

## Using Search Engine Optimization Techniques to Enhance the Visibility of Web-Based Extension Fact Sheets

### Abstract

To compete in today's online environment, Extension needs to increase its visibility through search engine results. The study reported here evaluated the impact of using Search Engine Optimization (SEO) techniques on six Web-based Extension *Nutrition and Health* fact sheets by examining data pre- and post-fact sheet revision from Google Analytics and rankings on Google results page. Comparing *Pageviews* data pre-and post-revision, the *Pageviews* for all six fact sheets increased, ranging from 101% to 281%, over a 3-month timeframe. Application of SEO techniques to Extension publications has the potential to increase the visibility of Extension's credible and research-based information.

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## Introduction

Advances in communications technology, most notably the Internet, have drastically changed the way in which individuals search for and access health information. According to the Pew Health Online Report, 77% of online health information seekers began their most recent session at a search engine such as Google, Bing, or Yahoo, often without an exact search plan (Fox & Duggan, 2013; Fox & Rainie, 2002). The quality and credibility of the websites that search engines identify in the results page is of great importance to consumers (Rainie & Fox, 2000). Results of search engine inquiries may display websites with irrelevant, unreliable, and inaccurate information on the first few pages of a search (Sutherland, Wildemuth, Campbell, & Haines, 2005; Scullard, Peacock, & Davies, 2010), which is of special concern because consumers often only look at the first few results of a search engine results page before selecting a website (Hochstotter & Lewandowski, 2009; Jensen & Spinks, 2006). Once a website is chosen, consumers rely on visual presentation of a Web page and their own best judgment to determine a website's credibility (Fox & Rainie, 2002). This is an alarming finding, because many nutrition websites, identified using popular search engines, are aesthetically appealing and easy to use but provide inaccurate nutrition information (Sutherland, Wildemuth, Campbell, & Haines, 2005).

Despite the fact that search engines are Extension's primary source of online traffic, Extension nationally has placed little importance on searchable Web-based information, as Rader (2011) reported that searches for "extension service" have declined by 50% from 2004 to 2010. In fact, only 16% of those 18-29 years of age have ever heard of Extension, compared with 73% of those 60 and older (Dittman Research & Communications Corporation, 2014). Targeted searches for Extension have decreased, as well as general awareness of the presence of Extension on the Internet (Rader, 2011). Rader (2011) described Extension's place in the online environment as "a popularity contest, and Extension is the most nerdish kid in school." Essentially, in order to compete in today's online environment, Extension needs to increase its visibility through search engine results.

The *Nutrition & Health* fact sheet publications from the Colorado State University (CSU) Extension website ([www.ext.colostate.edu](http://www.ext.colostate.edu)) are examples of credible, informative, and reliable information that must contend with other health-related websites in order to reach consumers online. However, Extension has placed little importance on the Internet as an outreach vehicle, which has led to its limited presence in search engine results (Rader, 2011). Many online communication barriers currently exist for Extension, such as low numbers of consumers from the "Net Generation" (those 18-29 years of age) using Extension resources. To have this generation recognize Extension as a valuable resource would expand the reach of Extension Web materials greatly. Contributing to the communication barrier are fact sheet publications originally written for print that are published online, without incorporation of certain terminology to attract Internet consumers.

One technique to drive more traffic to CSU Extension fact sheets involves the use of search engine optimization (SEO). The benefits of using SEO techniques for businesses with financial incentive and commercial organizations looking to increase profits through advertising revenue are well established (Rangaswamy, Giles, & Seres, 2009). However, the advantages of using SEO are not as recognized or well known for non-commercial websites such as Extension. Use of SEO techniques would be an effective and simple way for fact sheets on the CSU Extension website to gain competitive advantage by increasing their ranking on search engine results pages (SERPs), thus driving more traffic to the website. A research article from Hill et al (2012) recognizes several SEO techniques to help drive Web traffic to Extension websites, while Rader (2011) acknowledges the importance of using keywords to enhance the rank of Extension websites in Google Search.

## Purpose and Objectives

The overall aim of the project described here was to explore if SEO techniques could enhance the Web-based visibility of Extension *Nutrition & Health* fact sheets. The study objectives were to:

1. Understand how current Extension *Nutrition & Health* fact sheets are accessed and used on the Web; and
2. Test the impact of using SEO techniques with six fact sheets as a strategy to increase the visibility of Web materials online.

## Methods

To meet the study objectives, four steps were employed:

1. Review of Current Extension Fact Sheets;
2. Fact Sheet Revisions;
3. Application of Search Engine Optimization Techniques; and
4. Search Engine Optimization Testing.

## Review of Current CSU Extension Fact Sheets

In 2012, CSU Extension had a total of 478 fact sheets, including 32 *Nutrition & Health* fact sheets (8%). A thorough review of CSU *Nutrition & Health* fact sheets examined 1) their proportion of total Extension fact sheets, content, reading level, and graphical appeal; and 2) website pageviews and other Google Analytics metrics. *Nutrition & Health* fact sheets were examined for topic area, target audience, and date of last update. The reading level of a random sample of fact sheets (n=12) was conducted using the Flesch-Kincaid Grade Level test in Microsoft Word. The layout and graphical appeal of the current Extension fact sheet template was compared to a new, updated template with a convenience sample of university staff.

Google Analytics is a service offered by Google® that provides insight into how visitors are finding and using content on a website. It facilitates tracking visits to a website and monitoring engagement with specific content, such as fact sheets. Google Analytics was used to generate statistics regarding visitor interaction with content on the webpage, which we monitored using the metrics presented in Table 1.

**Table 1.**

Google Analytics Terms and Definitions

<b>Google Analytics Term</b>	<b>Definition</b>
Total Pageviews	The total number of pages viewed by all visitors to a website during a specified time frame. Pageviews allow the site administrator to know which pages receive the most traffic, as well as keywords and/or traffic sources that directed the visitor to specific landing pages on the website.
Bounce Rate	The percentage of visitors who view only one page before exiting site.
Average Time on Page	The average time spent by all visitors on a webpage. Presumably, the longer the time spent on a page, the more engaged the visitor was with the webpage content.
Traffic Sources	The ways in which visitors access a website (search, referral, and direct).

Pages per Visit	This metric displays the average number of pages viewed per visit to your site (Average Page Depth)
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## Fact Sheet Revisions

Based on the review of *Nutrition & Health* fact sheets outlined above, six fact sheets were chosen for revision. General revisions to each of the six factsheets included updated content, data, and figures, and change in overall tone, as well as a series of grammatical and structural edits. Once these revisions were complete, SEO techniques were incorporated into each of the six fact sheets.

## Application of Search Engine Optimization Techniques

A user-friendly protocol for applying SEO principles was developed for Web-based education materials, such as Extension fact sheets. The most current, comprehensive, and practical SEO guidelines were gathered from research-based materials available from a variety of sources (published within the last 5 years), including: journal articles, books, websites, and blogs that focused on recent research and updates concerning SEO practices. The following two primary on-page SEO principles were chosen for use in the protocol:

- **Keyword Analysis:** The process of choosing applicable keywords and phrases used by the target audience.
- **Keyword Placement:** The strategic placement of keywords throughout the web material.

### ***Keyword Analysis***

Four keyword generating tools and techniques were chosen based on established presence in research, ease of use, minimal/no cost, and positive user rating. In addition to the use of the keyword-generating tools, the researcher developed a list of potential keywords and phrases believed to be used by visitors to search for certain information. Keyword and phrase considerations included spelling mistakes, synonyms, and split or merged words.

Google Analytics was used to generate a list of the 50 most common keywords and phrases (4 calendar years' of data) chosen by visitors using popular search engines to reach each of the six selected fact sheets on the CSU Extension website.

Google AdWords Keyword Planner was used to generate a list of 100 keywords using the domain name of each respective fact sheet. Special note was made concerning popular keywords (according to average monthly search values), as well as keywords that matched visitor characteristics gathered from the Google Analytics keyword list. Attention was paid not to include keywords or phrases that could be ambiguous, broad, contain other keywords, or compete with other fact sheets on the CSU Extension website.

### ***Keyword Placement***

Guidelines were chosen based on established presence in the literature and ease of use for the target audience. Before guidelines were applied to each fact sheet, it was important that the content of the fact sheet, titles, and headings, were well organized and targeted for the intended audience. Primary guidelines included incorporating keywords and phrases in:

- Larger font, bolded font, or italicized font (referred to as *font modification*)
- Bullets or numbered lists (referred to as *paragraph modifications*)
- Headings, subheadings, and incorporating keywords near the top of the page (referred to as *format*)

Other factors such as the keyword density, inclusion of images, links, and meta keywords were also considered.

## ***Search Engine Optimization Testing***

The final proof of each fact sheet was posted by Extension's Director of Technology to the CSU Extension website, thus replacing all older versions. Data records for specified time periods were obtained using two tools; the *Pageviews* metric from Google Analytics and rank on Google Search Engine Results Pages (SERPs).

### ***Google Analytics Pageviews***

Google Analytics was used to obtain *Pageviews* data pre- and post-revision for each of the six fact sheets. Pre-revision fact sheet *Pageviews* data was gathered for 3 consecutive years: 2010, 2011, and 2012, during the dates of May 1st - July 31st. The 3 years of *Pageviews* data was then averaged for each fact sheet, to eliminate potential confounding factors. Post-revision fact sheet *Pageviews* data was obtained during 2013 for the same dates (May 1st - July 31st). The data from 2013 was then compared to the values from the 3-year average.

### ***Google Search Engine Results Pages***

Prior to fact sheet revisions, data was gathered from Google SERPs for each of the six fact sheets for the 3 months of February, March, and April, of 2013. For each fact sheet, a keyword was chosen to perform a Google search to determine the fact sheet's ranking on Google SERPs. The keyword was chosen using the title of the fact sheet and thought to be readily used by visitors who accessed that particular fact sheet. After the search, the corresponding URL for the respective fact sheet was then located on the search results. The page in which the URL was located, or its ranking if located within the top 10 results of the first page, was noted. If the URL could not be located on at least page 10, it was marked "located > (greater than) 10 pages." Post-revision, the same guidelines were followed during the month of August 2013. The results for the pre- and post-revision time frames were then compared for the six fact sheets.

## **Results**

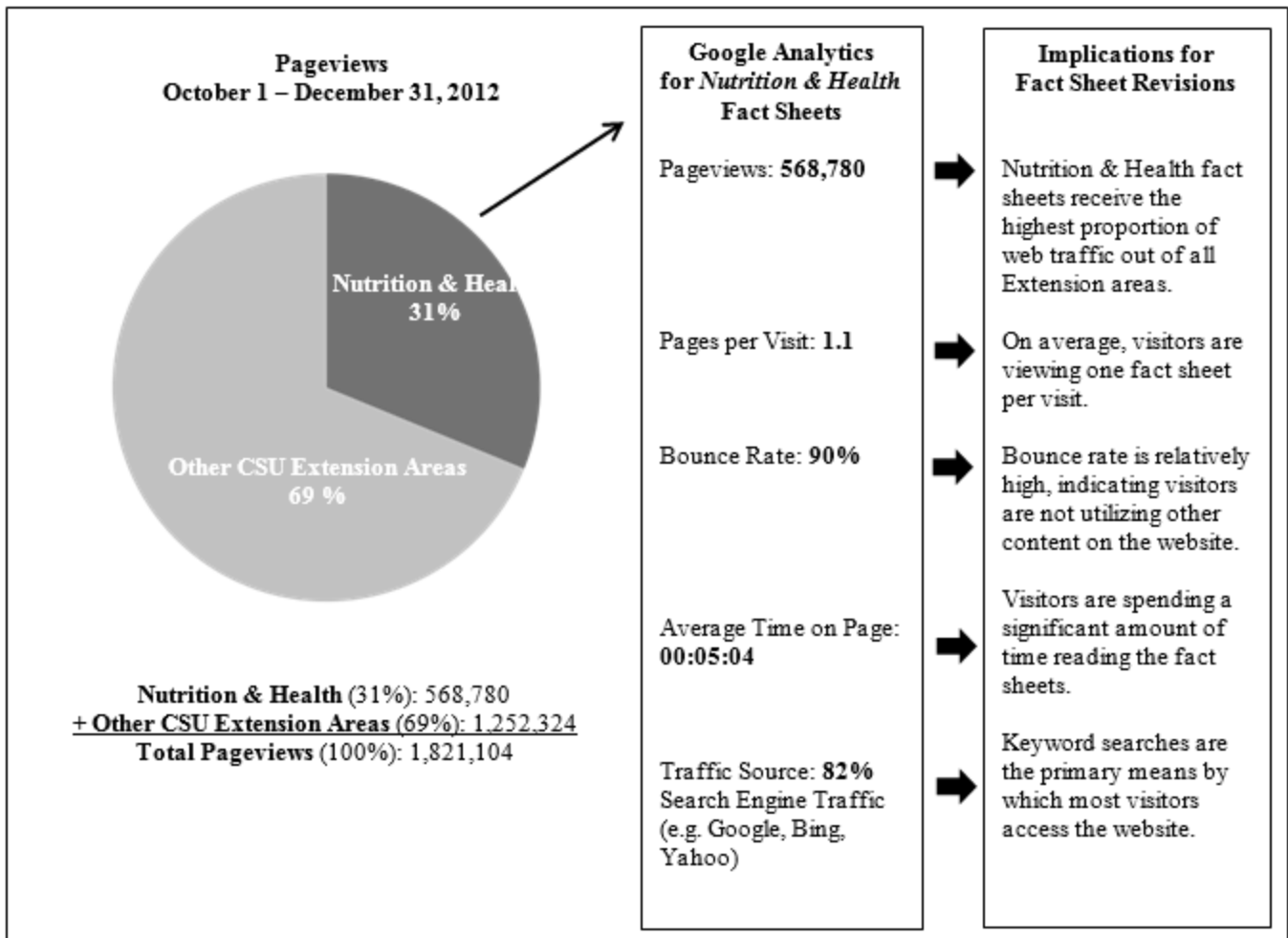
# Review of Current CSU Extension Fact Sheets

Upon review, the 32 *Nutrition and Health* fact sheets were primarily written for general audiences with a reading level ranging between 7th and 12th grade. Overall, consumers (n=22) described the new template as "fresh," "current," and "inviting," and they would be more likely to read it instead of the current template ("old," "outdated," "academic," and "would not read").

Between October-December 2012, nutrition- and health-related fact sheets received the highest proportion of Web traffic (31%) out of all CSU Extension areas. Despite an average page viewing time of 5 minutes, typically only one fact sheet was read per visit, which also correlated with a high bounce rate. The majority of visitors accessed the website via a keyword search through a search engine (Figure 1).

**Figure 1.**

Google Analytics and Implications for Revisions to Nutrition and Health Extension Fact Sheets



## Fact Sheet Revisions and Application of Search Engine Optimization Techniques

Each of the six existing fact sheets were revised our SEO protocol was applied. Table 2 highlights a sample of the major revisions to the *Water-Soluble Vitamins* fact sheet (similar revisions were also made for the five remaining fact sheets). Throughout the standard editing process, the content of each of the six fact sheets was altered to address consumer questions identified using the keywords from the protocol. Additionally, through the use of the SEO protocol, keyword incorporation and content changes were made to the title, headings, subheadings, and body of the fact sheet to better reflect the content. Through the keyword analysis portion of the protocol, additions such as keywords, links, misspellings, and synonyms were also included.

**Table 2.**  
Main Revisions of Water-Soluble Vitamins Fact Sheet

<b>Changes and Additions</b>	<b>Pre-Revision</b>	<b>Post-Revision</b>	<b>Reasoning/Rationale</b>
<b>Title</b>	<i>Water-Soluble Vitamins</i>	<i>Water-Soluble Vitamins: B-Complex and Vitamin C</i>	Incorporation of keywords in title. Title becomes more consumer targeted as well as clear/concise.
<b>B Vitamin Description</b>	B <sub>1</sub> , B <sub>2</sub> , B <sub>6</sub> , B <sub>12</sub>	B <sub>1</sub> , B- <sub>1</sub> , B <sub>2</sub> , B- <sub>2</sub> , etc.	No "B vitamins" were found in Google Analytics keyword search results. This may be due to the use of subscript numbers. All "B vitamins" were revised to be search engine friendly.
<b>Number of Headings/ Subheadings</b>	2/ None	5/ 11	Headings and subheadings allow for incorporation of additional keywords, in addition to being search engine friendly.
<b>Misspellings</b>	None	"Water-Soluable" included in meta data	Misspellings are popular with visitors, and should be identified as keywords that can drive traffic to the web-page. They can be easily hidden within the metadata (hidden keywords in html code).
<b>Number of Keywords</b>	60	310	A higher frequency of keywords acts to increase the ability for search engines to identify content.
<b>Links</b>	None	<i>Fat-Soluble Vitamins: A, D, E, and K</i> Fact Sheet	Links act to increase the ranking of related web material as well as lateral movement, and are consumer friendly, especially when the fact sheet title is used instead of the number.
<b>Synonyms</b>	-None for some keywords. -1-3 for some B-vitamins.	-Listed all popular synonyms for B-vitamins and Vitamin C.	Synonyms were included to cover all possible terms that users may use to search.

<b>Improved Content</b>	Did not address consumer questions.	Addressed consumer questions from keyword lists.	Updated material. Targeted the questions that visitors used to search. Acts to increase the importance of the web-page.
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## Search Engine Optimization Testing

### *Google Analytics Pageviews*

Table 3 shows a comparison of *Pageviews* for each fact sheet, pre-revision and post-revision. For all fact sheets, the number of *Pageviews* increased, ranging from 101% increase for *Diet and Hypertension* to 281% increase for *Cholesterol and Fats*.

**Table 3.**

Pageview Comparisons for *Nutrition and Health* Fact Sheets over a 3-Month Period:  
Pre-Revision, Post-Revision, Percent Change

	<b>Water Soluble Vitamins (9.312)</b>	<b>Fat Soluble Vitamins (9.315)</b>	<b>Nutrition and Cancer (9.313)</b>	<b>Cancer's Effect on the Diet (9.332)</b>	<b>Cholesterol and Fats (9.319)</b>	<b>Diet and Hypertension (9.318)</b>
Pre-Revision Pageviews	42,845	32,637	339	300	2,440	14,798
Post-Revision Pageviews	71,418	54,650	516	516	6,852	14,915
Percent Change	167%	167%	172%	152%	281%	101%

### *Google Search Engine Results Pages*

- Three fact sheets (*Water-Soluble Vitamins*, *Fat-Soluble Vitamins*, and *Diet and Hypertension*) were located first in rank on page one, according to Google SERPs both pre-revision and post-revision. These are three of our more popular fact sheets, as demonstrated by the number of pageviews in Table 3.
- One fact sheet (*Cholesterol and Fats*) was located on page three of Google SERPs pre-revision, while post-revision it was located third in rank on page one.
- Two fact sheets (*Cancer's Effect on the Diet* and *Nutrition and Cancer*) were both located greater



than 10 pages on Google SERPs pre-revision, while post-revision they were located on page three. These are two of our less accessed fact sheets, possibly due to low visibility as demonstrated by low pageviews (Table 3) and low SERP placement.

## Conclusions

A developed protocol involving SEO techniques, notably content alterations using *Keyword Analysis* and *Keyword Placement*, was assessed using six existing *Nutrition & Health* fact sheets. The application of these techniques was successful in increasing the Google SERPs ranking and *Pageviews* for each fact sheet, to varying degrees, thus acting to increase the visibility of the Extension website. The improvement from pre- to post-revision for each fact sheet, in regards to targeted content and keyword inclusion, reflected the utility of incorporating SEO techniques into traditional Extension publications. By increasing SERP rankings, consumers are more likely to choose these fact sheets over other online resources. In addition to increasing visibility of fact sheets, there should also be a focus on enhancing their visual appeal so that materials can compete with private sector materials and thus improve the likelihood of consumers returning to the website.

## Implications for Extension

SEO techniques can be used for various formats of Web-based materials, across all of Extension's diverse disciplines, and should be encouraged in the development of Web-based materials. Key recommendations for SEO inclusion include:

- Placing keywords appropriately in the title, headings, subheadings, and content to provide the visitor a quick way to recognize quality content that is applicable to his/her interests. When the titles are clear and succinct, visitors can better identify the content that is intended to be communicated in the material.
- Including links to other Web-pages on the Extension website enabling more lateral movement, thus increasing the awareness of the other Extension materials available. Ultimately, visitors who find the information useful or important will be more likely to display a back link on their own website, or share the website via social media. These factors act to increase the indexing of the website, thus increasing the ranking on SERPs and the resulting *Pageviews*.

Application of SEO techniques to Extension publications has the potential to increase the visibility of Extension's credible and research-based information, including reaching and appealing to new and/or younger audiences.

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