



## Online health consumer behaviour: What informs user decisions on information quality?



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### ABSTRACT

Around the world, the use of Online Health Information (OHI) is on the increase. This is even more prevalent in developing economies where poor healthcare access and delivery present OHI as a potent alternative to physician consultations. This phenomenon grants the online health information seeker the sole decision-making responsibility of determining the quality of OHI. Given the potential consequences of incorrect medical advice, it is important to understand what criteria constitutes quality OHI from the perspective of users so as to inform better OHI publication and design. Using choice-based conjoint analysis as a preference modelling technique, the results indicate that, in order of importance, OHI seekers view the credibility of the author or their affiliation as a key measure of OHI quality, while the provision of internal search functionality is viewed as a measure of design quality. OHI seekers however showed a less preference for web portals that store and process user data. The OHI quality preferences obtained in the study were used to audit selected OHI portals to ascertain their level of conformity with the observed user preferences.

### 1. Introduction

Around the world, and in many languages, online platforms (websites, social media, chatrooms, etc.) serve enthusiastic number of consumers on various online health information (OHI) needs. Ranging from benign to malignant health issues, consumers search the web for information on symptoms and conditions of ailments, communicate in real-time with health experts, learn to administer drugs, and complete online personal health assessment questionnaires (Finney Rutten et al., 2019; Fox & Duggan, 2013; Zhang et al., 2019). For others, OHI provides a means to feel confident and prepared when meeting physicians, reassure individuals of their health status or resolve otherwise confusing medical conditions (Redston et al., 2018). While OHI generally serves as supplemental information, there is a gradual dependence by consumers due to challenges to healthcare access and delivery in many parts of the world (Tan & Goonawardene, 2017). For instance, in Africa where challenges to health care access result in long queues and general inefficiencies, OHI is increasingly becoming a companion among the literate society (Gathoni, 2012; Hampshire et al., 2015). With relative improvements in internet access and mobile phone penetration on the African continent, online health information seekers are becoming empowered and sophisticated in their health decision making

(Borzekowski et al., 2006; Hampshire et al., 2015; Nwagwu, 2007; Pfeiffer et al., 2014).

As OHI becomes more prevalent and easily accessible, the traditional power and control exercised by medical professionals are gradually waning (Liu & Lei, 2019; Wang et al., 2018). In effect, the norm of soliciting medical information exclusively from health professionals is declining. This could be good and bad. Good in the sense that, access to OHI is democratized and therefore has the tendency to save time and healthcare access costs for OHI seekers. It could also be worryingly bad when the OHI seeker consumes inaccurate or misleading information. Another challenge is that while contents of online health information are generally authored by health organizations, recognized research institutions, medical centers and individual health professionals, a lot more also come from sources that though well intentioned, tend to misinform, mislead and persuade health anxious individuals to purchase health products (Cotten & Gupta, 2004). Note that, in the actual moment of information search, the online health information seeker, whether knowledgeable or not, remains the sole decision maker over what forms credible and reliable OHI on web portals.

To understand how the OHI seeker makes such decisions over what constitutes quality OHI, the study seeks to determine what information quality criteria guide the information seeker when accessing internet

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health information. To do this, an experimental design approach of choice-based conjoint analysis is used to understand the decision processes of OHI seekers towards determining quality of OHI on web portals. The study also reveals the trade-offs information seekers make on information quality when accessing OHI. The study contributes both to theory and practice by (1) helping to understand the choices of OHI seekers regarding the use of online health information on web portals, (2) modelling and validating a choice framework on how OHI seekers make complex decisions on quality OHI, (3) guiding OHI publishers on user preferred quality features which can be incorporated into the design of OHI web portals. The paper is further organized as follows: the next section presents the state of OHI literature. This is followed by the methodology, results, discussion and conclusions of the study.

## 2. State of online health information

Since the advent of the internet, many research works have been produced on various topics relating to online health information. A significant number of these have been dedicated to issues concerning the quality of the OHI. The literature focusing on quality of OHI can broadly be segmented into four groups. The first group addresses OHI 'content', and is often dedicated to specific diseases and disorders. The focus of the first group has been about whether OHI contents adequately serve its intended audiences. For instance, Gokcen and Gumussuyu (2019) studied OHI quality issues for disc herniation videos on YouTube, Alnafea et al. (2017), Arif and Ghezzi (2018) and Basch et al. (2018) respectively studied the quality of OHI contents for oral, breast, and prostate cancers. Others are dengue fever (Rao et al., 2012), concussion (Ahmed et al., 2012), infant feeding (Taki et al., 2015), scoliosis (Staunton et al., 2015), stroke and speech and language difficulty (Surman & Bath, 2013), paediatric urology (Fast et al., 2013), acute low back pain (Hendrick et al., 2012), hydrocele (Nason et al., 2013), microtia and aural atresia (Alamoudi & Hong, 2015), dental implant (Leira-Feijoo et al., 2015) and heart failures (Orlowski et al., 2013). The second category of research on quality OHI has focused on user perception and trust of OHI and its sources. Some of these works addressed for instance, factors that influence user perception of OHI quality on diet-nutrition (Jung et al., 2016), relationship between visual design and user perceptions of OHI website credibility (Sbaffi & Rowley, 2017), and user trust judgments of OHI (Lederman et al., 2014; Rowley et al., 2015). The third category on quality OHI research has looked at evaluation criteria, instruments and methodologies used in assessing quality OHI such as Zhang et al. (2015) where a systematic review of evaluation criteria, instruments and methodologies was conducted and in Oroszlányová et al. (2018) where quality of health web documents was predicted using their characteristics. Quality criteria are mainly characteristics or features that serve as guides to users when accessing health information, while the instruments or methodologies are procedural frameworks used in evaluating the quality of OHI. Prominent studies on quality criteria, instruments and methodologies are the Agency for Health Care Policy and Research (AHCPR) (Ambre et al., 1999), Journal of American Medical Association (JAMA) benchmark (Silberg et al., 1997; Winker et al., 2000), the DISCERN instrument (Charnock et al., 1999) and the Health on the Net Foundation (HONCode) principles (Boyer et al., 1998). The AHCPR criteria-set which this study adopts, proposed seven OHI criteria namely *credibility*, *content*, *design*, *disclosure*, *interactivity*, *links* and *caveat*. Table 1 provides an in-depth explanation of five of the AHCPR criteria and their sub-criteria used in this study. These five criteria were deemed appropriate for this study through an expert elicitation survey. In addition, the five criteria are also supported by the JAMA, the DISCERN and the HONCode though stated differently. For instance, the criterion 'credibility' is also used by the JAMA and the HONCode, but respectively referred to as 'authorship' and 'authoritative'. 'Disclosure' is referred to as 'disclosure' and 'financial disclosure' by the JAMA and the HONCode. The AHCPR's criterion, 'content' together with its description is also supported by the HONCode and the DISCERN instruments, but however

**Table 1**  
Evaluation criteria in OHI quality evaluation.

| Criteria             | Definition  | Literature support   |
|----------------------|---|--|
| <b>Credibility</b>   | This evaluation criterion is decomposed into three sub-criteria to measure the credibility of OHI as a function of quality. The three sub-criteria are the <i>source</i> of the information, its <i>up-to-dateness</i> and <i>relevance</i> . The sub-criteria, <i>source</i> , serves as reasonable grounds to defuse any doubts about the credibility of the information. Key metadata such as the official logo of the institution providing the information, together with author and qualification, source of funding (if any) evoke user trust in the source of the OHI. The sub-criterion, <i>up-to-dateness</i> , checks how current the information or material is and therefore its suitability for use. The sub-criterion, <i>relevance</i> also assists the OHI seeker to determine whether the content exactly relates to the purpose of the web portal. | (Eysenbach et al., 2002; Hu & Shyam Sundar, 2010; Jadad & Gagliardi, 1998; Kim et al., 1999; Ambre et al., 1997; Winker et al., 2000). |
| <b>Content</b>       | <i>Content</i> refers to the actual OHI information published online. Since it is what the information seeker invariably accesses, its form of presentation is very important as far as winning the trust of users. In this paper, two sub-criteria are deemed appropriate under <i>content</i> , namely <i>accuracy</i> and <i>disclaimer</i> . <i>Accuracy</i> seeks for scientific validity of the information provided. Users expect an OHI that is rooted in scientific theory and practice. <i>Disclaimer</i> addresses liability concerns by stating the limitations and scope of the content.   | (Ambre et al., 1997; Kim et al., 1999; Winker et al., 2000)  |
| <b>Design</b>        | The <i>design</i> criterion looks at the layout of the OHI portal, including graphics, text, search functionality, links, etc. Though the <i>design</i> criterion should not directly affect the quality of an OHI, it facilitates the acceptance, delivery and use and therefore is considered important in gauging user preferences of OHI quality. Three sub-criteria namely, <i>accessibility</i> , <i>logical organization (navigability)</i> and <i>internal search engine or functionality</i> within the web portal are considered.   | (Kim et al., 1999; Ambre et al., 1997; Winker et al., 2000) Robins et al., 2010)   |
| <b>Disclosure</b>    | The evaluation criterion <i>disclosure</i> focuses on the intentions or the reasons for the setting up of the OHI web portal. This criterion looks for the presence of a mission statement or the purpose of the OHI web portal. Two sub-criteria are deemed appropriate for measuring disclosure. These are the <i>purpose of the site</i> , and <i>profiling</i> which checks whether users are adequately informed of any collection, use or distribution of users' information collected on the web portal.   | (Kim et al., 1999; Ambre et al., 1997; Winker et al., 2000)  |
| <b>Interactivity</b> |   |  |

(continued on next page)

Table 1 (continued)

| Criteria | Definition  | Literature support   |
|----------|---|--|
|          | This evaluation criterion envisages that the OHI web portal possesses Web 2.0 features especially those that aid interactivity. Three sub-criteria namely, <i>mechanism</i> for feedback, <i>chat rooms</i> and <i>tailoring</i> are presented. The sub-criterion <i>tailoring</i> looks at personalization of OHI content such that a registered user has access to personalized content based on clinical algorithms. | (Winker et al., 2000; Kim et al., 1999; Robins et al., 2010) |

referred to as ‘transparency’ and ‘content’ respectively.

The last category of OHI research dedicated to quality issues have mainly focused on the behaviour of the online health information seeker and the need to understand how they make decisions regarding what constitutes quality of OHI on web portals. This category has primarily looked at the decision-making abilities of the OHI user; how they find, evaluate and use online health information (Lopes & Ribeiro, 2010, 2013; Morahan-Martin, 2004; Peterson et al., 2003; Sillence et al., 2007). This paper falls in this last category but with a different focus. The four closest studies to this paper, Peterson et al. (2003), Morahan-Martin (2004), Ye et al. (2017) and Sillence et al. (2007) though studied how an OHI seeker evaluate online health information, did not address the actual decision processes OHI seekers go through to select quality online health information. For instance, Peterson et al. (2003) studied the behaviour of people when using search engines to obtain health information, Morahan-Martin (2004) studied cross-cultural differences in how OHI is used, Ye et al. (2017) used two case studies to examine consumers’ quality evaluation of online health information through eye-movement patterns on webpages, while Sillence et al. (2007) proposed a staged model of trust development to understand how users search the internet for information and advice. So far, no attempts have been made to understand the choices that inform the decision of the online health information seeker to use OHI and the trade-offs made in the processes of deciding what constitutes quality OHI. We hypothesize that, to fully understand the decision-making processes of OHI seekers, including their motivations, preferences and aversions, it is prudent not to directly ask ‘what’ do you prefer or are averse to, but rather understand the ‘how’ of what informs user choices regarding OHI. There is therefore the need for a theory and a model that allow for deeper understanding of how the online health information seeker makes decisions regarding quality of OHI and on the premise that, the OHI seeker has no control over what is published, the publisher and the technology used in publishing OHI. This study is also different given that it focuses on a developing country context where difficulties to health care access compel especially the literate and semi-literate to consume more online health information. The next sections present the methodology detailing the choice-based conjoint model, the hierarchical Bayes (HB) estimation method for estimating the parameters of the model, the OHI quality criteria gleaned from the literature, survey procedure and the data collected.

### 3. Methodology

This section first presents a brief introduction to Choice-Based Conjoint (CBC) Model, the preference elicitation technique used in the study, and the Hierarchical Bayes (HB) method used in estimating the parameters of the CBC model. The CBC model is then used to elicit preferences of OHI seekers in a developing country. Before applying the CBC model, relevant OHI quality evaluation criteria were first selected from the literature. Following this, an experimental design approach was used to generate various combinations of OHI quality criteria (i.e. choice profiles) whose relative importance are then determined using the CBC

model. This section also gives a brief description of the sampling procedure used for the data collection.

#### 3.1. Choice-based conjoint model

Preference (utility) elicitation is defined as the process of assessing and extracting relevant information in user preferences with a view to achieving optimum decisions (Raghavarao et al., 2010). While several preference elicitation methods exist, conjoint analysis (CA) and the analytical hierarchy process (AHP) are two methods widely used in user preference measurement (Helm et al., 2008). In this study, the Choice-Based Conjoint Analysis method was deemed appropriate for the task of unravelling OHI users’ stated preferences and expectations regarding what constitutes quality OHI on the internet. This is because the CBC technique especially when deployed together with hierarchical Bayes estimation method, performs better at revealing individual respondents’ utilities than AHP (Helm et al., 2008). A Choice-based conjoint (CBC) analysis model also known as discrete choice model is generally used to understand the choices people make, and the reasons behind those choices. More precisely, it is used to ascertain the relative importance consumers ascribe to product attributes and the trade-offs they make in their choices. It is used in many areas including marketing, healthcare, and transportation (Rao, 2014, p. 389). In CBC, a choice is made up of different profiles of attributes that consumers use to maximize their satisfaction (utilities).

Suppose there are  $K$  systematically constructed choice sets, where each choice set is made up of a number of profiles. In CBC modelling, a decision maker (survey participant) is presented with choice tasks (alternative hypothetical scenarios) showing a number of product attributes and their features (sub-level attributes). At each presentation of a choice profile, the individual decision-maker chooses a single option among a finite set of choices that maximizes his utility (satisfaction). The choice profiles are a combination of features of a product’s attributes which are systematically constructed through an experimental design approach (See Appendix A for the choice profiles used in the study). The number of profiles presented to a decision maker at a given scenario is referred to as choice tasks. We assume that the best profile is selected according to the Random Utility Model (RUM) framework where a respondent chooses the best profile according to the one perceived to have the maximum utility. The RUM assumes that the utility of a profile can be decomposed into two parts, where one is a function of some observable covariates and unknown parameters to be estimated, and the other, a random deviate made up of all the unobservable determinants of the utility. Several methods exist for estimating the unknown parameters, and therefore the utilities. This paper employed the Hierarchical Bayes (HB) estimation method, in particular, because of its ability to allow respondents’ utilities to be segmented and thereby detect possible different preferences across different demographic groups. A brief description of the HB estimation method is presented in the next subsection.

##### 3.1.1. Hierarchical Bayes (HB) estimation method

The study used the HB estimation method to estimate the utility parameters of the choice-based conjoint analysis. The HB estimation method was purposively selected because its estimate of the individual-level utility scores (part-worth utility) is robust (Wang & Blei, 2018), and in turn improves general results of choice-based conjoint modelling. Moreover, HB is appropriate for estimating how different one respondent’s utilities are from other respondents. The HB model as adapted from Akinc and Vandebroek (2018), Wang and Blei (2018), Park (2004) and Lenk et al. (1996), is expressed in Equation (1) and Equation (2) below. Let there be  $n$  respondents, then the responses to the profiles presented to a respondent  $i = 1, 2, \dots, n$  can be expressed as:

$$Y_i = X_i\beta_i + \varepsilon_i \quad \text{for } i = 1, \dots, n \quad (1)$$

$$\beta_i = \varnothing z_i + \delta_i \quad \text{for } i = 1, \dots, n \quad (2)$$

In Eq. (1),  $Y_i$  is a vector of  $m_i$  metric responses of respondent  $i$  to the profiles described by a given design matrix  $X_i$ , and  $\beta_i$  is the  $p$ -dimensional vector of regression coefficient or path-worth utility for respondent  $i$ . One can also estimate individual level path-worth utilities using the multivariate regression model of Eq. (2), where  $z_i$  is a  $q$ -dimensional vector of covariates, and  $\varnothing$  is a  $p \times q$  matrix of regression coefficients. The error terms  $\{\varepsilon_i\}$  and  $\{\delta_i\}$  in Eqs. (1) and (2) are assumed to be mutually independent multivariate normal distributions with zero means and covariance matrices  $\{\sigma_i^2 I\}$  and  $\Xi$ , respectively. That is,  $\varepsilon_i$  is  $N_m\{0, \sigma_i^2 I\}$  and  $\delta_i$  is  $N_p\{0, \Xi\}$  where  $I$  is the identity matrix and  $\Xi$  is a  $p \times p$  positive definite matrix.

### 3.2. Preference elicitation of OHI seekers

This section applies the CBC model to elicit the preferences of OHI seekers. To do this, a list of criteria for the evaluation of OHI quality is first gleaned from the literature. This is followed by an explanation of how data was collected, including sampling technique and procedure. The study questionnaire can be seen in [Appendix A](#).

#### 3.2.1. Identification of OHI quality criteria

The literature on online health information (OHI) suggests several key criteria for evaluation. Notable among these are those provided by the AHCPR, the JAMA, the DISCERN and the HONCode. This study uses five of the seven criteria suggested by the AHCPR as presented in [Table 1](#). The five namely *credibility*, *content*, *design*, *disclosure* and *interactivity* were arrived at after a nine-member experts from health technology assessment, medicine, information systems and health infomediary publishers had offered explanations and subsequently ranked the seven AHCPR criteria in order of importance in relation to online health information seeking. Based on expert suggestion, the sixth AHCPR criterion, 'link', was coalesced under the criterion 'design' because its description fitted better under 'design'. Each major OHI evaluation criterion has a set of sub-criteria which define the main criteria. See [Table 1](#) for detailed explanation of the criteria and respective sub-criteria selected for the study.

#### 3.2.2. Experimental design

To present choice profiles in conjoint analysis, experimental design approach is used to generate various combinations of product attributes and levels. While several orthogonal experimental designs exist, the fractional factorial design is used for many reasons including cost, time, and convenience when the experiment involves a large number of factors. As the name suggests, a fractional factorial design uses a fraction of total choice combinations. Fractional factorial designs have been proven to provide enough information for the estimation of optimal utilities that are similar to that from a full factorial but with the advantage of requiring far fewer choice levels ([Montgomery, 2017](#); [Orme, 2006](#); [Rao, 2014](#), p. 389). For instance, in full factorial design, the 5 criteria and their sub-levels used in this study, would result in a combined total of  $(3 \times 2 \times 3 \times 2 \times 3) = 108$  different sets of choice tasks. To avoid burdening survey participants with many choice profiles which may lead to unreliable data, a smaller but optimized set of three choice tasks were drawn from 12 profiles satisfying orthogonality among criterion levels. For each of the 12 profiles, respondents were presented with 3 choice tasks from which one was to be chosen as the preferred OHI quality characteristics. Orthogonality ensures that the effect of a factor can be estimated separately from the effect of any other factor ([Montgomery, 2017](#)). The XLSTAT software (Addinsoft, 2018) was used for both the experimental design and the CBC analysis.

Orthogonality was achieved using the XLSTAT software. The software was used to implement D-optimality, which is the most commonly used metric in design construction ([Johnson et al., 2013](#)).

Simulating actual consumer choice situations, The CBC design also helped to explore the trade-offs OHI seekers make when choosing which OHI evaluation criterion is important to them as far as information quality is concerned.

#### 3.2.3. Sampling procedure and data collection

Two important criteria were used to select the target population. The first was that respondents must be internet users and secondly, have experience using the internet for health information seeking. Web-based survey technique was used to administer the questionnaire to a random sample of graduate and undergraduate students in Ghana. The sample represents a large population of internet users ([Thatcher & Goolam, 2005](#); [Omotayo, 2006](#); [Weil & Rosen, 1995](#)), knowledgeable and who are likely to use digital health products including OHI. E-mail addresses were first obtained from course representatives in the University, out of which 800 students were randomly selected. Students were then notified of their selection, and those who consented to participate were e-mailed the survey. The consented students were first taken through a pre-testing phase to familiarize themselves on how to answer choice-based conjoint analysis questionnaires. Responses obtained from the pre-test had an error rate of 25.23%, which highlighted the need to provide definitions to accompany some of the attributes and sub-attributes, as well as detailed guidelines to some questions for clearer understanding. This significantly reduced the error rate in the actual test to 1.3%, which were all uncompleted responses. In all, 711 students consented to complete the questionnaire. However, of this number, 62 respondents representing 8.72% indicated that they have never used the Internet for online health information seeking. Since this was a basic criterion of the study, 62 of these responses were removed leaving 649. The study sample had 54.08% females to 45.92% males, with graduate students being the most dominant group as shown in [Table 2](#). Majority of the respondents (83.83%) were aged between 18 and 34. This re-enforced the choice of the sample who are frequent internet users and are often sophisticated in their choices ([Omotayo, 2006](#); [Thatcher & Goolam, 2005](#); [Weil & Rosen, 1995](#)).

On the question of whether respondents seek confirmations of medical practitioners' recommendations and prescriptions on OHI web portals, a greater majority representing 69.80% indicated that they have at least once on an online platform, verified recommendations given by their doctors. It was further revealed that the most dominant medical issue searched for by online health information seekers is "causes and symptoms of diseases". On the question of what respondents would do when online medical information turns contrary to what their medical practitioner advised, 38.40% indicated were unsure of what their decision will be, 52.85% indicated will go with their physicians' advice while 8.78% said will go with the recommendation from the web portal.

Majority of the respondents representing 60.09% also indicated that there have been occasions where online health information has been enough to avoid consulting medical practitioners. On whether there has ever been adverse effect as a result of using OHI, a majority (67.18%) indicated having not experienced any adversity. However, 14.48% affirmed having experienced complications due to the use of OHI.

## 4. Results

In conjoint analysis, part-worth utilities are numerical scores that measure how much influence each sub-level criterion contributed to a decision-maker's choice. The part-worth utility and the relative importance (weight) of the OHI quality evaluation criteria derived from the survey data is as shown in [Table 3](#). In practical sense, the results depict respondents' value system regarding quality of OHI. Overall, the result indicates that, online health information seekers view 'credibility' (29.46%) as the most important factor when accessing online health information. This is followed by the 'design' of the OHI portal (20.54%), and the 'content' offered on the OHI platform (18.90%). The relative importance of 'interactivity' and 'disclosure' were respectively (17.79%)

**Table 2**  
Demographic profile of study participants.

| Profile of respondents (N = 649)  | Percentage (%) |
|---|----------------|
| Gender  |                |
| Male  | 45.92          |
| Female  | 54.08          |
| Age (yrs.)  |                |
| 18-24   | 32.83          |
| 25-34   | 51.00          |
| 35-44   | 11.86          |
| 45-54   | 3.85           |
| 55 and over   | 0.46           |
| Student-level   |                |
| Undergraduate   | 34.67          |
| Graduate  | 65.33          |
| Have you ever done a (further) check on the internet regarding what your medical practitioner told you?                     |                |
| Yes   | 69.80          |
| No  | 30.20          |
| Which of the following health issues do you mostly search online? (select only one (the most searched))                     |                |
| Communicate with health expert online?  | 5.40           |
| Search for causes and symptoms of a disease   | 89.82          |
| Fill health related questionnaire to ascertain state of illness   | 4.78           |
| What do you do when an online medical information turns contrary to what your medical practitioner advised?                 |                |
| Not sure (undecided)  | 38.40          |
| Go with my physician's advice   | 52.85          |
| Go with online information recommendation   | 8.78           |
| Has an online health information ever been enough to avoid seeing a medical doctor?   |                |
| Yes   | 60.09          |
| No  | 39.91          |
| Has there ever been an adverse effect resulting from a health information you acted upon from the internet?                 |                |
| Yes   | 14.48          |
| No  | 67.18          |
| Do not remember   | 18.34          |
| Which of the following would you assign as the most important reason for using online health information? (Select only one) |                |
| Discomfort in long waiting times to see a doctor  | 90.75          |
| To confirm doctor's recommendations   | 6.47           |
| To understand the experiences of other patients   | 1.70           |
| To save money on consultation fees at the hospital  | 0.46           |
| To diagnose recurring symptoms  | 0.62           |

and (13.31%). The part-worth utilities reveal the most preferred sub-criterion under each main criterion. The utility values with asterisks in column 3 of Table 3 indicate that the sub-criterion is the most preferred. Note that, a high positive part-worth utility value of a sub-criterion indicates a relatively high preference among the sub-criteria under a given main criterion. On the other hand, a negative part-worth utility indicates a less preference for the OHI evaluation sub-criterion. For instance, under the OHI evaluation criterion, 'credibility', study participants indicated their preference for source (authority) over up-to-dateness and relevance. This means that specific to the criterion credibility, respondents preferred

**Table 3**  
Part-worth utilities and relative importance of criterion and sub-levels. The utility values with asterisk in column 3 signify the most preferred sub-criteria.

| Criteria                       | Sub-criterion   | Part-worth utilities | Standard Error | Relative importance (Weight %) |
|--------------------------------|---|----------------------|----------------|--------------------------------|
| A <sub>1</sub> : Credibility   | A <sub>11</sub> : Source (Authority)                  | 0.219*               | 0.2709         | 29.46                          |
|                                | A <sub>12</sub> : Up-to-dateness                      | -0.426               | 0.1315         |                                |
|                                | A <sub>13</sub> : Relevance                           | 0.207                | 0.3350         |                                |
| A <sub>2</sub> : Content       | A <sub>21</sub> : Accuracy                            | 0.282*               | 0.1260         | 18.90                          |
|                                | A <sub>22</sub> : Disclaimer                          | -0.282               | 0.2260         |                                |
| A <sub>3</sub> : Design        | A <sub>31</sub> : Accessibility                       | 0.003                | 0.1113         | 20.54                          |
|                                | A <sub>32</sub> : Logical Organization (Navigability) | -0.086               | 0.1261         |                                |
|                                | A <sub>33</sub> : Search box or search field          | 0.083*               | 0.2387         |                                |
| A <sub>4</sub> : Disclosure    | A <sub>41</sub> : Purpose of the Site                 | -0.119               | 0.2238         | 13.31                          |
|                                | A <sub>42</sub> : Profiling                           | 0.119*               | 0.1294         |                                |
| A <sub>5</sub> : Interactivity | A <sub>51</sub> : Mechanism for Feedback              | 0.019*               | 0.2980         | 17.79                          |
|                                | A <sub>52</sub> : Chat Rooms                          | -0.032               | 0.3203         |                                |
|                                | A <sub>53</sub> : Tailoring                           | 0.013                | 0.2541         |                                |

OHI sources that provide author information or are affiliated to a credible organization, over how current or relevant the information is.

Likewise, in respect of the criterion content, respondents preferred provision of scientific accuracy of the OHI information over OHI sources that issue disclaimers. Note that, just because disclaimer received a negative utility value does not mean that this level was unattractive altogether. Disclaimer may have appealed to some respondents, however, compared to accuracy, it fared relatively worse. The various preferred OHI quality criterion levels are combined to give a picture of the ideal OHI quality characteristics preferred by online health information seekers.

It can be inferred in view of the analysis that, OHI seekers' ideal quality characteristic profile of OHI web portals are those that provide 'source' or author information (A<sub>11</sub>), have a 'search functionality' feature to enable easy search of information (A<sub>33</sub>), with highly 'accurate' contents (A<sub>21</sub>), provide 'feedback' to users (A<sub>51</sub>) and those that inform and seek users permission (opt-in-opt-out policy) to collect and process information (A<sub>42</sub>). It must be noted that this OHI quality characteristic profile set is arrived at after respondents have traded-off several sub-level characteristics to settle on this 'ideal' profile.

The Hierarchical Bayes (HB) estimation method helped to reveal how the demographics of respondents influenced the utility scores. In Table 4, it is instructive to note that though in aggregate terms the three most important OHI evaluation criteria users look for when accessing online health information are 'credibility', 'design' and 'content', males averagely preferred these criteria more, relative to females. Females on the other hand, preferred the criteria 'interactivity' and 'disclosure' slightly more than males. In the age category, though 18–24 and 25–34 were the dominant groups in the study, the most important OHI criterion, credibility of OHI was consistently more preferred by older adults (45–54 and 55 years and over). Similarly, respondents aged 55 and over preferred the criterion 'disclosure' more than the other age categories.

Unsurprisingly, relatively younger respondents (18–24 years) opted for the more aesthetic and appealing criteria, 'design' and 'interactivity'. Further in Table 4, it is observed that, those who indicated that OHI sometimes serve as substitute to consulting medical practitioners, preferred 'credibility', and 'disclosure' as quality OHI criteria to have on web portals. On the other hand, those who indicated that OHI were not substitutes to medical practitioners, relatively favoured the criteria 'content' and 'interactivity'. Similarly, for participants who indicated having experienced adverse effects as a result of using OHI, the criteria 'content' and 'credibility' were more important to them. We also note that those who indicated that a further check is carried to confirm their medical practitioner's recommendations, viewed 'content' more favourably as a quality OHI criterion than the other criteria. In the following sections, the results are discussed under three separate themes; choices and motivations, consumer sophistication, and aversion. To analyse consistency in the results, the discussion section combined Tables 2–4.

**Table 4**  
Relative importance of OHI evaluation criterion across demographic groups.

| Profile of respondents  | Credibility | Content | Design (%) | Disclosure | Interactivity |
|---|-------------|---------|------------|------------|---------------|
| Gender  |             |         |            |            |               |
| Male  | 29.47       | 19.33   | 21.16      | 13.14      | 16.92         |
| Female  | 29.45       | 18.56   | 20.02      | 13.46      | 18.48         |
| Age (yrs.)  |             |         |            |            |               |
| 18-24   | 29.13       | 17.49   | 21.51      | 13.60      | 18.30         |
| 25-34   | 29.92       | 20.24   | 19.15      | 13.16      | 17.52         |
| 35-44   | 28.71       | 29.64   | 20.85      | 11.97      | 16.84         |
| 45-54   | 31.06       | 18.97   | 18.92      | 14.71      | 16.34         |
| 55 and over   | 39.40       | 10.58   | 18.22      | 16.30      | 15.52         |
| Has an online health information ever been enough to avoid seeing a medical doctor?                         |             |         |            |            |               |
| Yes   | 29.84       | 18.68   | 20.73      | 13.02      | 17.73         |
| No  | 29.12       | 19.26   | 20.26      | 12.70      | 17.81         |
| Has there ever been an adverse effect resulting from a health information you acted upon from the internet? |             |         |            |            |               |
| Yes   | 29.03       | 19.52   | 23.23      | 13.38      | 16.92         |
| No  | 28.84       | 17.44   | 22.22      | 13.94      | 17.56         |
| Do not remember   | 32.10       | 17.86   | 19.86      | 10.99      | 19.18         |
| Have you ever done a (further) check on the internet regarding what your medical practitioner told you?     |             |         |            |            |               |
| Yes   | 29.41       | 19.14   | 20.46      | 13.34      | 17.65         |
| No  | 29.60       | 18.81   | 20.74      | 12.50      | 18.03         |

**5. Discussion**

This section combines Tables 3 and 4 to glean consistencies especially of the general answers given by respondents in Table 2 and the choices they made in the OHI quality criteria as presented in Tables 3 and 4. We also present audit findings of four (4) OHI portals in Ghana to ascertain whether their current OHI features conform to the stated preferences of respondents. That is, are users' quality OHI preferences (features) being provided by OHI portals in Ghana?

**5.1. Choices and motivations**

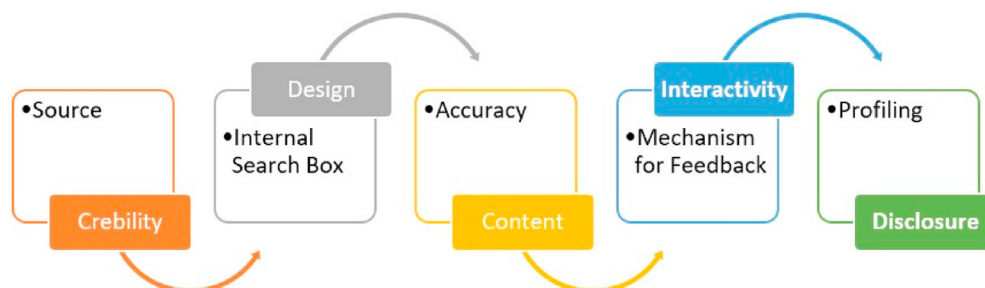
One of the goals of the study was to model a framework that captures how OHI seekers make complex decisions about what they consider the most important as far as quality of online health information is concerned. The choice-based conjoint analysis approach helped to reveal choices as shown in Table 3, while Table 2 revealed motivations for the use of OHI by study participants. In Table 2, it is noted that, majority ascribed 'discomfort in long waiting time' as the reason for their continued use of OHI. This assertion is given credence by the fact that, doctor to patient ratio in Ghana, as of 2018, hovers around 1:8000, though the world health organization prescribes, in the most, a 1:1000 ratio (Adua, Frimpong, Li, & Wang, 2017; Ghana Health Service, 2018). Such a situation coupled with other enabling factors such as growing internet and mobile device penetration rates naturally compels people to seek health solutions online. The motivations for OHI use also reflect the choice of quality criteria deemed important when accessing OHI.

In Fig. 1, respondents' preference framework for determining quality

OHI on web portals is shown. It depicts from left to right, respondents' view of the most important OHI quality criterion and its preferred sub-criterion. It can be seen that 'source' influences the credibility of OHI (such as the authority of the author, qualification and official logo of the institution they represent) while 'search functionality' influences design quality of an OHI web portal. In that order, 'accuracy' is the most important determinant of OHI content quality, 'feedback' influences OHI interactivity as a measure of quality and finally, 'profiling' is the most important determinant of OHI disclosure as a quality criteria. The results are reflective of the choices of the dominant age of the sample population. The study results are affirmed by Sun, Zhang, Gwizdka, & Trace (2019), Wu & Li (2016) and Flanagan & Metzger (2007). In Sun et al. (2019) review paper, 25 criteria and 165 indicators were identified in the literature as health information seeking criteria among consumers. However, the most widely criteria used by information seekers were trustworthiness, expertise, and objectivity which respectively relate to the credibility of the source, the accuracy of the content, and the design of the OHI. The study on the elderly's use of OHI in China by (Wu & Li, 2016) also indicated that among other factors such as education, Internet search proficiency and familiarity with the Internet, credibility of online health information was a significant factor in the elderly's decision to use online health information. The study results by Flanagan & Matzger (2007) however indicated that credibility of online information is influenced by design features, depth of content, site complexity.

**5.2. Consumer sophistication**

Varied instances of consumer behaviour are exhibited in this study. From the result in Table 2, two of the most persistent reasons why people continue to use online health information were (1) discomfort in long waiting lines at health centers and (2) confirming doctor's recommendation as accurate or otherwise, which are collaborated by Caiata-Zufferey, Abraham, Sommerhalder, & Schulz (2010) and Bell, Hu, Orange, & Kravitz (2011). While the first reason affirms a common spectacle in developing economies such as Ghana, the second reveals a growing sophistication in online consumer health choices. Another trait of health consumer sophistication is depicted in the fact that, in spite of the abundance of OHI on one hand and the discomfort of long waiting queues on another, majority of respondents did not consider OHI as complete substitute to consulting a medical practitioner. Further, majority of respondents indicated that should an online health information turn contrary to what their medical practitioner advised, they will trust recommendations given by practitioners, while a significant number were unsure of what their decision will be. This demonstrates that the online health consumer despite challenges with health care access and delivery, showed a quality of having an understanding of OHI issues as depicted in their decision-making. The trust in physicians despite growing use of OHI is affirmed by Dutta-Bergman (2003) and but resort to OHI only when trust in the physician is low (Bell et al., 2011). These conclusions are consistent with the preference modelling results in Table 3, where 'credibility' was considered the most important OHI quality criteria. This is to say that, in spite of the growing desire to use



**Fig. 1.** Ideal OHI quality characteristic profile.

OHI, respondents nonetheless preferred OHI web portals that in the least demonstrate credibility through author trustworthiness, relevance and up-to-dateness of the content provided. That is, there is a cautious enthusiasm among respondents regarding OHI use. The result also demonstrates that even though OHI is not complete substitute for medical doctors, people are gradually becoming empowered in their health decisions to the extent of looking for second opinions on physicians' recommendations. Further, majority of the respondents also indicated that there have been occasions where online health information became enough to avoid consulting physicians. These affirm studies by [Borzekowski et al. \(2006\)](#), [Nwagwu \(2007\)](#), [Pfeiffer et al. \(2014\)](#) and [Hampshire et al. \(2015\)](#) who studied different behaviours in online health choices among Africans and found that participants showed great interest in OHI and indicated that OHI has been reliable and very useful.

### 5.3. Least preferred OHI quality criteria

Beyond the motivation to use OHI and the apparent sophistication in user choices, the results in [Table 2](#) also showed that respondents showed less preference for certain aspects of OHI use. For instance, significant majority of the respondents indicated that the most regularly searched health issues were "causes and symptoms" of diseases. The other two options in the same question enquired whether OHI seekers use the internet to communicate with experts online, or complete health questionnaires, to which a few (10.18%) indicated using. This can be interpreted to mean that, most participants showed less preference for online health activity that store and process user data. It must be noted that most OHI sites capture, process and even share user data with advertising and third parties ([Reis et al., 2013](#)). In view of this, most study participants showed less preference for OHI sites that collect personally identifiable information. In the order of importance, most respondents least preferred the criterion, 'disclosure' and 'interactivity'. Note that, even though the criterion, 'disclosure' is to prompt OHI users of web portals that collect user data, participants just did not like OHI sources that collect user data at all. As shown in [Table 3](#), most participants also showed less preference for OHI portals that offer a means of interactivity such as chatrooms and questionnaires. This is consistent with the aversion on 'disclosure' since a means of OHI interactivity often lead to user data collection and processing.

### 5.4. Audit of OHI platforms

This section sought to match respondents' stated preferences to OHI features on some health web portals in Ghana. The goal was to find out whether respondents' ideal OHI features (see [Fig. 1](#)) were currently being provided by OHI platforms in Ghana. The OHI quality criteria audit was carried out from 2nd March to 3rd October 2018 on two publicly and two privately run OHI portals. [Table 5](#) presents the results of the audit where

**Table 5**  
Audit of 4 portals against the OHI quality criteria.

|  | Credibility |   | Content    |   | Design              |   | Disclosure      |   | Interactivity          |   |
|--|-------------|---|------------|---|---------------------|---|-----------------|---|------------------------|---|
| Ghana Health Nest<br><a href="http://ghanahealthnest.com/">http://ghanahealthnest.com/</a>                       | Source      | ✓ | Accuracy   | ✓ | Accessibility       | ✓ | Purpose of site | ✓ | Chatrooms              | × |
|  | Relevance   | × | Disclaimer | ✓ | Navigability        | ✓ | Profiling       | ✓ | Tailoring              | × |
|  | Up-to-date  | ✓ |            |   | Internal Search box | ✓ |                 |   | Mechanism for feedback | ✓ |
|  |             |   |            |   |                     |   |                 |   |                        |   |
| Ghana Health Service<br><a href="http://www.ghanahealthservice.org/">http://www.ghanahealthservice.org/</a>      | Source      | × | Accuracy   | ✓ | Accessibility       | ✓ | Purpose of site | × | Chatrooms              | × |
|  | Relevance   | × | Disclaimer | × | Navigability        | ✓ | Profiling       | × | Tailoring              | × |
|  | Up-to-date  | × |            |   | Internal Search box | × |                 |   | Mechanism for feedback | × |
| Ghana Health Online<br><a href="http://ghhealthonline.com/healthnews/">http://ghhealthonline.com/healthnews/</a> | Source      | ✓ | Accuracy   | ✓ | Accessibility       | ✓ | Purpose of site | ✓ | Chatrooms              | × |
|  | Relevance   | ✓ | Disclaimer | ✓ | Navigability        | ✓ | Profiling       | ✓ | Tailoring              | × |
|  | Up-to-date  | ✓ |            |   | Internal Search box | ✓ |                 |   | Mechanism for feedback | ✓ |
| Ghana Medical Association<br><a href="http://ghanamedassoc.org/">http://ghanamedassoc.org/</a>                   | Source      | ✓ | Accuracy   | ✓ | Accessibility       | ✓ | Purpose of site | ✓ | Chatrooms              | × |
|  | Relevance   | ✓ | Disclaimer | × | Navigability        | ✓ | Profiling       | × | Tailoring              | × |
|  | Up-to-date  | ✓ |            |   | Internal Search box | ✓ |                 |   | Mechanism for feedback | ✓ |

the symbols (✓) and (×) respectively represent the availability of the OHI feature or otherwise. The findings generally present a positive outlook for OHI platforms as far as the criteria and sub-criteria used in the study are concerned. However, specific to the ideal OHI characteristic profile preferred by respondents, there were some key discrepancies among the four platforms. For instance, while the two privately owned OHI portals provided all of the preferred OHI characteristic profile, the publicly owned ones had some key features missing on their web portals. The Ghana health service, as far as respondents' preferred OHI quality features were concerned, had only one feature out of five present on its web portal, as of the time of this research. The Ghana Medical Association, the other publicly owned web portal, had four out of five features available, missing out on only 'profiling'. It is interesting to note that, none of the four web portals currently provides chatroom and tailoring features. This means that, as of the time of the audit, none of the portals was providing a means for registered users to access personalized OHI content or interact in real time with so-called health experts. Note that, coincidentally, the omissions of 'chatrooms' and 'tailoring' reflect the aversions participants expressed in the study.

## 6. Conclusion

The quality of online information has been called into question by many researchers who believe that the content is often susceptible to abuses ([Eysenbach & Jadad, 2001](#); [Purcell et al., 2002](#)). Unlike information obtained from traditional media such as books, newspapers, radio and television, which often comes with disclaimers, author information, year of publication, the publisher and the target audience, online information is often published without these metadata, and therefore are highly susceptible to alteration. Given the above challenges, the sensitive nature of health information in general, and the growing trend of OHI portals, the study sets out to understand how the online health information seeker makes decisions on what constitutes quality information. We find that, in searching for OHI, the user looks out for author credentials or their affiliation to determine the credibility of the OHI portal. To assess design quality, the OHI seeker's closest inclination is to look out for an internal search functionality. Similarly, accuracy is the most important consideration for determining the quality of OHI content published on a web portal. In addition, the OHI user will prefer the provision of feedback as a measure of quality interactivity offered on an OHI web portal. Lastly, information seekers' view of quality OHI web portal, is also one that gives prior notice to users on collection, use, or distribution of users' data on web portals.

While [Fig. 1](#) provides the ideal OHI quality characteristic profile that guides OHI seekers when accessing OHI, trade-offs were made in the decision-making process. This means that, should an OHI web portal for some reason not be in a position to provide all of the features in the quality characteristic profile, users expect in the least that author

credentials or the affiliation are provided. This is a must have quality criteria to the OHI seeker not to be compromised. Similarly, where the web portal can only provide two OHI quality criteria, users expect an internal search functionality to be added to the provision of author information and in this order for all of the features. The results can also be inferred for varied consumer behaviour of sophistication, motivation and aversions regarding the use of OHI. Finally, the choices as expressed by the study participants were used as criteria to audit four OHI portals in Ghana, to ascertain whether OHI features considered as relatively important by study participants, were being provided by these portals.

The study also shows a growing sophistication in the behaviour of the online health information seeker especially in a developing economy. Though some progress has been made in reducing patient-to- doctor ratios in Ghana, the emergence of several technology affordances such as search engines, artificial intelligence, machine learning and general digital healthcare empower the online consumer to be independent or knowledgeable to an extent of asking relevant informed questions from medical professionals. The danger, however, is how the online health consumer, when not aided by health professionals, make decisions that are not injurious to their health and well-being. Understanding the choices, motivations, sophistication and aversions of the OHI seeker should help bring to the attention of health stakeholders, the complexity surrounding user decisions of quality online health information.

Taking this into consideration, the average user would need to be supported with accurate information in the decision processes. Additionally, the results should also inform OHI authors, portal developers and institutions to tailor their content to suit stated preferences of OHI

seekers. For instance, the audit suggests that publicly owned OHI web portals in Ghana need to improve significantly in their provision of OHI. Stakeholders in the E-health sector in Ghana must also do more background checks on individuals and organizations behind OHI portals to ensure a high level of accuracy and reliability of the content produced. In general, the findings should serve as foundational knowledge for researchers to begin simulating how the digital health consumer responds to the varied digital products on offer today, especially those that are used outside the supervision of trained medical professionals.

#### Declaration of competing interest

The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript.

The following authors have affiliations with organizations with direct or indirect financial interest in the subject matter discussed in the manuscript:

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#### Appendix A. Survey questionnaire. The survey questions were largely drawn based on insights from the studies in Fox and Fallows (2003); Silver (2015), and Chu et al. (2019)

This questionnaire has been designed to carry out a research on the above topic for academic purposes. All information provided will be used solely and exclusively for academic purposes and would be treated with the necessary confidentiality it deserves. Information provided would be used to make sound empirical analysis in order to come out with suitable recommendations that would help improve online health information access in developing countries.

#### Section A

Bio-data [select only one unless otherwise indicated].

1. Gender \*
  - Female
  - Male
2. Age
  - 18-24
  - 25-34
  - 35- 44
  - 45- 54
  - 55+
3. Student-level
  - Undergraduate
  - Graduate
4. How often do you use the internet?
  - Daily
  - A few times in a week
  - A few times in a month
  - Never use it
5. Do you use the internet to seek for health information?
  - Yes
  - No
6. Which of the following health issues do you mostly search online? (select only one (the most searched))
  - Search for causes and symptoms of a disease
  - Communicate with health expert online
  - Fill health related questionnaire to ascertain state of illness

7. Have you ever done a (further) check on the internet regarding what your medical practitioner told you?
  - Yes
  - No
8. What do you do when some online medical information turns contrary to what your medical practitioner advised?
  - Not sure (undecided)
  - Go with my physicians' advice
  - Go with online recommendation
9. Has online health information ever been enough to avoid seeing a medical doctor?
  - Yes
  - No
10. Has there ever been an adverse effect resulting from some health information you acted upon from the internet?
  - Yes
  - No
  - Do not remember
11. Which of the following would you assign as the most important reason for using online health information? (Select only one)
  - Discomfort in long waiting times to see a doctor
  - To confirm doctor's recommendations
  - To understand the experiences of other patients
  - To save money in consultation fee at the hospital
  - To diagnose recurring symptoms

*Section B*

*Preferences of Online Health Information Quality*

In this section, you will be shown three (3) combinations of perceived online health information quality criteria. In each instance, indicate by ticking (✓), which characteristics (choice) would be your best choice when accessing online health information from the internet.

12. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2      | Choice 3               |
|----------------------|------------------------|---------------|------------------------|
| <b>Credibility</b>   | Source                 | Up-to-date    | Relevance              |
| <b>Content</b>       | Accuracy               | Accuracy      | Disclaimer             |
| <b>Design</b>        | Internal search engine | Accessibility | Accessibility          |
| <b>Disclosure</b>    | Purpose of site        | Profiling     | Profiling              |
| <b>Interactivity</b> | Chat rooms             | Tailoring     | Mechanism for feedback |

13. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1                               | Choice 2               | Choice 3               |
|----------------------|--|------------------------|------------------------|
| <b>Credibility</b>   | Source                                 | Up-to-date             | Relevance              |
| <b>Content</b>       | Disclaimer                             | Accuracy               | Accuracy               |
| <b>Design</b>        | Logical organization<br>(Navigability) | Internal search engine | Internal search engine |
| <b>Disclosure</b>    | Profiling                              | Profiling              | Purpose of site        |
| <b>Interactivity</b> | Chat rooms                             | Chat rooms             | Tailoring              |

14. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2                               | Choice 3        |
|----------------------|------------------------|--|-----------------|
| <b>Credibility</b>   | Source                 | Up-to-date                             | Relevance       |
| <b>Content</b>       | Accuracy               | Disclaimer                             | Disclaimer      |
| <b>Design</b>        | Accessibility          | Logical organization<br>(Navigability) | Accessibility   |
| <b>Disclosure</b>    | Purpose of site        | Purpose of site                        | Purpose of site |
| <b>Interactivity</b> | Mechanism for feedback | Tailoring                              | Chat rooms      |

15. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1                               | Choice 2               | Choice 3               |
|----------------------|--|------------------------|------------------------|
| <b>Credibility</b>   | Relevance                              | Up-to-date             | Source                 |
| <b>Content</b>       | Accuracy                               | Disclaimer             | Disclaimer             |
| <b>Design</b>        | Logical organization<br>(Navigability) | Internal search engine | Internal search engine |
| <b>Disclosure</b>    | Profiling                              | Purpose of site        | Profiling              |
| <b>Interactivity</b> | Mechanism for feedback                 | Mechanism for feedback | Tailoring              |

16. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2               | Choice 3      |
|----------------------|------------------------|------------------------|---------------|
| <b>Credibility</b>   | Relevance              | Source                 | Source        |
| <b>Content</b>       | Disclaimer             | Accuracy               | Accuracy      |
| <b>Design</b>        | Accessibility          | Accessibility          | Accessibility |
| <b>Disclosure</b>    | Profiling              | Purpose of site        | Profiling     |
| <b>Interactivity</b> | Mechanism for feedback | Mechanism for feedback | Tailoring     |

17. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2               | Choice 3      |
|----------------------|------------------------|------------------------|---------------|
| <b>Credibility</b>   | Relevance              | Source                 | Source        |
| <b>Content</b>       | Disclaimer             | Accuracy               | Accuracy      |
| <b>Design</b>        | Accessibility          | Accessibility          | Accessibility |
| <b>Disclosure</b>    | Profiling              | Purpose of site        | Profiling     |
| <b>Interactivity</b> | Mechanism for feedback | Mechanism for feedback | Tailoring     |

18. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2                               | Choice 3               |
|----------------------|------------------------|--|------------------------|
| <b>Credibility</b>   | Relevance              | Relevance                              | Up-to-date             |
| <b>Content</b>       | Accuracy               | Accuracy                               | Accuracy               |
| <b>Design</b>        | Internal search engine | Logical organization<br>(Navigability) | Internal search engine |
| <b>Disclosure</b>    | Purpose of site        | Profiling                              | Profiling              |
| <b>Interactivity</b> | Tailoring              | Mechanism for feedback                 | Chat rooms             |

19. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1        | Choice 2               | Choice 3                               |
|----------------------|-----------------|------------------------|--|
| <b>Credibility</b>   | Relevance       | Source                 | Up-to-date                             |
| <b>Content</b>       | Disclaimer      | Accuracy               | Disclaimer                             |
| <b>Design</b>        | Accessibility   | Internal search engine | Logical organization<br>(Navigability) |
| <b>Disclosure</b>    | Purpose of site | Profiling              | Profiling                              |
| <b>Interactivity</b> | Chat rooms      | Chat rooms             | Tailoring                              |

20. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2                               | Choice 3               |
|----------------------|------------------------|--|------------------------|
| <b>Credibility</b>   | Source                 | Source                                 | Up-to-date             |
| <b>Content</b>       | Disclaimer             | Disclaimer                             | Disclaimer             |
| <b>Design</b>        | Internal search engine | Logical organization<br>(Navigability) | Internal search engine |
| <b>Disclosure</b>    | Profiling              | Profiling                              | Purpose of site        |
| <b>Interactivity</b> | Tailoring              | Chat rooms                             | Mechanism for feedback |

21. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1      | Choice 2        | Choice 3               |
|----------------------|---------------|-----------------|------------------------|
| <b>Credibility</b>   | Up-to-date    | Relevance       | Source                 |
| <b>Content</b>       | Accuracy      | Disclaimer      | Accuracy               |
| <b>Design</b>        | Accessibility | Accessibility   | Accessibility          |
| <b>Disclosure</b>    | Profiling     | Purpose of site | Purpose of site        |
| <b>Interactivity</b> | Tailoring     | Chat rooms      | Mechanism for feedback |

22. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2               | Choice 3                            |
|----------------------|------------------------|------------------------|-------------------------------------|
| <b>Credibility</b>   | Up-to-date             | Source                 | Relevance                           |
| <b>Content</b>       | Accuracy               | Disclaimer             | Accuracy                            |
| <b>Design</b>        | Internal search engine | Internal search engine | Logical organization (Navigability) |
| <b>Disclosure</b>    | Profiling              | Profiling              | Profiling                           |
| <b>Interactivity</b> | Chat rooms             | Tailoring              | Mechanism for feedback              |

23. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1                            | Choice 2               | Choice 3               |
|----------------------|-------------------------------------|------------------------|------------------------|
| <b>Credibility</b>   | Up-to-date                          | Relevance              | Source                 |
| <b>Content</b>       | Disclaimer                          | Disclaimer             | Accuracy               |
| <b>Design</b>        | Logical organization (Navigability) | Accessibility          | Internal search engine |
| <b>Disclosure</b>    | Purpose of site                     | Profiling              | Purpose of site        |
| <b>Interactivity</b> | Tailoring                           | Mechanism for feedback | Chat rooms             |

24. When accessing health information from the internet, which of these features would inform your best choice?

|                      | Choice 1               | Choice 2               | Choice 3                            |
|----------------------|------------------------|------------------------|-------------------------------------|
| <b>Credibility</b>   | Up-to-date             | Relevance              | Source                              |
| <b>Content</b>       | Disclaimer             | Accuracy               | Disclaimer                          |
| <b>Design</b>        | Internal search engine | Internal search engine | Logical organization (Navigability) |
| <b>Disclosure</b>    | Purpose of site        | Purpose of site        | Profiling                           |
| <b>Interactivity</b> | Mechanism for feedback | Tailoring              | Chat rooms                          |

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