-distribution of household demographics derived from Environics Analytics' DemoStats 2018, PRIZM5 2018 and custom census cross-tabulations from Statistics Canada.
Beyond these estimates, EA collects data from Statistics Canada's National Economic Accounts (NEA) program. The NEA's consumption estimates and forecasts at the provincial and territorial levels form a set of authoritative control numbers against which all of our consumption estimates are matched. These control numbers are derived primarily from the Quarterly Survey of Financial Statements (QSFS) and augmented by the SHS when the sector is not previously measured. In practice, the QSFS program produces robust consumption estimates, with its data derived from the financial statements of household serving institutions rather than relying on the memory recall of household members. This approach allows us to correct for response and reporting biases within our SHS-derived models.

Additionally, EA incorporates administrative data from the Canada Revenue Agency (CRA) when available. This CRA data, a combination of standard and custom data from Statistics Canada, are collected at the census tract level of geography—and higher—and we use it to guide our estimates for household income taxes paid, employment contributions, Canada/Quebec Pension Plan payments and charitable contributions. These financial-related outlays account for about 15 percent of total Canadian household expenditures.

HOW THEY WERE BUILT – MODELLING FRAMEWORK

The construction of HouseholdSpend 2018 and FoodSpend 2018 involved three distinct phases: the creation of the initial small-area behavioural estimates; the collection and projection of the control totals; and a mathematical reconciliation process that ensures everything "adds up."

SMALL-AREA ESTIMATES

A series of Heckman selection, log-linear and multinomial logit models were calibrated using observation-level SHS micro-data. These models predicted consumption using a combination of demographic, location, PRIZM5,

seasonality and time data as independent parameters. The log-linear models and Heckman selection models generally estimate the base-level consumption totals like "total current consumption" or "purchases of primary real estate". These estimates are then partitioned using a parent-child structure of household spending categories, for example, breaking down "food purchased at restaurants" into "meals and snacks", then subdividing "meals" into "breakfasts, lunches and dinners." Analysts used these models to score a multidimensional cross-distribution of household demographics derived from Environics Analytics' DemoStats 2018, PRIZM5 2018 and custom census cross-tabulations from Statistics Canada. This data cube was produced for every postal code and census dissemination area in Canada. Altogether, the initial development of HouseholdSpend and FoodSpend required over 700 estimates of consumption using over 200 models and 160,000 coefficients for over 1,000,000 small area geographic units in Canada.

PROVINCIAL, TERRITORIAL, AND SMALL-AREA CONTROL TOTALS

The spending control totals fall into two categories: NEA-derived provincial control totals and administrative data-derived small-area control totals. Analysts derived the spending control totals for 49 general categories of current consumption at the provincial and territorial level from the Provincial and Territorial Expenditure Accounts (PTEA), a derivative of Statistics Canada's NEA program. PTEA is an authoritative source that compiles and integrates a large amount of information from various survey divisions within Statistics Canada, along with other data, to estimate provincial and territorial GDPs, as well as their component categories and underlying sector accounts. While the PTEA control totals are generally used directly, in some cases they are affected by inconsistencies in definitions between PTEA and the SHS. For example, the shelter and miscellaneous expenditure categories from PTEA cannot be reconciled directly with the SHS. In these cases, the estimated consumption is controlled back to the aggregated spending values from the SHS, with some adjustments.

Income taxes and select deductions such as employment contributions, Canada/Quebec Pension Plan payments and charitable contributions—all are controlled to data published at the small-area level (generally, census tract and higher).

Table 2 lists the control sources and years available at the established time controls.

Table 2: Sources of control totals for HouseholdSpend 2018 and FoodSpend 2018

Category	Description	Source	Year	Product
CC002	Child care outside the home	PTEA	2011-2016	HouseholdSpend 2018 and FoodSpend 2018
CC014	Child care in the home	PTEA	2011-2016	HouseholdSpend 2018
CL001	Clothing	PTEA	2011-2016	HouseholdSpend 2018
CS001-CS010	Communications excluding postal, courier and other communication services	PTEA	2011-2016	HouseholdSpend 2018
CS010	Postal, courier and other communication services	PTEA	2011-2016	HouseholdSpend 2018

ED002	Education	PTEA	2011-2016	HouseholdSpend 2018
FD003-FD806	Food purchased from stores excluding non-alcoholic beverages	PTEA	2011-2016	HouseholdSpend 2018
FD806	Non-alcoholic beverages	PTEA	2011-2016	HouseholdSpend 2018
FD990	Food purchased from restaurants	PTEA	2011-2016	HouseholdSpend 2018
GC001	Games of chance	PTEA	2011-2016	HouseholdSpend 2018
HC001	Healthcare	PTEA	2011-2016	HouseholdSpend 2018
HC003+004	Prescribed and non-prescribed medicines and pharmaceutical products	PTEA	2011-2016	HouseholdSpend 2018
HC020	Total health insurance premiums	PTEA	2011-2016	HouseholdSpend 2018
HE002	Household appliances	PTEA	2011-2016	HouseholdSpend 2018
HE010	Other household equipment	PTEA	2011-2016	HouseholdSpend 2018
HF001	Household furnishings and equipment	PTEA	2011-2016	HouseholdSpend 2018
HF002	Household furnishings	PTEA	2011-2016	HouseholdSpend 2018
HO001	Household operation	PTEA	2011-2016	HouseholdSpend 2018
HO004+005	Pet food and purchase of pets and related pet goods	PTEA	2011-2016	HouseholdSpend 2018
HO006	Veterinarian and other services	PTEA	2011-2016	HouseholdSpend 2018
HO019+020	Nursery and greenhouse stock (flowers, plants, seeds), and fertilizers, herbicides, insecticides, pesticides, soil and soil conditioners	PTEA	2011-2016	HouseholdSpend 2018
ME001	Miscellaneous expenditures	SHS	2011-2016	HouseholdSpend 2018
ME018	Discounts and other fees, goods and services	SHS	2011-2016	HouseholdSpend 2018
ME021	Miscellaneous, other goods and services	SHS	2011-2016	HouseholdSpend 2018
PC001	Personal care	PTEA	2011-2016	HouseholdSpend 2018
PC021	Hair grooming services	PTEA	2011-2016	HouseholdSpend 2018

RE001	Recreation excluding recreational vehicles	PTEA	2011-2016	HouseholdSpend 2018
RE004	Outdoor play equipment and accessories	PTEA	2011-2016	HouseholdSpend 2018
RE020	Photographers' services and other photographic services	PTEA	2011-2016	HouseholdSpend 2018
RE062	Movie theatres	PTEA	2011-2016	HouseholdSpend 2018
RE076	Pre-recorded media, downloads and audio/video media	PTEA	2011-2016	HouseholdSpend 2018
RO001	Reading materials and other printed matter	PTEA	2011-2016	HouseholdSpend 2018
RO004	Books and pamphlets (excluding school books)	PTEA	2011-2016	HouseholdSpend 2018
SH001	Shelter	SHS	2011-2016	HouseholdSpend 2018
TA002	Tobacco products and smokers' supplies	PTEA	2011-2016	HouseholdSpend 2018
TA005-TA006	Alcoholic beverages excluding those served on licensed premises	PTEA	2011-2016	HouseholdSpend 2018
TA006	Alcoholic beverages served on licensed premises	PTEA	2011-2016	HouseholdSpend 2018
TR001	Transportation including recreational vehicles, but excluding fuels and lubricants	PTEA	2011-2016	HouseholdSpend 2018
TR005	Purchases of automobiles	PTEA	2011-2016	HouseholdSpend 2018
TR006+007	Purchases of vans, and mini-vans, trucks and sports utility vehicles	PTEA	2011-2016	HouseholdSpend 2018
TR032+RV011	Vehicle insurance premiums for automobiles, trucks and vans and recreational vehicles	PTEA	2011-2016	HouseholdSpend 2018
TR033	Tires, batteries, and other parts and supplies for vehicles	PTEA	2011-2016	HouseholdSpend 2018
TR034	Maintenance and repairs of vehicles	PTEA	2011-2016	HouseholdSpend 2018

TR036	Gas and other fuels	PTEA	2011-2016	HouseholdSpend 2018
TR037	Other automobile, van and truck operation services	PTEA	2011-2016	HouseholdSpend 2018
TR038+RV016	Parking costs at work, at school, park-ride and parking meters, and recreational vehicle parking, airport fees; boat storage and harbour dues	PTEA	2011-2016	HouseholdSpend 2018
TR051	Bus, subway, street car and commuter train	PTEA	2011-2016	HouseholdSpend 2018
TR052	Transportation by taxi	PTEA	2011-2016	HouseholdSpend 2018
TR054	Transportation by airplane	PTEA	2011-2016	HouseholdSpend 2018
TX001	Income taxes	Tax file at Census Tract level	2012-2015	HouseholdSpend 2018
EP002	Employment insurance and Quebec parental insurance premiums	Tax file at Census Tract level	2012-2015	HouseholdSpend 2018
EP004	Canada and Quebec Pension Plan payments	Tax file at Census Tract level	2012-2015	HouseholdSpend 2018
EP005	Retirement and pension fund payments	Tax file at Census Tract level	2012-2015	HouseholdSpend 2018
ME013	Dues to unions and professional associations	Tax file at Census Tract level	2012-2015	HouseholdSpend 2018
MG006	Charitable contributions	Tax file at Census	2012-2016	HouseholdSpend 2018

		Tract level		

Due to slight differences in definitions and timeframes in the control totals, both the PTEA-based and administrative data-based control totals needed to be adjusted and projected. As an example of the definitional corrections, PTEA control adjustments were made to reallocate net expenditures abroad to each category, using data from Statistics Canada's National Tourism Indicators (NTI) and Travel Survey of Residents of Canada (TSRC).

This year's HouseholdSpend and FoodSpend databases were built using the most up-to-date PTEA and SHS statistics; however, the provincial/territorial estimates were available up until 2016 and therefore needed to be projected to the current year (2018). The projection of PTEA and SHS control totals for 2017 were completed using the 2017 NEA data by allocating to each province/territory using shares from 2016. Furthermore, the 2018 estimates were initially derived by fitting a linear regression with year values as independent variable, for each category and for each province/territory. The final estimates were then controlled to the seasonally-adjusted, year-over-year growth rate of NEA data between the first quarter of 2017 and the first quarter of 2018.

A similar approach was undertaken for the small-area administrative data control totals. Missing and suppressed values in census tract-level administrative data control totals did occur in the raw data from Statistics Canada. The values were imputed using other years' values, if possible, or corresponding shares relative to income from the census metropolitan area (CMA) level. Except for charitable donations, the share of census tract-level control over total income from 2016 to 2018 was projected using a logit model with decay factors applied against the log odd difference for each projected year. The control values for 2016 to 2018 were then derived by multiplying the projected shares to the household income known for each year from DemoStats.

The 2017 and 2018 shares of census tract level charitable contributions over total income were calculated as the sum of charitable contributions from 2012 to 2016 divided by the sum of total income for the same period. Control values for 2017 and 2018 charitable contributions were then derived by multiplying the projected shares to the household income known for each year from DemoStats. This approach was chosen because the charitable contributions data have a relatively large degree of temporal stochasticity and the aggregate charitable donations can be greatly affected by large, one-time donations.

RECONCILIATION PROCESS

For each year, the control totals have to be reconciled with the initial small-area estimates at the postal code and dissemination area level. This reconciliation was achieved using a set of non-linear mathematical optimizations that adjust the initial small-area estimates to agree with higher geographic level control totals. The controlled category totals at the small-area level were then allocated using the initial estimate shares of the category components. This reconciliation process results in estimates that match the control totals at different levels of geography while deviating as little as possible from the estimates derived from the raw data.

SPECIAL NOTE ABOUT COMPARABILITY WITH WEALTHSCAPES

Starting with the 2016 release, WealthScapes (and its varitations), HouseholdSpend and FoodSpend all use identical definitions for disposable income and discretionary income. In fact, WealthScapes' disposable and discretionary income data are produced directly from the HouseholdSpend and FoodSpend databases. The only difference between the disposable and discretionary income figures for each database is the year of reference. All of the statistics in HouseholdSpend 2018 and FoodSpend 2018 are for the current year (2018), and are identical to those found in DemoStats 2018. But WealthScapes 2018's population and income statistics come from 2017 data, while WealthScapes 2018's historical year statistics refer to 2016.

REFERENCE DOCUMENTS

HouseholdSpend and FoodSpend Release Notes:
environicsanalytics.com/en-ca/release-notes
HouseholdSpend and FoodSpend Variables Lists:
environicsanalytics.com/en-ca/variables
HouseholdSpend and FoodSpend Metadata:
environicsanalytics.com/en-ca/metadata