Systematic Literature Review Protocol

A review of global food price elasticities

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A review of global food price elasticities: systematic review protocol

1. Research Question

Systematically to review the impact of changing food prices on the demand for food worldwide.

2. Background

As the price of a particular food changes in a given market, the demand for this food among consumers is also likely to change. However, the degree of change in demand is likely to depend on factors such as the setting (and local market) and the type of food. The responsiveness of food demand to price changes can be estimated as an elasticity – a coefficient which indicates the magnitude and direction of the relationship between price and demand, and which can therefore be compared between different foods or between different settings. Estimation of price elasticities is useful because it can assist in modelling the effect that changes in food price (either due to policy changes or to food price shocks) would have on diets and consequently on nutrition and health.

In the economics literature, studies have used various types of demand systems to explore food price elasticities on the basis of choices consumers make between food and other expenditures, and between expenditures on different types of food. Demand systems modelling was developed in the 1950s by economists and statisticians interested in the laws that govern markets and in modelling consumer preferences in these markets [1]. In its basic form, this type of modelling involves fitting variations on regression models to household or aggregate consumption data (either cross-sectional or time-series) and incorporating assumptions of consumer demand based on psychological theories of utility maximization. However, over time these models have become more complex, and are generally now based on the Almost Ideal Demand System (AIDS) model developed by Deaton and Muellbauer [2].

A previous review published in 2010 investigated the impact of food prices on demand for food in the United States using the results of studies that had estimated food price elasticities using various types of demand systems models [3]. The results of this review showed that the relationship between food prices and food demand in general was relatively inelastic (i.e. demand changed little in relation to changing prices), but some foods such as food consumed away from home as well as soft drinks, juice and meat showed higher price elasticities (i.e. demand reduced relatively more following an increase in the price) than more staple foods such as cheese, eggs and fats or oils. However, the review was restricted only to studies from the United States, and little evidence was available on whether elasticities were different between income groups or what other foods might be substituted for those that increased in price (known as cross-price elasticities).

An international comparison of food price elasticities has also previously been undertaken by the United States Department of Agriculture using data from the 1996 International Comparison Programme [4]. The report concluded that lower-income countries tend to have larger food price elasticities, and in
common with the systematic review described above also found that higher-valued food items tended to be more price elastic than staple foods. However, this report used national-level GDP and price data rather than individual or household level data from surveys, and there have been criticisms of the data quality. Again, this report was unable to investigate differences in elasticities according to different socioeconomic groups, and cross-price elasticities were not estimated.

It is therefore the intention of this review to provide a synthesis of the recent evidence on food price elasticities worldwide. This will provide valuable information on how the diets of consumers in various countries might respond to policy-induced changes in the price of various foods. Many governments are now considering the implementation of ‘fat taxes’ or ‘thin subsidies’ in order to improve the health of their populations by changing the composition of their diets [5], and food price shocks are also increasingly occurring worldwide. However, as yet there is little information available as to the magnitude of the effect that such changes in price would have on consumption of the relevant foods or on consumption of other foods.

Another aspect of diet and nutrition in which little evidence is available is that of food substitution, and by studying cross-price elasticities estimated by the included studies this review will add to the evidence in this area. The review will seek to identify patterns whereby an increase in the price of a given food leads to an increase in consumption of other foods, and determine whether substitution mainly occurs within or between food groups in different settings.

3. Aims

Primary aim:

- To systematically review worldwide food price elasticities in order to provide global estimates of the potential effect of food price changes on the composition of diets

Secondary aims:

- To examine differences in food price elasticities between income groups within and between countries
- To systematically review estimates of cross-price elasticities where possible in order to explore the degree and type of substitution between different foods resulting from food price changes

4. Search strategy

A number of search terms will be used across multiple databases in order to identify studies which have calculated food price elasticities. Search terms will include combinations of “price elast*”, “demand elast*”, “demand system” and “almost ideal demand” with specific terms including “food”, “meat”, “fruit”, “vegetable*”, “beverage*”, “dairy”, “fish”, “cereal”, “rice”, “milk”, “cheese” and “maize”. This
list will be expanded if additional search terms are identified during the review process. A final list will be defined prior to running the full search.

Multi-database searching will be employed, across the following databases:

- ISI Web of Science
- EconLit
- PubMed
- Medline
- AgEcon
- Agricola

Other sources of literature will also be searched in order to identify additional studies from the non-peer reviewed literature. These will include:

- Google
- Google Scholar
- Ideas REPEC
- Eldis
- USAID
- FAO
- World Bank
- IFPRI

Published peer-reviewed studies will be included in the review, as will grey literature such as dissertations, conference proceedings, reports and other non-peer reviewed studies. The inclusion of the latter will assist with any identification of publication bias (which would be expected to be particularly severe in the peer-reviewed literature) and will also facilitate the inclusion of government-commissioned studies. Grey literature will be subject to the same quality assessment as peer-reviewed studies (see 5. below).

Reviews will be hand-searched for other relevant references, as will the reference lists of included studies. Only publications with an English abstract will be included. All located abstracts will then be examined based on the inclusion and exclusion criteria defined below.

**Inclusion criteria:**

- Cross-sectional or cohort, experimental or quasi-experimental studies
- Data from household surveys, national aggregate data or supermarket scanners
- Full-text articles with English abstracts

**Exclusion criteria:**

- Review articles with no original results presented
5. **Study quality**

Study quality will be assessed using a checklist of items on which each included study will be assessed. Studies which do not meet every item on the checklist will be considered of poor quality and will be afforded less weight in the review. For sensitivity analysis, these papers will be removed from any statistical analysis in order to determine whether they affect the results.

To meet the quality guidelines each study should include:

- A description of how food prices were measured (i.e. were these actual prices or unit values)
- A description of how consumption was measured
- The number of households or individuals contained in the dataset (does not apply to studies using aggregate data)
- A description of exactly what foods were included in each food group
- A clear description of the models used and any assumptions contained therein
- A description of how elasticities were estimated, e.g. are they point or arc estimates and are they symmetric for price increases and decreases

6. **Data extraction**

An Access database will be compiled containing all relevant information from the included studies. This database will include fields describing the study authors, year, journal or publication format, setting,
year(s) data were collected, broad statistical methods, number of participants/households, whether the study meets the quality guidelines, food categories, price elasticity estimates (and standard errors where available) and any other relevant information about the study such as whether it contains separate estimates for income groups. A separate database will be set up to record cross-price elasticities where these are present.

The review team leader (Green) will conduct the search using the databases listed above, and this search will be replicated by another review team member (Cornelsen) in order to check for inconsistencies. Two members of the review team (Green and Cornelsen) will extract the data from the studies and input them into the Access database. Cross-checking of data extraction will be performed on 10% of the included studies in order to confirm that identical data have been extracted. A third member of the team will also be involved in cross-checking data extraction.

7. Potential sources of bias

Publication bias – this will be assessed by comparing the effect sizes reported by peer-reviewed and non peer-reviewed studies that are judged to be of good quality.

English-language bias – this will be assessed by comparing the effect sizes reported by English language and non-English language studies.

Multiple publication – if the results of a study have been published in more than one journal (or have been included in a review article as well as a report of a single study) any duplicate results will be removed.

Methodological issues – included studies will have used a wide range of different methods, although most will have used various types of demand systems modelling. Studies will be differentiated by the methods/types of data they have used in order to determine whether different models produce estimates of systematically different magnitudes.

Modelling error – studies using econometric models can be prone to measurement error because a number of assumptions are made in setting up the model. If the measurement error is systematic then this can lead to bias in the results. This will be investigated in the review and the assumptions used in setting up the models will be examined.

8. Data analysis

If sufficient data are available, statistical analysis will be conducted on the collected studies in addition to narrative analysis. This will include meta-analysis and meta-regression to produce combined own price and cross-price elasticity estimates. The presence of heterogeneity between studies is extremely
likely and will be investigated, and (data allowing) sub-group analysis will be conducted according to foods, countries, methods and other relevant criteria.

9. Outputs

It is envisaged that a number of journal papers would be produced as a result of this review. These could include the following:

- One or more papers reporting elasticities in different geographical areas (e.g. the EU, particular regions, developing countries etc.)
- One or more papers reporting elasticities for particular types of food (grouped into categories to be determined)
- A paper exploring cross-price elasticities and substitution between different food types

These papers would be targeted towards public health or epidemiology journals, with one or more papers potentially being targeted to the *British Medical Journal* or *Lancet*.

10. Conclusions

This review will assess the price elasticities of demand for different food groups in different countries, with a focus on which food groups have higher and lower price elasticities, and whether there are large differences between countries in different regions and at different levels of development. Where possible, attention will also be paid to whether price elasticities vary between different income groups, and what foods may be substituted for those that increase in price (using evidence from cross-price elasticities). The review will therefore add to the knowledge base on how changing food prices affect the composition of diets worldwide, and the impact that these changes are likely to have on population health.

References