

## COHORT PROFILE

# Cohort Profile: West of Scotland Twenty-07 Study: Health in the Community

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## How did study come about?

The West of Scotland Twenty-07 Study (Twenty-07 for short) was set up in 1986 by Sally Macintyre, Patrick West, Ellen Annandale, Kate Hunt, Graeme Ford, Rex Taylor, Sheila MacIver, Russell Ecob and Rory Williams at the Medical Research Council (MRC) Medical Sociology Unit, Glasgow (now the MRC Social and Public Health Sciences Unit).<sup>1</sup> The aim of the Twenty-07 Study is to investigate, longitudinally, the social processes producing or maintaining inequalities in health by six key social positions: social class (defined, as was traditional at the time, as the main occupation of the head of household), gender, age, area of residence, marital status (now broadened to encompass family structure) and, in collaboration with other Unit programmes, ethnicity. Figure 1 illustrates the basic design of the study—it involves three cohorts 20 years apart—born around 1932 (dotted line), 1952 (dashed line) and 1972 (gray line)—with a planned follow-up period of 20 years, to provide information on 60 years of the life course.

In the initial sweep, in 1987/88, the study members were thus approximately 15, 35 and 55 years of age and in the final planned round of face-to-face data collection, in 2007/08, they are approximately 35, 55 and 75 years. The study was designed to examine critical points in the lifespan; we are tracking the three cohorts as they make the transition from adolescence to working life (line a), through the main part of working life (line b) and from working

life to retirement (line c). It was also designed to explore the effect of the historical context of people's lives on their health and circumstances by comparing the different cohorts at the same age at different points in time (i.e. line d; 35-year-olds in 1987 and 2007, and line e; 55-year-olds in 1987 and 2007).

## What does it cover: topics

The study was set up as an extensive investigation into people's every day lives and health over time in the context of their physical and social environments. The underlying model that guided the study at its inception and through data collection is shown in Figure 2.<sup>1</sup> This demonstrates two-way associations between four broad groups of factors—personal life circumstances; local life circumstances; beliefs, attitudes and values; and behaviours—and the six social positions of interest and health.

As the study has aged, and the literature on health inequalities has developed, the overall framework for analysis has evolved: to take on more of a life course perspective, to investigate the role of biological pathways between social positions and health, and to encompass a wider perspective on the role of culture on health inequalities.

## Who is the sample?

The study was originally located in the Central Clydeside Conurbation (Figure 3), a socially heterogeneous and predominantly urban region, including Glasgow City, which is known to have generally poor health, although this varies considerably across the study area, for example, in 1981 standardized mortality ratios (SMRs), calculated with Scotland as the standard population, ranged from 62 to 147.<sup>2</sup>

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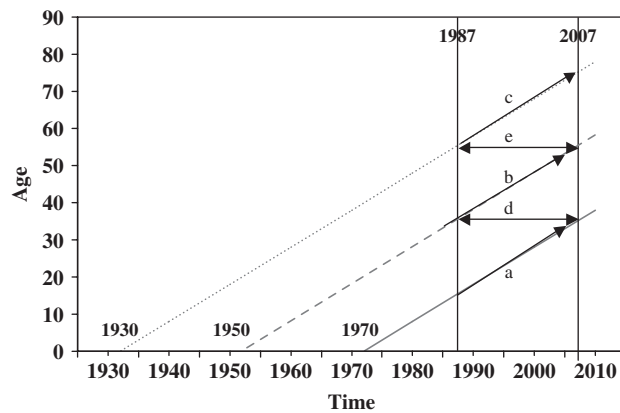


Figure 1 Twenty-07 cohorts

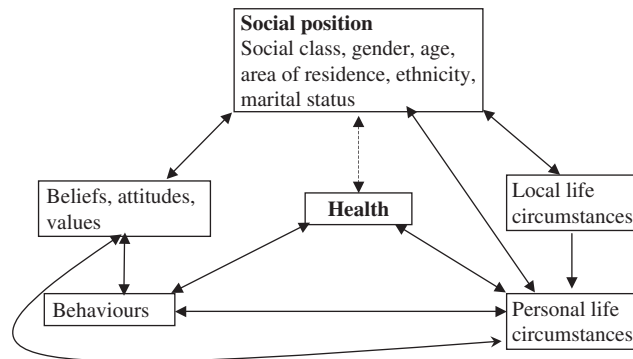


Figure 2 Model underlying Twenty-07 Study at its inception

The study comprises two distinct but connected samples: the regional sample and the localities sample. Two-stage stratified sampling was used to select subjects. For the regional sample, local government districts were stratified by unemployment and socio-economic group data from the 1981 Census and 52 postcode sectors were systematically selected from these with a probability proportionate to their population size. The same postcode sectors were chosen for all three cohorts. The sampling frame used for individuals was Strathclyde Regional Council's 1986 Voluntary Population Survey—an enhanced electoral register that provides details of the age and sex of all household members.<sup>3</sup> Individuals were selected from the 52 postcode sectors within each age cohort with a systematic selection with a prescribed sampling interval from a random start. If two individuals were selected from the same household, one was replaced.

The locality sample was designed for more intensive study of the relationship between people's personal and health circumstances and the environment in which they lived. Ten postcode sectors in two areas of the city of Glasgow were selected purposefully to capture different socio-economic experiences and

environments. In 1987 the north-west area of the city was more middle class with an SMR of 83 while the south-west area was more working class with an SMR of 114,<sup>2</sup> though neither was at the extremes of social disadvantage. Individuals of target age were selected from the Voluntary Population Survey in these postcode sectors. To achieve an adequate sample size per cohort, virtually all of the population of relevant ages was sampled in these areas.

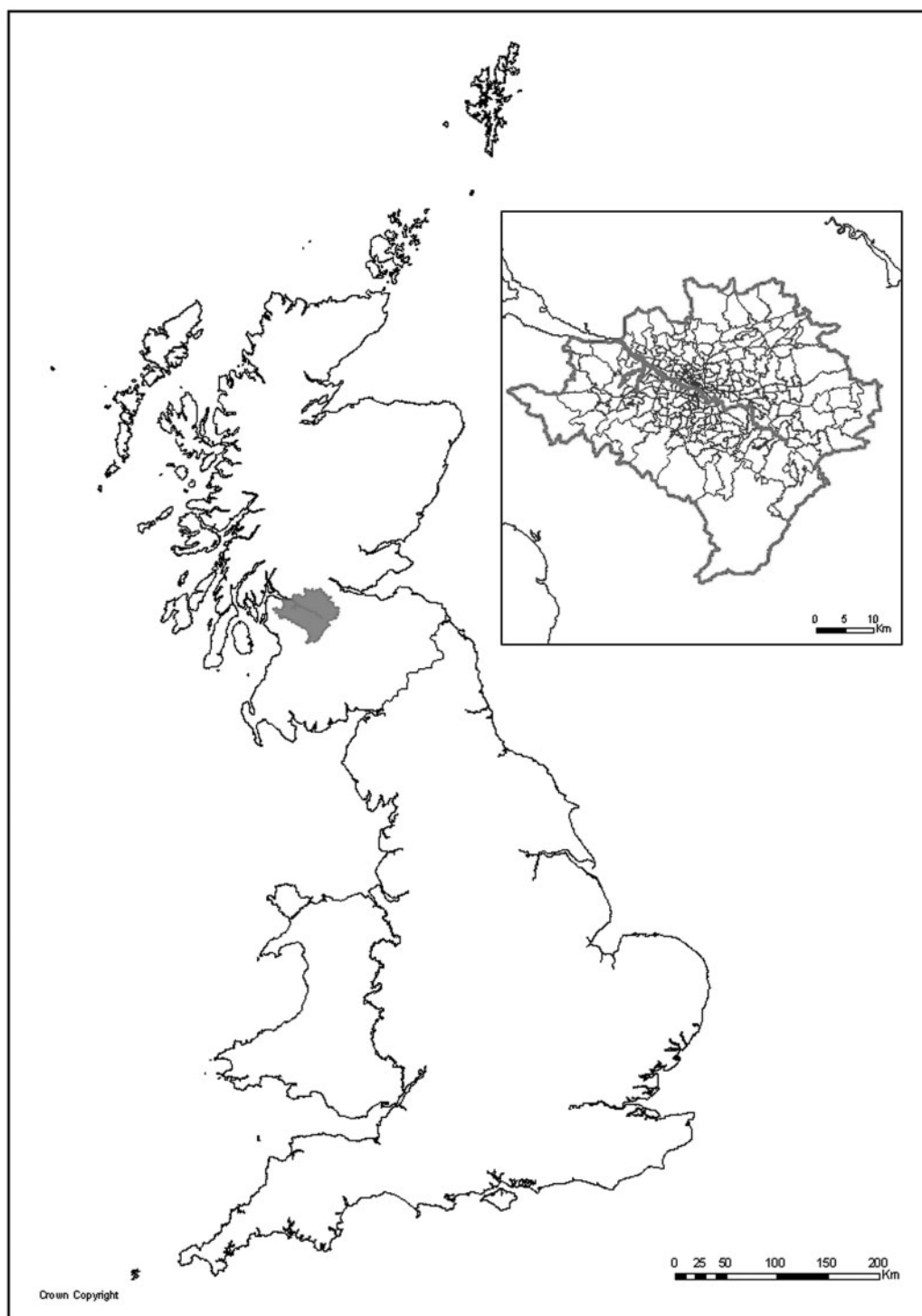
A sample of 30- to 40-year-old South Asians (mainly Punjabi with origins in the Indian subcontinent) in Glasgow was selected at the same time for the ethnic component of the study, with the 1950s cohort of the regional sample used as a comparative reference population.<sup>4</sup>

Once the target sample had been identified, selected individuals were approached by Strathclyde Regional Council employees to ask for their consent for their names to be transferred to the MRC. For the 15-year-olds, parental consent was sought. If consent was given, names were transferred to the MRC whose staff then approached them to take part in the study. Across the three cohorts and both the regional and locality samples, 8266 people were approached by Strathclyde Regional Council and 5184 agreed to their names being transferred to the MRC (63%) and 4510 took part at baseline in 1987/88. This achieved sample was 87% of the transferred sample and 55% of the initial sample, which varied by cohort as shown in Table 1.

Der<sup>5</sup> investigated the representativeness of the 1987/88 achieved sample in comparison to 1991 Census data using a subsample of the Sample of Anonymised Records (a 2% sample of census data for individuals) for the same geographic area. Comparison of the two populations on gender, social class, housing tenure and car ownership showed no consistent differences across or within cohorts. Chi-squared tests to compare the two populations showed statistically significant differences for car ownership and social class for the 1970s cohort only. For this cohort, while there was a greater proportion of parental car owners in the Twenty-07 (65%) than in the census (58%), the pattern for social class was more mixed with the Twenty-07 having a significantly lower percentage of social class II to the census (19% vs 24%) but a higher proportion of social class III<sub>m</sub> (39% vs 32%). Overall, there was 'little evidence of systematic biases in the Twenty-07 samples with respect to gender or SES'.<sup>5</sup>

## How often have the cohorts been followed up?

The Twenty-07 Study has been followed up four times to date and the final wave of fieldwork is ongoing (2007/08). In addition, there have been a number of postal surveys of the youngest cohort, in the early years



**Figure 3** The study area: the Central Clydeside Conurbation, West of Scotland

of the study to capture their rapidly changing circumstances as they left school, and one to locality respondents. There have also been nine nested projects conducted to date.<sup>6–18</sup> An evaluation of the impact of these nested studies on subsequent response rates showed they had no apparently adverse effects.<sup>19</sup>

### What has been measured?

While the data collected at each wave have changed over time and varied by cohort according to their stage in the life course, overall there has been relatively consistent pattern of topics covered by the study over time, as shown in Figure 4.

**Table 1** Initial, transferred and achieved samples

Sample	1970s		1950s		1930s		Total		Total
	Region	Locality	Region	Locality	Region	Locality	Region	Locality	
Initial sample	1682	857	1688	830	2155	1054	5525	2742	8266
Percent transferred	70	70	65	64	55	55	63	63	63
Transferred sample	1177	602	1096	528	1196	585	3469	1715	5184
Achieved sample	1009	506	985	459	1042	509	3036	1474	4510
Percentage of initial sample who took part in wave 1	60	59	58	55	48	48	55	54	55
Percentage of transferred sample who took part in wave 1	86	84	90	87	87	87	88	86	87

<b>Self-reported health</b>	Ownership of household goods
General well-being	Domestic labour & caring responsibilities
Symptoms	Family health
Chronic conditions	Employment status
Disabilities	Occupation and work environment
Vision	Income
Hearing	Family networks
Mental health	Social support
Use of health care services	Life events
Medications	
<b>Physical health measures</b>	<b>Behaviours</b>
Height (standing and sitting)	Diet
Weight	Exercise
Waist	Smoking
Hips	Alcohol and illegal drug use
Blood pressure	Sexual behaviour and contraceptive use
Respiratory function	Preventative health care use
Grip strength	Illness behaviour
Bioimpedance	Social participation
BP reactivity (wave 3 only)	Leisure activities
	Criminal activities
<b>Biological samples</b>	<b>Beliefs, attitudes and values</b>
Secretory Immunglobulin A (wave 3 only)	Concepts of health
Blood samples (wave 5 only)	Beliefs about illness
DNA (wave 5 only)	Health knowledge
	Self esteem
<b>Cognition</b>	Mastery
AH4 (waves 1,4,5 only)	Religious beliefs
Reaction times	Worries
	Beliefs about gender, age and marital roles
<b>Life circumstances</b>	Life satisfaction
Family formation	Opinions
Household composition	
Housing tenure and conditions	

**Figure 4** Measures included in the Twenty-07 Study

Data have also been gathered about the local social and physical environment, for example, social work services,<sup>20</sup> food availability and price,<sup>21</sup> health care<sup>22</sup> and retail outlets.<sup>23</sup>

Respondents have been flagged since the start of the study for mortality follow-up, and have been asked for permission to link to their coded

hospital records available from the Scottish health system.

### What is attrition like?

Table 2 shows the response rates for waves 1–4 and the broad reasons for non-response.

**Table 2** Response rate over time

Interview outcome at each wave	Wave 2 (1990/92)		Wave 3 (1995/97) <sup>a</sup>		Wave 4 (2000–04)	
	<i>N</i>	% of total at baseline	<i>N</i>	% of total at baseline	<i>N</i>	% of total at baseline
Refusal	221	4.9	478	10.6	374	8.3
Uncontactable	306	6.8	287	6.4	587	13.0
Not issued <sup>b</sup>	90	2.0	580	12.9	517	11.5
Dead	73	1.6	193	4.3	371	8.2
Respondent	3820	84.7	2972	65.9	2661	59.0
Response rate (% living baseline sample)		86.1		68.8		64.3

<sup>a</sup>Members of the localities sample were only sent a postal questionnaire in wave 3. There was a much lower response to this than to the face-to-face interviews carried out around the same time among the regional sample (locality postal *rr* = 60.4%; regional *rr* = 74.1%).

<sup>b</sup>At waves 2 and 3 the study policy was not to re-issue respondents who had refused at a previous wave, moved from the study area or withdrawn from the study. At wave 4 this policy changed and attempts were made to trace all respondents except those that had withdrawn from the study.

At wave 4 (2000/04) 8% of the sample had died, 13% had been lost to follow-up and 8% refused. Not surprisingly far more of the 1930s cohort—aged approximately 68—had died by the 4th wave (nearly 20%) than the 1970s cohort (1%) who were then aged 28. At this time, we had lost touch with one-quarter of the youngest cohort, nearly 10% of the 1950s cohort but < 5% of those born in the 1930s, reflecting differential mobility at these stages of the life course.

A comparison of the baseline characteristics of those who have participated in all of the first four waves with everyone who took part at baseline showed that respondents from higher socio-economic groups were more likely to have stayed in the study, but that there was no difference by gender or health.<sup>24</sup> Inverse probability weights have been constructed for the study to rebalance the wave 4 sample back to baseline.<sup>25</sup>

For the fifth wave of the study, 2007/08, strenuous efforts have been made to trace respondents previously lost to follow-up, including a local media campaign, mass mail outs, searches of websites such as Friends Reunited, My Space etc and internet-based directory services, as well as obtaining address files from the health service for those registered with a GP in Scotland. Fieldwork for this wave is ongoing at the time of writing, so no results are yet available.

## What has been found: key findings and publications

To date over 200 papers and reports have been published (for a complete list of publications, go to [http://www.sphsu.mrc.ac.uk/studies/2007\\_study](http://www.sphsu.mrc.ac.uk/studies/2007_study)). Here we highlight selected findings in relation to each of the six social positions.

### Social class

Early papers based on the baseline data demonstrated a significant social class gradient in a range of health measures, although the detailed patterns varied by cohort.<sup>26</sup> Analyses of subsequent waves showed inequalities in health by housing tenure and car access<sup>27</sup> and by income,<sup>28</sup> although again these associations varied by cohort and by gender. Evidence from Twenty-07 confirms the expected social patterning of healthy diets,<sup>29</sup> smoking<sup>30</sup> and sport participation.<sup>31</sup> More detailed analyses have focused on investigating the biological, psychological and behavioural pathways between social circumstances and health. For example, in wave 3 we measured secretory immunoglobulin A—an indicator of the general well-being of the immune system—which was found to be lower in more disadvantaged social classes.<sup>32</sup> With the collection of blood samples, and a range of biomarkers in wave 5, this area of work will grow in importance for the study over the next few years.<sup>33</sup> One hypothesis—that intelligence may explain social inequalities in health—was not confirmed; the AH4—an IQ measure—did attenuate the association between five indices of socio-economic position (childhood and current social class, education, income and area deprivation) and mortality, but did not entirely explain it.<sup>34</sup>

### Age

One early controversial finding focused on social class gradients (or lack of them) among the youngest cohort who were 15-years-old when the study began. Investigating a range of indicators of health, both objective and subjective, very little evidence of a social class gradient—based on parental class—was found, with the exception of height.<sup>35</sup> Other studies have had similar findings.<sup>36</sup> Subsequent research has ruled out the suggestion that the lack of class gradient was an artefact.<sup>37</sup> At 18, respondents who had been

in ill health at age 15 were more likely to be unemployed, suggesting health selection might play a part;<sup>38</sup> although controlling for this, unemployment also had an impact on health.<sup>39</sup> Ongoing research is investigating if, when and why social inequalities in health emerge in early adulthood.

### Gender

Findings from Twenty-07 have led us to question whether gender differences were really as simple as they seemed.<sup>40</sup> The direction and magnitude of gender differences in health varied according to the particular health measure considered and the phase of the life cycle. Subsequent analyses also questioned the assumption that women are more likely to over report health problems<sup>41</sup> and to seek medical help<sup>42</sup> than men. Developing this work, we argued that it is important to unravel social gender from biological sex to examine gender differences in health. Using the Bem sex role inventory,<sup>43</sup> a measure of gender role orientation, we found that there was little evidence of a gender role effect on biological markers of health such as height or blood pressure, but for self reported measures of mental and physical health high 'masculinity' scores appear to have an advantageous effect on health and high 'femininity' scores a detrimental effect on health.<sup>44</sup> However, in relation to mortality from CHD, high 'femininity' scores were found to be protective for men.<sup>45</sup> We have also examined gender role orientation and attitudes in relation to smoking and suicide.<sup>46,47</sup>

### Area

Focusing on the localities sample, early analyses of the Twenty-07 Study noted a pattern of deprivation amplification by which environmental features (such as lack of public transport) compounded individual disadvantage (lack of car access).<sup>48</sup> We have used these localities to investigate, *inter alia*, the neighbourhood patterning of health related behaviours,<sup>49</sup> body size and shape,<sup>50</sup> perceptions of incivilities,<sup>51</sup> price and availability of food,<sup>52</sup> social capital and cohesion,<sup>53</sup> housing stressors<sup>54</sup> and use of local areas.<sup>55,56</sup> We have also capitalized on the larger clustered regional sample to model neighbourhood effects, and interactions between individual and area characteristics, for example, in health related behaviours.<sup>57</sup>

### Family composition

Baseline data demonstrated findings consistent with the literature that those who were separated, widowed or divorced had poorer health than those who were married. Analyses suggested that material resources and experience of stress and social support accounted for most of these differences.<sup>58</sup> In relation to family life more broadly, analysis of the youngest cohort found that family structure had little association with health, but having a poor relationship and

experiencing conflicts with parents was associated with poor psychological well-being among girls and higher symptoms among boys and girls.<sup>59</sup>

### Ethnicity

In the late 1980s the largest minority ethnic groups in the Clydeside area were South Asians and people of Irish Catholic descent. Comparing the linked South Asian sample with the general 1950s regional cohort showed that South Asians were significantly shorter and broader, with poorer lung function and higher blood pressure.<sup>4</sup> The South Asian sample were also more socially and economically disadvantaged but were less likely to smoke or drink alcohol.<sup>60</sup> Respondents of Irish Catholic descent were found to have both poorer socio-economic circumstances and poorer health than 'non-Catholics'.<sup>61</sup> While some of the excess morbidity of respondents of Irish Catholic descent can be explained by health behaviours such as diet,<sup>62</sup> there were limited differences in other behaviours such as smoking;<sup>63</sup> socio-economic disadvantage does not fully explain the health gap.<sup>64</sup>

### What are strengths and weaknesses?

The key strength of the Twenty-07 Study comes from its design. Including three cohorts, aged 20 years part and following them for 20 years, provides unique insights and comparisons of key life changes and trajectories through adulthood at different points in history.<sup>65</sup> The Twenty-07 was one of the first to bring together individual and contextual neighbourhood information, which went far beyond what census-based indicators could provide. Its location in the West of Scotland, with widely varying socio-economic circumstances and health experiences in a rapidly changing environment, has provided a well-characterized context for the study. Finally, over time, the study has included a depth and breadth of topics, and different ways of examining the same subject, which provide many unique features for analysis. The detailed information that we have collected on health and social circumstances has enabled us to do some innovative nested qualitative studies.

Like many other cohort studies Twenty-07's weaknesses are the flip side of its strengths. Its location and focus on three key age cohorts can mean its findings are not always generalizable to the whole population. The study's original samples size was relatively small, and with attrition, this can mean some complex relationships become difficult to explore. Finally, like all longitudinal studies,<sup>66</sup> Twenty-07 has had to balance maintaining consistent measures over time with meeting the needs of conducting research in an ever-changing social and research environment; a difficult balance to always judge correctly.

## Where next?

2007/08 is the final planned wave of fieldwork of the Twenty-07 study, the intention being that respondents will subsequently be followed unobtrusively via mortality flagging and access to the Scottish morbidity record system. There is a Twenty-07 tissue bank containing samples of respondents' blood and DNA. The main focus over the next 5 years will be to analyse the data collected to address the original aims of the study in today's context of a life course approach to investigating social inequalities in health.

## Can I get hold of the data? Where can I find out more?

We are keen to collaborate with other researchers on analyses of Twenty-07 data. Please contact Michaela Benzeval, the Research Project Director (Michaela@sphsu.mrc.ac.uk), in the first instance to explore potential ideas.

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