

UK Biobank

Occupational history web-based questionnaire

Version 1.0

<http://www.ukbiobank.ac.uk/>

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This document details the methodology behind a newly developed web-based questionnaire to collect lifetime occupational history in UK Biobank.

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1. Introduction

1.1: The baseline assessment collected information on current job title (for those in employment) through a verbal interview, which was categorised according to the Standard Occupational Classification 2000. No information was collected on the last job of those who had retired by the time of the baseline assessment, or on previous jobs they had held.

1.2: A common approach used to collect individual lifetime occupational histories is through face-to-face personal interviews, self-administered job questionnaires or through retrieval of job/industry titles from contemporary and historical occupational records. However, these data are typically in narrative form and must be translated into standard codes suitable for analysis. Traditionally, trained individuals have manually assigned job titles using a set of standard job codes (standard occupational classifications [SOC]). However, this process is resource-intensive and is not feasible for large-scale epidemiological studies. Automatic web-tools are available (e.g. CASCOT; SOIC; OccuCoder), but the quality of the data is highly dependent on the quality of the job description data (e.g., sensitive to spelling errors, etc.)

1.3: To overcome the above limitations, a new efficient web-based tool was developed that automatically collects and codes self-reported job titles over an individuals' lifetime, based on the hierarchical standard SOC coding structure (publication in preparation).

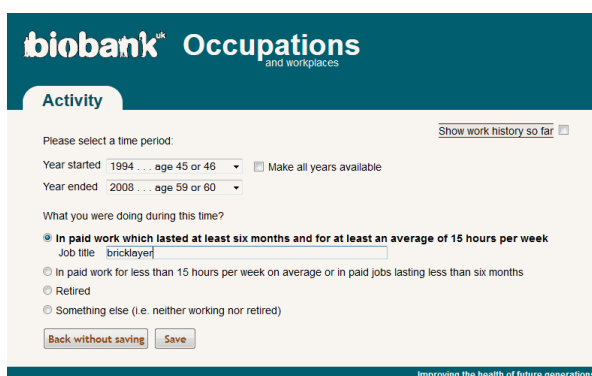
2. Questionnaire design

2.1: This web-based questionnaire OSCAR (**O**ccupations **S**elf **C**oding **A**utomatic **R**ecording tool) was designed for UK Biobank to collect information on all paid jobs carried out for more than 6 months and for at least 2 days (or 15 hours) a week after finishing full time education, as well as questions on shift patterns and hours worked for each job recorded.

2.2: The web-based occupational questionnaire OSCAR was designed by Dr Sara De-Matteis and Prof Paul Cullinan (Respiratory Epidemiology, Occupational Medicine and Public Health, National Heart and Lung Institute, Imperial College, London) and Dr Lesley Rushton (Dept. Epidemiology and Biostatistics, Imperial College London) and was developed by Heather Young (CEU, University of Oxford). This work was funded by the Health & Safety Executive (Merseyside, UK).

2.3: The questionnaire was originally designed to enable analyses of the association of occupation with respiratory health outcomes (with a focus on chronic obstructive pulmonary disease (COPD)) in UK Biobank participants to be carried out. However, the lifetime job histories collected by OSCAR can be used for other occupational analyses (such as those relating to cancer, cardiovascular disease, arthritis etc.) and to facilitate more in-depth studies of specific occupational groups (e.g. health care workers, teachers, etc.).

2.4: First, participants are asked to type in each of their job titles and the corresponding year or age at the start and end of each job. An example for the occupation of a bricklayer is shown below (fig 1).



The screenshot shows the 'Activity' section of the UK Biobank questionnaire. The header includes the 'biobank^{uk} Occupations and workplaces' logo. Below the header, there is a 'Please select a time period:' section with dropdown menus for 'Year started' (1994... age 45 or 46) and 'Year ended' (2008... age 59 or 60), and a checkbox for 'Make all years available'. A 'Show work history so far' checkbox is also present. The main question is 'What you were doing during this time?' with three radio button options: 'In paid work which lasted at least six months and for at least an average of 15 hours per week' (selected), 'In paid work for less than 15 hours per week on average or in paid jobs lasting less than six months', and 'Retired'. Below these is a text input field for 'Job title' containing 'bricklayer'. At the bottom, there are 'Back without saving' and 'Save' buttons. A footer at the very bottom reads 'Improving the health of future generations'.

Fig 1. Example job title entry page (bricklayer is used here as an example)

2.5: The questionnaire was designed so that an occupational history timeline builds up after each entry, thereby making it easy for participants to identify and edit errors. Participants are also asked about the reasons for any gaps in employment history. Participants are allowed to count several consecutive similar jobs for different employers as one. In addition, participants could also record multiple jobs held at the same time (as long as each job was performed for the equivalent of 2 or more days per week for 6 months (e.g. bar work at nights and part-time shop-work during days). Participants who had multiple roles within their job at the same time were instructed to only record the role that occupied most of their time (e.g., if they were a clinician and a researcher, but spent more time in the clinic, then they should choose the job title of 'doctor'.

2.6: They are then asked to find their job through a list of job categories based on the hierarchical structure of the UK standard occupational classification SOC (version 2000), starting with the major job categories (i.e. 1-digit SOC codes) to the job sub-groups (i.e. 2- and 3-digit SOC codes) and finally to specific job titles (i.e. 4-digit SOC codes). When the participant selects the final job title, the corresponding 4-digit SOC code is automatically assigned to that job title for each participant (although the participants do not see the underlying coding system). The 4-digit SOC code ensures that the majority of the jobs occurring in the UK general population are covered using a wide variety of codes (n=353). This self-allocation ensures that the participant is able to quickly and easily find a job title that matches theirs as closely as possible.

2.7: The SOC2000 coding structure is the same classification system as used for the job information collected at recruitment.

2.8: Given the technical language of the SOC 2000, job categories and titles were reworded to help participants recognise and allocate the correct job category/title. In addition, the job categories groupings were not based on education level, as used by the SOC 2000, but instead based on similar job tasks. For example, an engineer and engineer technician based on the analogy of their jobs were grouped together. A colour system was used to differentiate the major job categories (n=15) to facilitate the participants in the self-allocation of the correct job.

2.9: For example, if a participant was a bricklayer, they would first select the most appropriate colour-coded category of jobs (circled in red in Fig 2).

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Main Job Grouping

1994-2008 bricklayer

Now please try to match your job, as closely as you can, to one of our predefined job titles by stepping through three sets of options. Start by selecting one of the **15** below, followed by the **Next** button.

For all **general office or clerical work**, please go to group **#11** (office-based work).

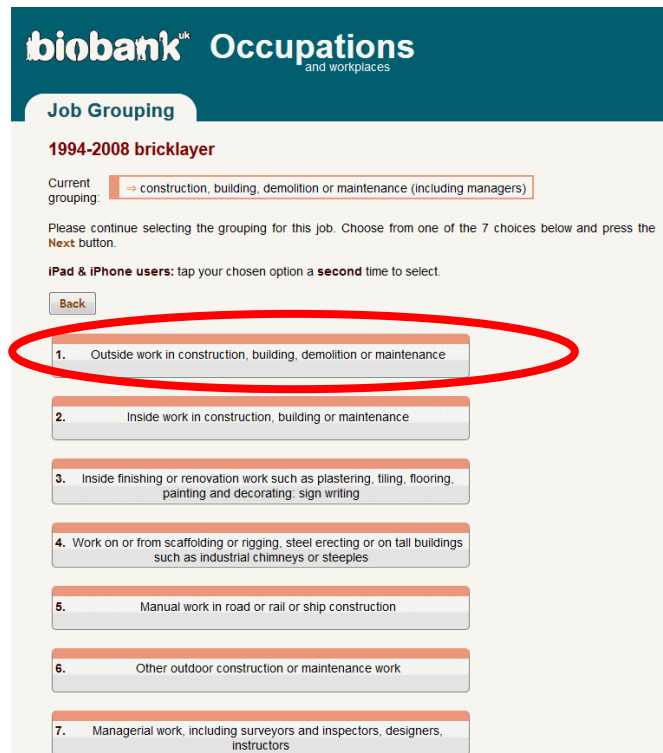
iPad & iPhone users: tap your chosen option a **second** time to select.

[Back](#)

1. agriculture, horticulture, fishing, other work with animals (including managers)	2. construction, building, demolition or maintenance (including managers)	3. transport (road, rail, air, water), work with other mobile machinery (including managers)
4. routine factory-based manufacturing (including managers & cleaners)	5. mining, quarrying, energy production, water treatment (including managers)	6. skilled manual work (including managers)
7. cleaning, caretaking, waste collection, pest control (including managers)	8. science, research, engineering, computer technology (including managers)	9. health (human or animal), residential/social/religious care, undertaking (including managers)
10. sport, culture, arts, media, entertainment (including managers)	11. office-based work: professional, managerial, administrative or general office/clerical	12. selling and shop work (retail/wholesale), storage and distribution (including managers)
13. personal services, travel/tourism, hospitality (including managers)	14. education, school-related work (including managers)	15. Armed Forces, emergency services, security, health & safety (including managers)

Fig 2: 15 colour-coded job categories for participants to select the most suitable job category

2.10: Next, the participant (e.g., bricklayer) would drill down to find the job title that most suited them (fig 3):



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Job Grouping

1994-2008 bricklayer

Current grouping: → construction, building, demolition or maintenance (including managers)

Please continue selecting the grouping for this job. Choose from one of the 7 choices below and press the **Next** button.

iPad & iPhone users: tap your chosen option a **second** time to select.

1. Outside work in construction, building, demolition or maintenance
2. Inside work in construction, building or maintenance
3. Inside finishing or renovation work such as plastering, tiling, flooring, painting and decorating; sign writing
4. Work on or from scaffolding or rigging, steel erecting or on tall buildings such as industrial chimneys or steeples
5. Manual work in road or rail or ship construction
6. Other outdoor construction or maintenance work
7. Managerial work, including surveyors and inspectors, designers, instructors

Fig 3: selection of sub-category for job classification

2.11: The final classification would lead to automatic coding of a 4-digit SOC code that corresponds to the selected job title (fig 4).



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Job Grouping

1994-2008 bricklayer

Current grouping: ⇒ construction, building, demolition or maintenance (including managers)
⇒ Outside work in construction, building, demolition or maintenance

Please continue selecting the grouping for this job. Choose from one of the 14 choices below and press the **Next** button.

iPad & iPhone users: tap your chosen option a **second** time to select.

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1. bricklayer
2. mason, stonemason, monumental mason
3. roofer, roof tiler, slater, felt roofer, thatcher
4. welder
5. electrician, electrical fitter
6. carpenter, carpenter and joiner, builder's joiner
7. pipe fitter

Fig 4: selection of final category/job title for job classification

2.12: Job titles that were considered intrinsically generic (e.g. secretary) and which are present in different job sectors, were duplicated across different job categories to ensure that a participant could find his/her job, where expected.

2.13: The questionnaire included warnings and tips throughout the process to assist the completion of the questionnaire.

2.14: Participants could view their occupational timeline as they progressed through the questionnaire and had the opportunity to amend details, if necessary (fig 5).

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Timeline

Your history is complete

Please look over it carefully. When you're happy, please press: **Finished**

Your work history so far:

Year Started	Year Finished	Occupation	
1971	1991	Childhood and education	>>
1991	1994	Unemployed	>>
1994	2008	bricklayer	>>
2008	Still working	builder	>>

Use the buttons in the table above to add information, change details or remove the row. To ensure that nothing is missed, we kindly ask that you don't leave any unfilled rows.

Some people like to start with their first job, some with their current job. You may complete it in any order you like.

[Return to the introduction](#) [Add another row](#)

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Fig 5: Example of a timeline of occupational history from the questionnaire

2.15: For each selected job title questions were also asked on:

- the number of hours worked per week
- shift patterns
- exposure to specific occupational agents

Once the work history section was complete participants were also asked about:

- respiratory health outcomes and medication for these conditions
- smoking habits

2.16: Validation of the OSCAR questionnaire is being conducted by Imperial College, London, the results of which will be published in due course.

3. Questionnaire administration

3.1: Participants were invited via email to complete the occupational history web-based questionnaire between July and Sept 2015. Reminder emails were sent to partial and non-responders up until Dec 2015.

3.2: Overall, 100,398 (31%) participants fully completed the questionnaire (and 122,189 (38%) partially responded).

3.3: The median duration of the questionnaire was 17 mins (IQR: 11 – 30 mins).

4. Data available in Showcase

4.1: Data-fields are available that describe:

- Job title (as entered by the participant)
- 4-digit SOC coded classification for each job
- Duration of each job
- Shiftwork details of each job
- Workplace environment (dusty, noisy, etc.) of each job
- Breathing problems in each job
- Medical information (focused on respiratory outcomes)
- Smoking habits

5. Validation of OSCAR and interpretation of the data

Preliminary validation work was conducted by comparing self-selected SOC codes (using OSCAR) with expert manual coding of the job title (considered the ‘gold standard’), provided from a random sample of 400 work histories. There was moderately good agreement between the 4 digit SOC code blindly assigned by the manual coder and the one assigned by OSCAR (Kappa= 45% (95% confidence interval; 42% - 49%)). As expected, the % of agreement increased when considering the matching at a broader job category level, reaching 70% agreement between major job categories (i.e. 1-digit SOC codes).

Informal qualitative scrutiny of the work histories showed that for many occupations the majority of the final 4 digit SOC codes are likely to be reasonably correct. If anything, OSCAR codes are likely to be more specific than that obtained through manual coding (e.g., ‘geophysicist’ coded by OSCAR vs. ‘research scientist’ by the manual coder). However, for certain industries, participants may have felt that the industry is more important than their trade. For example, participants working as an

electrician, fitter, or engineer in the coal mining industry, often selected 'coal worker or miner' rather than 'electrician' etc. Hence, manual coding of these occupations would result in different codes being assigned that are more relevant to the trade.

We recommend that users should explore the data carefully prior to analysis. Selection of specific jobs or occupations should include examination of the relevant codes and also potentially searching the job title text. We also recommend scrutiny of jobs within the work histories as a job title may seem inappropriate for the code but be perceived as accurate when viewed with the rest of the work history.