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NATIONAL BUILDING STUDIES

Special Report No. 14

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An Inquiry into
**DOMESTIC HOT
WATER SUPPLY**
in Great Britain



PART II

The Use of Water Heating Appliances in Summer,
and the Relation between the Usage of Hot Water
and the Appliances Available



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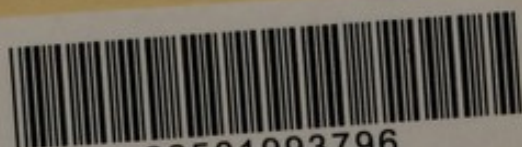
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NATIONAL BUILDING STUDIES

Special Report No. 14

DEPARTMENT OF SCIENTIFIC AND
INDUSTRIAL RESEARCH

(BUILDING RESEARCH STATION)

AN INQUIRY INTO
DOMESTIC HOT
WATER SUPPLY
IN GREAT BRITAIN

PART II

THE USE OF WATER HEATING APPLIANCES IN SUMMER,
AND THE RELATION BETWEEN THE USAGE OF HOT
WATER AND THE APPLIANCES AVAILABLE

LONDON

HER MAJESTY'S STATIONERY OFFICE

1952

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PREFACE

In National Building Studies Special Report No. 8, "An Inquiry into Domestic Hot Water Supply in Great Britain, Part I", the first results were given of an investigation made by the Chief Scientific Adviser's Division of the Ministry of Works into the supply of hot water to households in Britain. The present Report, which was completed after responsibility for the Chief Scientific Adviser's Division had been transferred to the Department of Scientific and Industrial Research in April, 1950, gives an analysis of the remainder of the data obtained in the investigation.

F. M. LEA,

Director of Building Research

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May, 1952.

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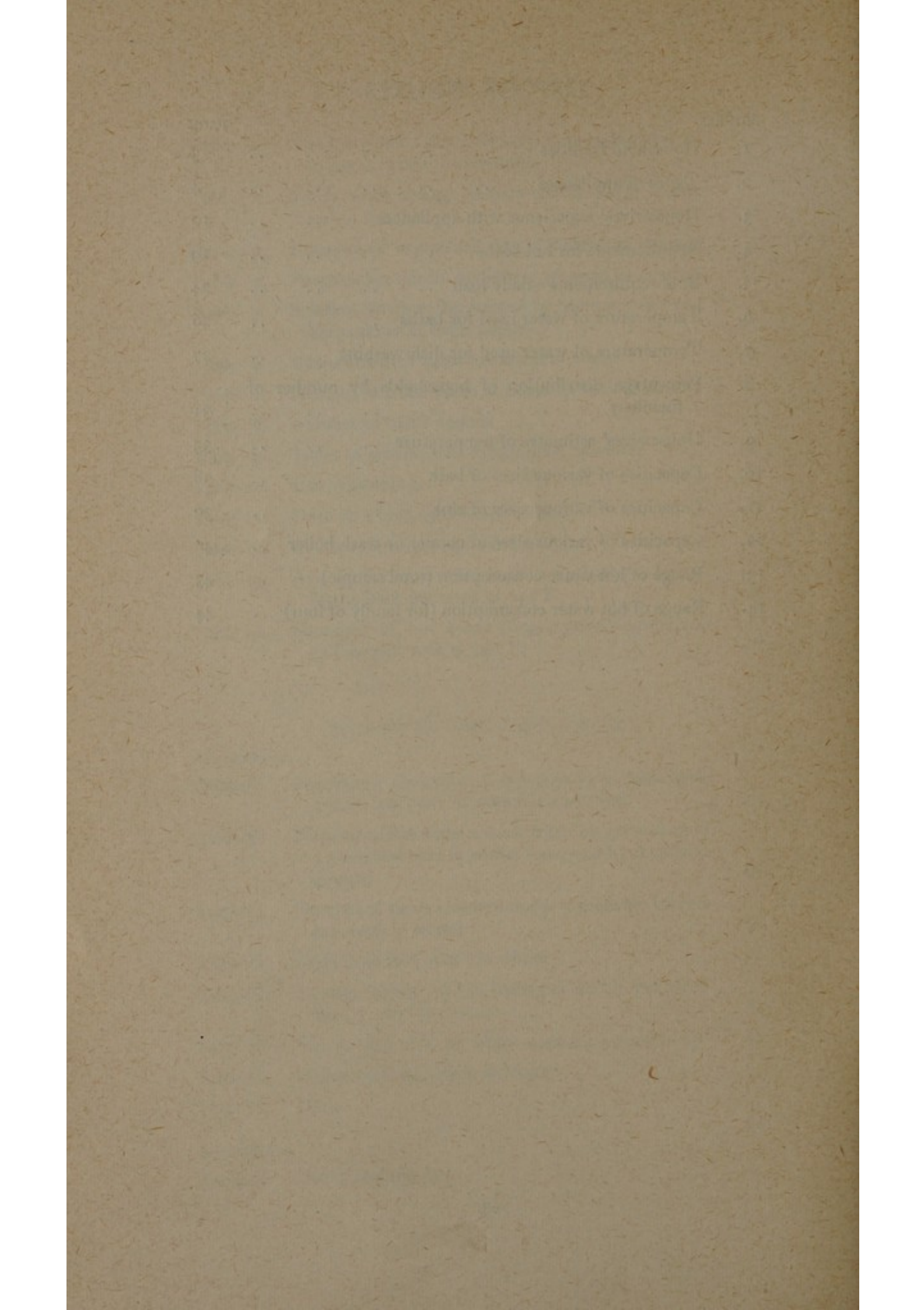
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AN INQUIRY INTO DOMESTIC HOT WATER SUPPLY IN GREAT BRITAIN

PART II. THE USE OF WATER HEATING APPLIANCES IN SUMMER, AND THE RELATION BETWEEN THE USAGE OF HOT WATER AND THE APPLIANCES AVAILABLE.

Introduction

THE objects of the inquiry into Domestic Hot Water Supply in Great Britain were to determine :—

The distribution of existing hot water appliances and facilities ;

The relation between the consumption and use of hot water and the appliances available ; and

The amount of hot water adequate for the average household.

The inquiry was carried out by means of two surveys on a national scale and three smaller intensive surveys. Particulars of the surveys are as follows :

SURVEY	SUBJECT	NO. OF HOUSEHOLDS SURVEYED	CARRIED OUT DURING
National Survey	Water heating appliances and their use in winter	5,997	March, 1947
National Survey	Water heating appliances and their use in summer	2,000	August and September, 1948
Temperature Survey	Temperature at which hot water is used	97	April-July, 1947
Consumption Survey	Amount (and temperature) of hot water used in winter	326	February-April, 1948
Consumption Survey	Amount (and temperature) of hot water used in summer	279	July-September, 1948

The surveys were planned by the Social Survey Panel of the Scientific Advisory Committee to the Ministry of Works, on which assessors from the following Government Departments also served : Ministry of Health, Ministry of Fuel

and Power, Department of Scientific and Industrial Research and the Central Office of Information.

The arrangements for the national surveys were made by Miss K. Box, B.A., and Mr. P. G. Gray of the Social Survey, Central Office of Information, and those for the intensive surveys by Mrs. P. G. Allen, the Executive Officer to the Panel. The field work for the national surveys was carried out by Research Services Ltd. according to the design and instruction of the Social Survey. The field work for the intensive surveys was carried out by the Chief Scientific Adviser's Division of the Ministry of Works.* Copies of the instructions to interviewers and of the questionnaire for the summer national survey are given in Appendix 6.

Mr. P. G. Gray prepared the report on which Part I was based and on which the earlier sections of Part II are also based.

Part II has been written by Mrs. P. G. Allen with the statistical assistance of Miss O. M. Castle, B.A.

Grateful acknowledgement is made to all who assisted in the inquiry; to the Local Authorities in whose areas the surveys were carried out; and, in particular, to those housewives and their families who kept records of hot water consumption.

In this present Special Report, which forms Part II of the full report, the analysis of the data obtained during the winter national survey is completed, and the results of the summer national survey and the three smaller surveys are given.

RESUMÉ OF PART I

Part I of the report, giving the leading results of the first national survey, was published in March 1950⁽¹⁾, under the title of "Distribution of Water Heating Appliances and their Use in Winter". The survey covered 5,997 households. These comprised 4,801 urban and 1,196 rural households, and it was found that, of these, 3 per cent and 21 per cent respectively had no piped supply of cold water (nearly all those households occupied dwellings erected before 1914). Similarly, 15 per cent of urban households and 16 per cent of rural households had no means of heating water, other than by kettles and pans.

Figures 1 and 2 show diagrammatically the national distribution of facilities and appliances. In many cases, the numbers of the individual gas or electric appliances found in the sample were too small for their distribution to be taken as representative of the country as a whole†. (Additional information provided by the North Thames Gas Board relating to the distribution of appliances in their area and information provided by the British Electricity Authority is given in Appendix 5.)

One of the most striking findings of the survey was that 13 per cent of urban households and 9 per cent of rural households had no baths.

* On 1st April, 1950, the Chief Scientific Adviser's Division of the Ministry of Works was transferred to the Building Research Station of the Department of Scientific and Industrial Research.

† See Part 1, page 45.

Detailed percentages for the various Regions are given below, together with percentages in relation to the national sample.

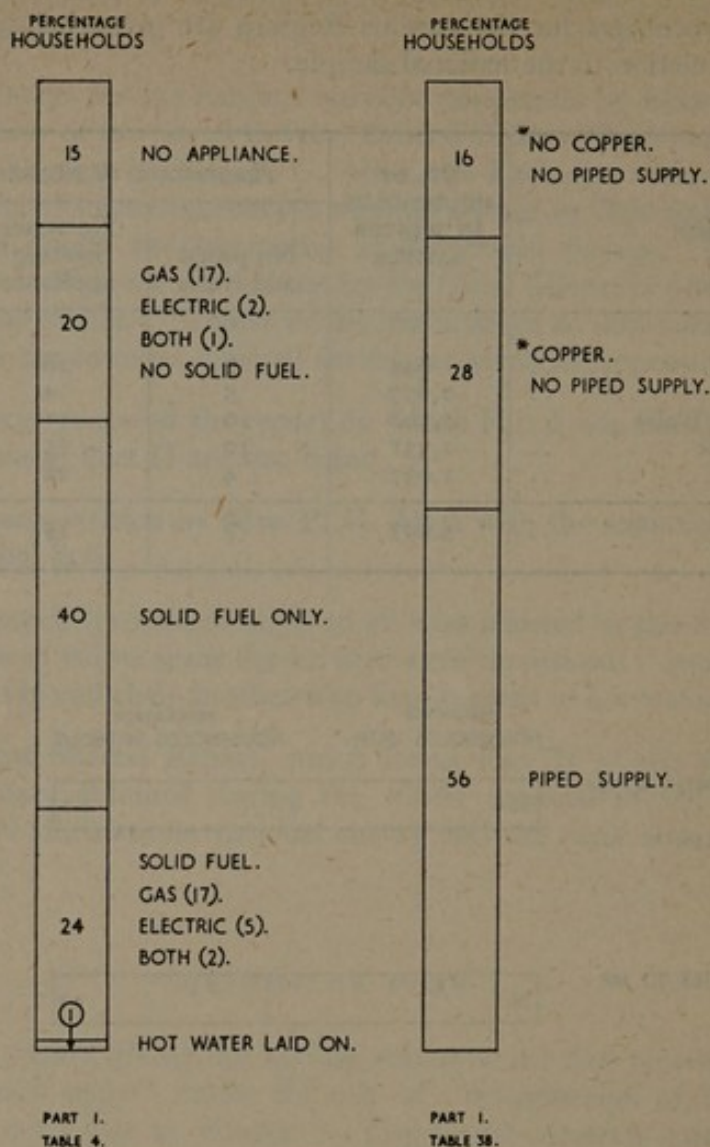
REGION	NO. OF HOUSEHOLDS IN WINTER SAMPLE	PERCENTAGE OF HOUSEHOLDS WITH :		
		No piped cold water	No water heating appliance	No bath
Scotland	644	7	28	35
North	1,677	5	9	9
Midlands and Wales .. .	1,308	10	11	6
South and East	1,331	10	15	7
London	1,037	4	22	14
Total	5,997	7	15	12

	PERCENTAGE HOUSEHOLDS WITH.	PERCENTAGE HOUSEHOLDS WITHOUT.	
COLD WATER TO TAP.	93	7	PART I TABLE 1
HOT WATER TO TAP.	56	44	PART I TABLE 8
BATHROOM.	46	54	PART I TABLE 12
HOT WATER TO SINK, BATH AND HANDBASIN.	36	64	PART I TABLE 8
* TANK LAGGED.	15	85	PART I TABLE 41

* HOUSEHOLDS WITH HOT-WATER TANKS.

FIG. 1. HOUSEHOLD FACILITIES
(National Survey: March 1947—5,997 Households)

DOMESTIC HOT WATER SUPPLY



* COPPER, WASH-BOILER OR SET-POT.

FIG. 2. TYPES OF APPLIANCES

(National Survey : March 1947—5,997 Households.)

A piped supply of hot water to bath, sink, and hand basin is now regarded as essential in dwellings, but it was found that this was available to only 36 per cent of the households in the national sample.

In addition to facts and figures relating to water heating appliances and to the use made of them, Part I also gave information regarding housewives' experience with their appliances, and the degrees of satisfaction with which they regarded the performance of their hot water appliances, under winter conditions.

Although no specific inquiry was made in any of the surveys into the cost of water heating, the national surveys, which were primarily concerned with the distribution of appliances and user reaction showed, as might be expected, that the higher economic groups had in general more efficient water heating appliances

than the lower groups, and the smaller scale consumption surveys showed that consumption increased with improvement in methods of providing hot water. Hot water consumption is thus at present greater in the higher economic groups. It may well be however that if more efficient water heating appliances become available at acceptable costs to the lower economic groups the present large differences between those groups would disappear. It would further seem that the average requirement for a household of four persons judged by the results of the survey would then be 300 gallons per week at 140°F., a result not far removed from that originally recommended* by the Egerton Committee.

This provision at the moment seems unlikely of attainment at an acceptable weekly cost on current prices except where solid fuel appliances are used. It is, however, possible to obtain 150 gallons by gas or electric water heaters at an acceptable cost, and this quantity should perhaps be regarded as a minimum provision for existing dwellings of all types.

Use of Appliances

THE SAMPLE

Information relating to the seasonal use of appliances † has been obtained from the results of a winter survey of a national sample of nearly 6,000 households, carried out in March 1947, and a summer survey of a national sample of 2,000 households carried out in August and early September 1948; this sub-sample was taken from the original sample of 6,000. It was decided to select for the summer inquiry, only a proportion of the households having the more common appliances or groups of appliances as found during the winter inquiry, but to include all households having the less common appliances or groups of appliances.‡ For the winter survey the weather was exceptionally severe, but for the summer survey normal conditions were experienced. For ease of comparison with Part I, the numbers of households and of appliances quoted in this report are the actual figures for the winter sample.

SEASONAL USE

Frequency of use of appliances is an important factor in relation to the consumption of hot water and in Tables 1 and 2 this is considered for some of the more common types of appliances.

* Heating and Ventilation in Dwellings. Post-War Building Studies No. 19. H.M.S.O. 1945. 2s. 6d. net.

† For definitions of appliances see Part I, page 5, and also Appendix 6 of this report, Instructions to Interviewers. For notes on appliances see Part I, pages 45 to 47.

‡ The sampling fractions were :
one-fifth of households with no appliances,
one-eighth of households with coppers only,
one-fifth of households with fires with ovens (combination grates and free standing stoves) and another appliance,
one-third of households with inset fires (back boilers),
one-half of households with a single point gas geyser and another appliance (but not another single point gas geyser),
all households having any other type of appliance or combination of appliances.

TABLE 1. NUMBER OF DAYS PER WEEK ON WHICH APPLIANCES ARE IN USE IN WINTER AND IN SUMMER

TYPE AND NUMBER OF APPLIANCES IN WINTER SAMPLE			PERCENTAGE OF APPLIANCES IN USE						AVERAGE NUMBER OF DAYS PER WEEK APPLIANCES ARE IN USE
			Every day	4-6 days	3 days	2 days	1 day	Not used	
STORAGE HEATERS									
<i>Solid fuel</i>									
Inset fire .. (688)	W	96	←		3	→	1	6.8	
	S	27	5	16	17	14	21	3.1	
Fire with oven .. (1,350)	W	96	←		3	→	1	6.8	
	S	40	9	14	17	8	12	4.1	
Independent boiler (391)	W	90	←		9	→	1	6.6	
	S	33	9	16	21	14	7	3.8	
Electric storage .. (207)	W	88	←		7	→	5	6.4	
	S	83	4	3	4	2	4	6.2	
Immersion .. (249)	W	38		6	11	14	9	22	3.7
	S	67	10	8	5	5	5	5.6	
COPPERS									
Solid fuel (1,613)	W	2	1	4	17	60	16	1.2	
	S	2	5	7	18	47	21	1.4	
Gas (1,826)	W	3	2	6	16	65	8	1.5	
	S	7	5	11	20	50	7	2.0	
Electric (232)	W	4	2	6	14	72	2	1.6	
	S	5	18	8	15	52	2	2.3	

NOTE.—In all Tables, W and S indicate Winter and Summer respectively. In the sample of 5,997 households there were 7,380 appliances; 15 per cent of households had no appliances. For ease of comparison with Part I, the numbers of households and of appliances quoted in this report are the actual figures for the winter sample. Gas storage heaters are not included since so few were found in the winter sample (54 out of 7,380 appliances covering 1 per cent of households). The numbers of electric appliances found in the sample are too small for their distribution to be taken as representative of the country as a whole.

Table 1 shows the number of days each week and Table 2 the times during the day when appliances are in use in winter and in summer. The inset fire and the fire with oven are primarily space heaters, so that their extensive use in winter is expected. Over 90 per cent are in use every day and all day, but 4 per cent only are used overnight. It is, however, unlikely, except in some post-war houses, that appliances of these types are designed for overnight burning. The third group of the solid fuel appliances shown in Table 1 is the independent boiler: this appliance is designed for continuous burning and 63 per cent are kept alight continuously in winter.

In summer, the tendency is for more inset fires and fires with ovens to be alight in the evening rather than in the morning or afternoon. The times of use of independent boilers are different: similar proportions are alight in the morning

and in the evening, and fewer in the afternoon. Daily use is made of 27 per cent of inset fires, 40 per cent of fires with ovens and 33 per cent of independent boilers.

TABLE 2. TIMES WHEN STORAGE HEATERS ARE IN USE IN WINTER AND IN SUMMER

TYPE AND NUMBER OF APPLIANCES IN WINTER SAMPLE		PERCENTAGE OF APPLIANCES IN USE DURING :				
		Morning (6 a.m.— 1 p.m.)	Afternoon (1 p.m.— 5 p.m.)	Evening (5 p.m.— 11 p.m.)	Overnight (11 p.m.— 6 a.m.)	All the time
STORAGE HEATERS						
<i>Solid fuel</i>						
Inset fire (688)	W	93	—96—		4	3
	S	37	47	68	2	2
Fire with oven .. (1,350)	W	95	—95—		4	4
	S	52	47	61	1	1
Independent boiler (391)	W	96	—95—		63	63
	S	50	39	51	14	14
Electric storage .. (207)	W	90	—90—		34	34
	S	39	23	33	14	14
Immersion (249)	W	60	—60—		12	8
	S	58	23	42	17	12

The number of electric storage heaters used daily show little seasonal variation—88 per cent in winter and 83 per cent in summer, but the times of use show considerable variation ; for example, in the morning 90 per cent are used in winter and 39 per cent in summer.

Immersion heaters, however, are usually installed in conjunction with a solid fuel appliance, and seasonal variation in use is associated with use of the solid fuel appliance. Rather more than one-third of immersion heaters are used every day in winter and two-thirds in summer.

Gas storage heaters are not included in some of the Tables as so few were found in the sample (54 out of 7,380 appliances).

Coppers are generally in use once or twice a week only, though there is a tendency to more frequent use in summer than in winter.

Briefly, seasonal use can be summarized as follows :

Solid fuel storage heaters : nearly all used in winter, one-third used daily in summer.

Electric storage heaters : as many used each day in either season, but at fewer times during the day in summer.

Immersion heaters : twice as many used daily in summer as in winter.

Coppers : more frequently used in summer.

APPLIANCES NOT USED

Among appliances not used in summer, the solid fuel appliances predominate ;

21 per cent of inset fires, 12 per cent of fires with ovens and 7 per cent of independent boilers are not used in summer.

About 4 per cent of electric storage heaters are not used at any time in either season. In summer 5 per cent and in winter 22 per cent of immersion heaters are also not used.

In summer 21 per cent and in winter 16 per cent of solid fuel coppers are not used ; 7-8 per cent of gas coppers and 2 per cent of electric coppers are not used in either season.

No evidence of the age, efficiency or state of repair of these unused appliances was collected.

EXPERIENCE IN USE

Housewives were asked in the summer inquiry " Does use of the appliance for water heating in summer cause serious inconvenience in any way ? " Serious inconvenience due to overheating the house was reported by 30 per cent of housewives using inset fires, 30 per cent using fires with oven, and 25 per cent using independent boilers.

In addition, the question on satisfaction with the performance of the appliances for water heating asked in the winter inquiry was repeated. The replies from the winter survey are given in Table 10 of Part I and those from the summer inquiry in Table 3 of Part II.

Housewives were asked in Question 6 (Appendix 6) " Is the appliance unsatisfactory ? ", thereby drawing attention to defects in the service provided. In studying Table 3, it should be remembered that user satisfaction with any appliance is governed not only by the technical performance of that appliance, but also by the service the user expects it to provide. Too much emphasis should not be placed on the relative degrees of satisfaction where the number of appliances in the sample are small. It was not possible to take into account the age, efficiency, state of repair or efficiency of lagging of appliances, nor to assess the skill of housewives in the management of their appliances.

In drawing conclusions from these results, it should be appreciated that the possession of more than one appliance may have influenced the degree of satisfaction afforded by each. The degree of satisfaction afforded would no doubt have been materially increased had the sample comprised only households with the improved types of appliances now available.

More housewives express satisfaction with independent boilers than with other types of solid fuel water heaters ; this is to be expected, since the primary purpose of an independent boiler is water heating.

Electric immersion and storage heaters are considered satisfactory by more housewives than are solid fuel appliances ; this also applies to gas and electric coppers.

The terms of reference for the present surveys did not include an investigation into costs of water heating. Some evidence, however, is available and is given on page 51 ; costs are clearly an important factor in assessing satisfaction.

TABLE 3. HOUSEWIVES' EXPERIENCE WITH APPLIANCES IN SUMMER
(See Part I, Table 10)

PERCENTAGE OF APPLIANCES CONSIDERED BY THE HOUSEWIFE TO BE:												
TYPE OF APPLIANCE	NUMBER OF APPLIANCES IN WINTER SAMPLE	REASONS FOR DISSATISFACTION										
		SATISFACTORY FOR WATER HEATING	NOT SATISFACTORY FOR WATER HEATING	Bother to light, keep going, adjust, etc.	Often in need of repair	Water does not get hot enough	Not enough hot water at a time	Takes too long to get hot	Have to run water slowly	Expensive, uses too much fuel, etc.	Dirt, smells, fumes, drips, etc.	Other*
STORAGE HEATERS												
Solid fuel	688	76	24	4	1	4	8	16	2	1	1	3
Inset fire ..	1,350	73	27	5	6	7	12	14	—	2	2	4
Fire with oven ..	391	81	19	7	1	2	3	4	—	3	2	7
Independent boiler ..												
Gas												
Storage† ..	54	64	36	—	2	—	14	21	—	19	—	—
Electric												
Storage† ..	207	86	14	—	1	—	9	4	—	2	—	—
Immersion† ..	249	88	12	—	1	2	2	5	—	5	—	5
INSTANTANEOUS												
Gas												
Single-point ..	633	80	20	2	3	4	4	7	8	1	1	4
Multi-point ..	90	68	32	4	5	18	1	7	16	4	1	2
COPPERS												
Solid fuel	1,613	73	27	17	8	1	4	11	1	2	2	2
Gas ..	1,826	90	10	3	1	1	2	4	1	2	1	5
Electric	232	92	8	—	1	1	1	4	3	2	—	1
HOT WATER LAID ON	47	91	9	—	—	4	4	4	—	—	—	4

* Mainly lack of piping and structural defects.

† The numbers of the individual appliances are too small for their distribution, to be taken as representative of the country as a whole.

The comparative results for winter and summer are shown in Fig. 3.

In general, appliances are found to be more satisfactory for water heating in summer than in winter; this is no doubt partly explained by the higher temperature of the cold water supply in summer than in winter—see Appendix 3. Housewives were not asked to say whether they considered the appliances satisfactory for the supply of hot water for particular purposes.

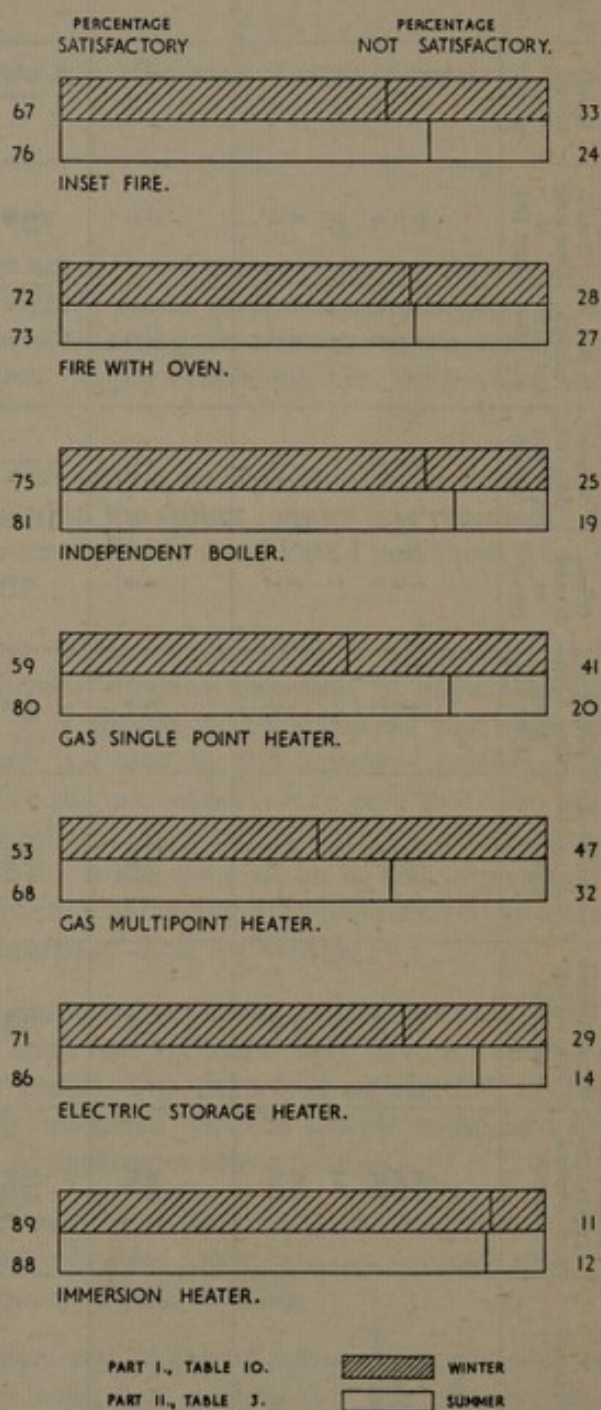


FIG. 3. HOUSEWIVES' EXPERIENCE WITH APPLIANCES
(National Surveys: March 1947—5,997 Households
August–September 1948—2,000 Households)

The results show that the greater degree of satisfaction with performance in summer applies to the solid fuel appliances as well as to the electric storage and gas instantaneous heaters and to the coppers and hot water laid on. However, the space feature of the solid fuel appliances cannot be ignored in hot weather.

No seasonal variation was found in the proportion of housewives expressing satisfaction with immersion heaters.

USE FOR VARIOUS PURPOSES

The purposes for which appliances are used in summer are shown in Table 4. (The corresponding table for winter use is Table 11 of Part I.) The method of analysis adopted does not enable information to be obtained relating to the number of households heating water, for various purposes, by different appliances or groups of appliances.

Table 4 shows that 57 per cent of the independent boilers and rather more than a third of the other solid fuel storage appliances are used for all purposes in summer. These proportions are considerably less than those in winter. Fewer gas and electric storage heaters, but more immersion heaters, are used for all purposes in summer than in winter. There is no seasonal variation in the use of instantaneous gas single point heaters, but slightly fewer multi-point gas heaters are used in summer. More coppers of all types are used in summer. On balance, it can be concluded that fewer water heating appliances are used for all purposes in summer than in winter.

No strong seasonal variation is indicated in the total number of appliances used for heating bath water. Although fewer solid fuel space heating appliances are used for heating bath water in summer than in winter, the percentages are still very high, viz.: fires with oven 86 per cent; inset fires 77 per cent. No seasonal variation is shown for gas storage and instantaneous heaters, but more electric storage heaters, more immersion heaters and more coppers of all kinds are used in summer than in winter for heating bath water. The increased use of coppers for heating bath water in summer shows that more people carry hot—probably very hot—water from the kitchen to the bathroom in summer. This practice is liable to lead to accidents in passages and on stairs.

The need for hot water in the home for clothes washing is amply demonstrated by the extent of use made of all appliances for this purpose. The most commonly used appliance for clothes washing is the copper.

SMALL AND BULK REQUIREMENTS

Hot water required for dish-washing, house cleaning or personal ablution, *i.e.*, washing at the hand basin, may be classified as small quantity requirements, whereas hot water required for baths or clothes washing can be classified as bulk requirements.

TABLE 4. PURPOSES FOR WHICH APPLIANCES ARE USED IN SUMMER
(See Part I, Table II)

TYPE OF APPLIANCE	NUMBER OF APPLIANCES IN WINTER SAMPLE	PERCENTAGE OF APPLIANCES USED FOR :										
		Baths	Washing	Washing clothes	Dish washing	House cleaning	All purposes	Baths only	Bath and washing only	Washing clothes only	Other purposes	Not used
STORAGE HEATERS												
Solid fuel												
Inset ..	688	77	60	48	54	59	42	14	1	—	22	21
Fire with oven ..	1,360	86	71	45	65	73	36	13	3	—	36	12
Independent boiler ..	391	91	68	77	69	73	57	6	—	1	29	7
Gas												
Storage ..	54	62	33	57	38	55	17	21	2	10	43	7
Electric												
Storage ..	207	57	82	63	82	81	43	4	4	1	44	4
Immersion ..	249	93	80	72	71	72	60	12	6	—	17	5
INSTANTANEOUS												
Gas												
Single-point ..	633	69	43	36	37	39	12	42	6	1	33	6
Multi-point ..	90	94	83	79	65	63	57	5	7	—	26	5
COPPERS												
Solid fuel	1,613	38	8	74	4	6	4	5	—	36	36	21
Gas ..	1,826	38	4	84	4	8	4	1	—	49	40	7
Electric ..	232	45	11	94	9	11	6	2	1	54	35	2

The extent to which various appliances are used in summer for small and bulk requirements is summarized below :

					<i>Small requirements (per cent)</i>	<i>Bulk requirements (per cent)</i>
Independent boiler .. .. .	..	..	..	..	73	91
Fire with oven .. .. .	..	..	..	..	73	86
Inset fire .. .. .	..	..	..	..	60	77
Gas storage .. .. .	..	..	..	..	55	62
Gas single point .. .. .	..	..	..	..	48	69
Gas multi-point .. .. .	..	..	..	..	83	94
Electric storage .. .. .	..	..	..	..	82	62
Immersion heater .. .. .	..	..	..	..	80	93
Solid fuel copper .. .. .	..	..	..	..	8	74
Gas copper .. .. .	..	..	..	..	8	84
Electric copper .. .. .	..	..	..	..	11	94

As would be expected, coppers are rarely used for small requirements. There is, however, no information available on the frequency of use of kettles and pans when small quantities of hot water are needed. It is, of course, particularly difficult to obtain reliable data on frequency of occurrence of small operations on a national survey.

Bath Water

VALIDITY OF DATA

Information relating to the use of hot water for baths has been obtained from the results of the two national surveys.

Information relating to personal habits is particularly liable to criticism, as proof of its validity is always difficult, and, for a national survey, impracticable. It may, for example, be contended that there is a tendency for people to say they bath more frequently than they actually do. It might also be contended that in view of the extremely cold weather and severe fuel restrictions in force at the time of the winter survey the figures for the numbers of baths taken are on the high side and are not true for the actual period of the inquiry, though they may refer to usual practice. However, although the absolute figures may be open to doubt, their relative values are indicative of the extent of the desire for baths.

NUMBER OF BATHS

The average numbers of hot baths taken per person per week in winter have been classified on a basis of households into four categories : (i) 5 or more ; (ii) 2-4 ; (iii) about 1 ; and (iv) less than 1 or none.

Although more hot baths are taken in summer than in winter, the general pattern is similar for both seasons. The percentages of households taking various numbers of baths are as follows :

	<i>Summer</i>	<i>Winter</i>
(i) Five or more baths weekly per person ..	7	5
(ii) Two to four baths weekly per person ..	39	29
(iii) One bath weekly per person	46	59
(iv) Less than one bath weekly per person ..	8	7

There is no significant variation in this general pattern between urban and rural districts, but certain variations are observed when the results are considered by regions. For example, in Scotland the figure for households in category (iv) is relatively high, but this is to be expected as Table 12 of Part I shows that 35 per cent of households in the sample for Scotland have no bath. Only 17 per cent of households without a bathroom have an average of more than two baths per person per week. Access to a shared bathroom increases this proportion to 35 per cent, while possession of a bathroom raises the figure to 49 per cent. (See Appendix I—Table E.)

In 11 per cent of households, bath-water is sometimes shared; there is little variation between regions or between economic groups in this respect. (See Appendix I—Table D.)

The quantity of water required for a bath will depend, of course, on the size of bath used, as well as on personal preference regarding depth and temperature of the water. It is, therefore, pertinent to note that 70 per cent of children under four years of age are bathed in a baby's bath or in the sink. (Quantities of hot water used for baths are shown in Table 13, page 42, and the capacities of baths of various sizes are shown in Figure 10, page 38; see also Appendix 1—Table F.)

RELATION BETWEEN THE NUMBER OF BATHS AND THE METHOD OF HEATING WATER

Table 5 shows the relation between the number of baths taken and the method of heating water for households heating bath water by one method only.

Households having hot water laid on show the highest percentage (55) for an average of five or more hot baths a week in summer, while those having immersion heaters and multi-point geysers show the two next highest percentages (26 and 22).

In winter, households with hot water laid on again show the higher percentage (30) while households having independent boilers come next (25); such households appear most frequently in the highest economic groups. (See Part I—Table 7).

WHERE BATHS ARE TAKEN

Not all baths are taken at home. Table 9 shows that, in winter, out of the entire sample of households 80 per cent take all their baths at home, 9 per cent take some or all at public baths, 6 per cent take some or all elsewhere, while 5 per cent are in the no-bath category, which covers those households where for various reasons baths are not taken. This may be due to lack of a fixed or a portable* bath, lack of a piped supply of hot water, disabilities due to old age or other causes or the use of other means of personal ablution.

The order of the economic† groups is reflected in the order of the percentage of households taking baths at home. (See also Appendix I—Tables G and H).

The lack of bathrooms and appliances in Scotland is reflected in the very high proportion of households using public baths when compared with other regions.

* Percentage of households with portable baths are shown in Part I—Table 12.

† For definitions of economic groups see footnote to Table 6 and Part I, page 2.

TABLE 5. RELATION BETWEEN THE METHOD OF HEATING WATER AND THE NUMBER OF BATHS TAKEN

TYPE OF APPLIANCE	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE USING ONE METHOD ONLY		PERCENTAGE OF HOUSEHOLDS IN WHICH THE AVERAGE NUMBER OF BATHS PER WEEK PER PERSON AGED 5 AND OVER IS :			
			5 or more	2-4	About 1	Less than 1
STORAGE HEATERS						
<i>Solid fuel</i>						
Inset fire	563	W	4	39	57	—
		S	4	42	54	—
Fire with oven ..	1,114	W	7	39	53	1
		S	10	43	46	1
Independent boiler	369	W	25	48	27	—
		S	15	62	23	—
<i>Electric</i>						
Storage	86	W	13	38	49	—
		S	11	60	29	—
Immersion	199	W	14	55	31	—
		S	26	54	19	1
INSTANTANEOUS						
<i>Gas</i>						
Single point ..	367	W	4	32	63	1
		S	17	46	37	—
Multi-point ..	72	W	11	47	42	—
		S	22	46	32	—
COPPERS						
<i>Solid fuel</i>						
	311	W	—	13	85	2
		S	—	25	75	—
Gas	329	W	1	14	82	3
		S	5	41	50	4
Electric	52	W	—	15	85	—
		S	—	47	53	—
KETTLES AND PANS ..	1,100	W	2	21	72	5
		S	4	37	58	1
HOT WATER LAID ON ..	37	W	30	43	24	3
		S	55	30	15	—

DOMESTIC BATH WATER LOAD

The bath water load is not distributed evenly throughout the day, nor evenly throughout the week. Table 6 shows the times of the day when baths are taken at home. The percentages add up to more than 100 as, of course, in some households baths are taken during more than one period of the day.

The evening, from 5 p.m. onwards, is the most popular time for the hot bath ; in 80 per cent of households baths are taken at this time. Baths are taken in

22 per cent of the households in the afternoon, and in 12 per cent in the morning. Seasonal variation is slight. More hot baths are taken in the morning in the southern parts of the country than elsewhere.

TABLE 6. TIMES AT WHICH BATHS ARE TAKEN AT HOME

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE		PERCENTAGE OF HOUSEHOLDS TAKING BATHS IN THE :			NONE TAKEN AT HOME
			Morning (before 1 p.m.)	Afternoon (1-5 p.m.)	Evening (after 5 p.m.)	
DISTRICT*						
Urban	4,801	W	12	25	80	12
Rural	1,196	W	10	17	86	9
REGION						
Scotland	644	W	4	10	62	35
North	1,677	W	8	25	85	9
Midland and Wales	1,308	W	12	28	87	6
South and East ..	1,331	W	15	24	83	7
London	1,037	W	17	24	76	14
ECONOMIC GROUP†						
I	667	W	4	14	60	29
II	476	W	9	18	74	18
III	2,619	W	9	24	81	12
IV	1,757	W	14	27	88	5
V	478	W	33	27	92	1
Number of households in sample	5,997	W S	12 13	23 21	81 79	12 15

Percentages add up to more than 100 as in some households baths are taken at various times, for example, both in the morning and in the evening.

* The division is by administrative area: county boroughs, boroughs and urban districts count as urban. The regions are given in detail in Part I, page 2.

† The economic grouping is on the basis of the weekly wage rate of the chief wage earner and is described in Part I, page 2: I up to £3, II over £3 and up to £4, III over £4 and up to £5. 10s. od., IV over £5. 10s. od. and up to £10, V over £10. The classification used is that of the Social Survey; the numbering is in reverse order to that for the classification of occupations used by the General Register Office which is: I Professional, II Intermediate, III Skilled, IV Partly skilled, V Unskilled.

There has been a general advance in wage rates since the field work was carried out in 1947 and 1948, the greatest proportionate increases being in the lower rates. The distribution of households amongst the groups, however, is unlikely to be seriously affected. Group I is still the pensioner group, Group II the unskilled operative, and although more of the better paid unskilled operatives are now perhaps in Group III than in 1947, the number is not thought to be great. Group III incidentally includes also the lower paid skilled operative and the lower paid clerical worker. Group IV may also now have rather more better paid skilled operatives than before. This group includes also the better paid clerical workers and the lower paid managerial and professional workers. Group V comprises as before the better paid managerial and professional workers.

Table 7 shows the number of baths taken at home on various days. Baths are taken more frequently at the weekend than during the week. There is no seasonal

TABLE 7. NUMBER OF BATHS TAKEN AT HOME ON VARIOUS DAYS

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE		PERCENTAGE OF HOUSEHOLDS IN WHICH BATHS ARE TAKEN ON :								No baths taken at home
			Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	No regular day(s)	
DISTRICT											
Urban	4,801	..	22	11	11	14	12	26	30	41	12
Rural	1,196	..	15	11	9	12	9	23	31	47	9
REGION											
Scotland	644	..	11	6	6	7	6	14	11	42	35
North	1,677	..	16	9	10	11	11	23	23	54	9
Midland and Wales	1,308	..	22	13	12	15	13	27	33	45	6
South and East	1,331	..	22	12	11	14	11	29	39	34	7
London	1,037	..	28	14	15	19	16	31	37	29	14
ECONOMIC GROUP											
I	667	..	8	3	2	5	4	14	19	35	20
II	476	..	12	5	5	8	6	14	24	45	18
III	2,619	..	19	9	8	11	9	26	29	40	12
IV	1,757	..	25	14	14	17	15	29	33	46	5
V	478	..	39	33	33	36	34	38	42	48	1
Number of households in sample	5,997		20	11	11	14	12	25	30	42	12
			23	18	18	19	17	30	31	41	15

Percentages add up to more than 100 as in some households baths are taken on various days.

variation in this preference which is also found to be maintained for urban and rural districts, and for all the economic groups.

In 8 per cent of households in winter, hot baths are taken every day, whereas in 16 per cent of households hot baths are taken on one day only. In either season 41 per cent of households have no regular bath days. In 29 per cent of households in the highest economic group (V) hot baths are taken every day compared with 1 per cent of households in the lowest economic group (I). Operative factors are likely to be the cost of heating water as well as the ease of obtaining hot water.

REQUIREMENTS FOR HOT BATHS

Housewives were asked (Appendix 5, Question 14) if their households would take more baths if the hot water supply were improved. The replies are summarized in Table 8 and show that in four out of five of the economic groups there is a desire for more hot baths in two-thirds of the households. In the highest economic group, where baths are now taken most frequently, a one-third increase is desired.

TABLE 8. NUMBER OF BATHS DESIRED

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE		PERCENTAGE OF HOUSEHOLDS		
			Now taking 5 or more baths weekly	Now taking 2 to 4 baths weekly	Where more baths would be taken
AVERAGE NUMBER OF BATHS NOW TAKEN PER PERSON PER WEEK					
5 or more	313	W			26
2 to 4	1,700	W			53
About 1	3,548	W			70
Less than 1 or none	436	W			80
DISTRICT					
Urban	4,801	W	5	29	65
Rural	1,196	W	7	26	59
REGION					
Scotland	644	W	2	23	64
North	1,677	W	4	32	59
Midland and Wales ..	1,308	W	5	30	56
South and East ..	1,331	W	5	23	66
London	1,037	W	8	31	75
ECONOMIC GROUP					
I	667	W	1	10	63
II	476	W	1	19	68
III	2,619	W	3	26	71
IV	1,757	W	7	36	59
V	478	W	25	49	36
Number of households in sample					
	5,997	W S			63 65

The requirements for hot baths are illustrated in Figure 4. It can be expected that, with improved hot water facilities, 64 per cent of households will take more

hot baths, and that the average number of baths per person will increase to about 3 per week, as compared with the average disclosed by the surveys, for persons ages 5 years and over, of 1.6 in winter and 2.0 in summer. (See Appendix 1.)

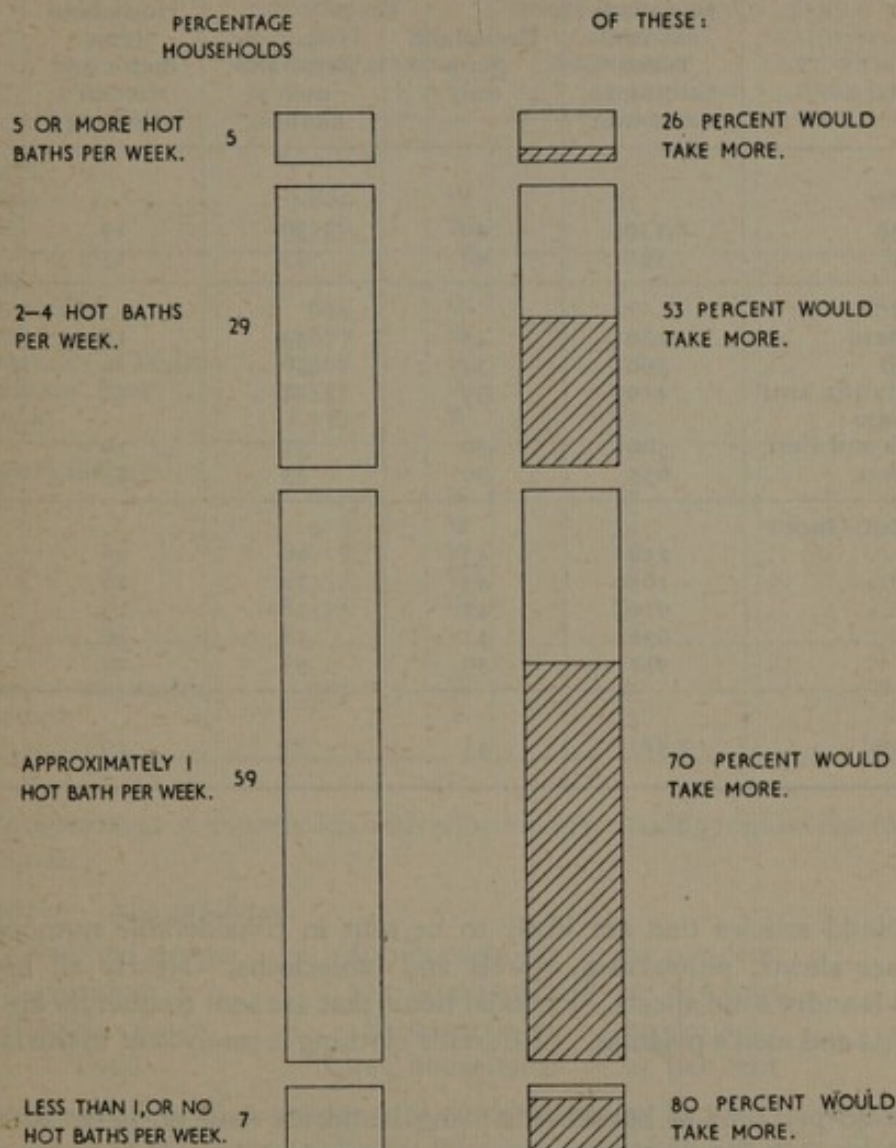


FIG. 4. REQUIREMENTS FOR HOT BATHS
(Tables 5 and 12 refer.)

Clothes Washing

As with the two previous sections, the information on use of hot water for clothes washing has been obtained from the results of the two national surveys.

THE HOUSEHOLD WASH AND LAUNDRY USE

The types of articles sent to laundries are classified in Table 9 as (a) household items only; (b) household items and men's clothing; and (c) household items, men's and women's clothing.

TABLE 9. TYPES OF ARTICLES SENT TO LAUNDRIES IN WINTER

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE USING LAUNDRIES REGULARLY	PERCENTAGE OF HOUSEHOLDS SENDING :			
		Household items only	Household items and men's clothing	Household items, men's and women's clothing	Other
DISTRICT					
Urban ..	2,130	40	36	19	5
Rural ..	391	48	33	15	4
REGION					
Scotland ..	289	45	33	16	6
North ..	598	34	36	22	8
Midlands and Wales	419	39	34	21	6
South and East	560	50	37	10	3
London ..	655	39	35	23	3
ECONOMIC GROUP					
I ..	256	43	28	28	1
II ..	165	43	32	20	5
III ..	910	41	38	17	4
IV ..	838	41	38	16	5
V ..	352	39	35	24	2
Total ..	2,521	41	35	19	5

Household articles that are likely to be sent in considerable numbers to the laundry are sheets, pillowcases, towels and tablecloths. Nearly all households that use a laundry send sheets. Personal items that are sent frequently are overalls, men's shirts and men's pyjamas. Children's clothing is rarely sent to the laundry.⁽²⁾

About 40 per cent of households using laundries send no personal clothing ; in this, there is little variation between districts or regions, or between economic groups. Similarly for households sending men's clothing in addition to household articles there are no marked district or regional differences. There is, however, some variation in practice between the economic groups. The lowest economic group contains the highest proportion of households sending household items and men's and women's clothing to the laundry ; it is probable that this tendency reflects lack of facilities at home.

Table 10 shows that the proportion of households using a laundry regularly is just over 40 per cent for both winter and summer. Households were classified as using a laundry regularly if they sent any article to the laundry at regular weekly or fortnightly intervals. Fewer households use a laundry regularly in rural areas than in urban areas. This variation is no doubt to some extent due to the absence of laundry facilities in sparsely populated areas. Most use is made of laundries by households in the London Region, and for the country as a whole by those in the highest economic group (Group V, 74 per cent).

TABLE 10. USE OF LAUNDRIES

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE		PERCENTAGE OF HOUSEHOLDS USING LAUNDRY REGULARLY	PERCENTAGE OF HOUSEHOLDS WHICH WOULD DO MORE WASHING AT HOME IF HOT WATER SUPPLY WERE IMPROVED
DISTRICT				
Urban	4,801	W	44	20
Rural	1,196	W	33	11
REGION				
Scotland	644	W	45	31
North	1,677	W	36	16
Midlands and Wales	1,308	W	32	13
South and East ..	1,331	W	42	9
London	1,037	W	63	32
ECONOMIC GROUP				
I	667	W	38	19
II	476	W	35	18
III	2,619	W	35	21
IV	1,757	W	48	16
V	478	W	74	8
Number of households in sample	5,997	W S	42 43	— 18

The proportions of households with coppers only making regular use of laundries are as follows :

Copper—only appliance

Solid fuel copper	:	609 households	— 20 per cent
Gas copper	:	715 households	— 27 per cent
Electric copper	:	85 households	— 36 per cent
Total	:	1,409 households	— 25 per cent

Where there is both a copper and some other appliance (1,782 households), the possession of the extra appliance does not appear to affect regular use of a laundry to any considerable extent (28 per cent).

According to type of appliance other than a copper, the proportions of households using laundries regularly are as follows :

No copper, but having some other appliance

Solid fuel :

Inset fire	:	199 households	— 53 per cent
Fire with oven	:	312 households	— 51 per cent
Independent boiler	:	260 households	— 78 per cent

Gas :

Single or multi-point geyser	:	116 households	— 76 per cent
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Electric :

Immersion heater	:	102 households	— 64 per cent
Other methods	:	659 households	— 66 per cent
Total	:	1,648 households	— 64 per cent

DOMESTIC HOT WATER SUPPLY

TABLE II. DAYS ON WHICH CLOTHES ARE WASHED

			NUMBER OF HOUSEHOLDS IN WINTER SAMPLE	PERCENTAGE OF HOUSEHOLDS WITH WASHING DAYS ON : *							
				Sunday	Monday	Tuesday	Wednes- day	Thursday	Friday	Saturday	No special day
DISTRICT											
Urban ..	..	..	4,801	W	54	12	5	3	3	3	29
Rural ..	..	..	1,196	W	65	10	3	2	1	2	23
REGION											
Scotland	..	..	644	W	34	16	7	4	3	2	35
North ..	..	..	1,677	W	55	13	5	1	1	2	26
Midlands and Wales	..	..	1,308	W	62	13	4	3	3	3	24
South and East ..	..	..	1,331	W	66	7	3	2	2	4	25
London ..	..	..	1,037	W	54	12	6	5	4	5	35
ECONOMIC GROUP											
I ..	..	..	667	W	42	11	4	1	1	2	40
II ..	..	..	476	W	55	12	5	2	3	3	30
III ..	..	..	2,619	W	58	13	6	3	2	3	23
IV ..	..	..	1,757	W	60	11	4	2	3	3	27
V ..	..	..	478	W	56	8	2	3	3	3	37
Number of households in sample			5,997	W S	56 55	12 9	5 5	3 3	2 2	3 3	28 30

* Some people wash clothes on more than one day in the week.

In households not having a copper, twice as many use a laundry regularly as in households having a copper.

Where kettles and pans are the only method of obtaining hot water, 54 per cent of households regularly use a laundry.

Where there is a satisfactory supply of hot water for clothes washing, and laundry facilities are available and can be afforded, regular use of a laundry may also be expected. This seems indicated by the fact that in the highest economic group 70 per cent of housewives express satisfaction with their hot water supply, but nevertheless 74 per cent use a laundry regularly.

Housewives were asked "Would you do more clothes washing at home if your hot water supply were improved?" (Appendix 6, Question 18.)

Table 14 shows that one in five households in urban areas, and one in three households in Scotland, and also in the London Region, would do more washing at home if there were an improvement in the methods of obtaining hot water. It does not follow that regular use of a laundry would diminish in consequence provided of course that ability to pay for laundry service remains constant; it might be that improved standards of personal and household cleanliness would result.

HOT WATER LOAD FOR CLOTHES WASHING

Table 11 is a confirmation in figures that Monday is the popular wash-day; washing then takes place in about 55 per cent of households. In Scotland the proportion is lower with 34 per cent. Tuesday is the next most popular day, although the proportion does not rise above 16 per cent for any regional or economic group. In 28 per cent of households there is no regular wash day.

Table 11 gives details for the winter season only; no inconsistency for the summer season was observed from the analysis of the data.

In Figure 5 the relation between the daily bath water load and the daily clothes washing load is illustrated. The significance of the Monday wash-day as a peak load period is apparent as against the greater spread-over of the week-end bath water load. This relationship will be of special interest to those responsible for the maintenance of large-scale central hot water schemes; variations in local practice will be of importance and allowance must be made for the high proportion of households where there are no regular bath days (42 per cent) and where there is no special wash-day (28 per cent).

Dish-Washing

In general, fewer appliances are used for heating water for dish-washing in summer than in winter; this is true for all types of appliances except the single point geyser, where no seasonal variation is shown, and coppers, where slightly more are used. The inference is, of course, that greater use is made of kettles and pans for this purpose in summer. There may also be less need of hot water for dish-washing in summer, at least for certain types of meals.

DOMESTIC HOT WATER SUPPLY

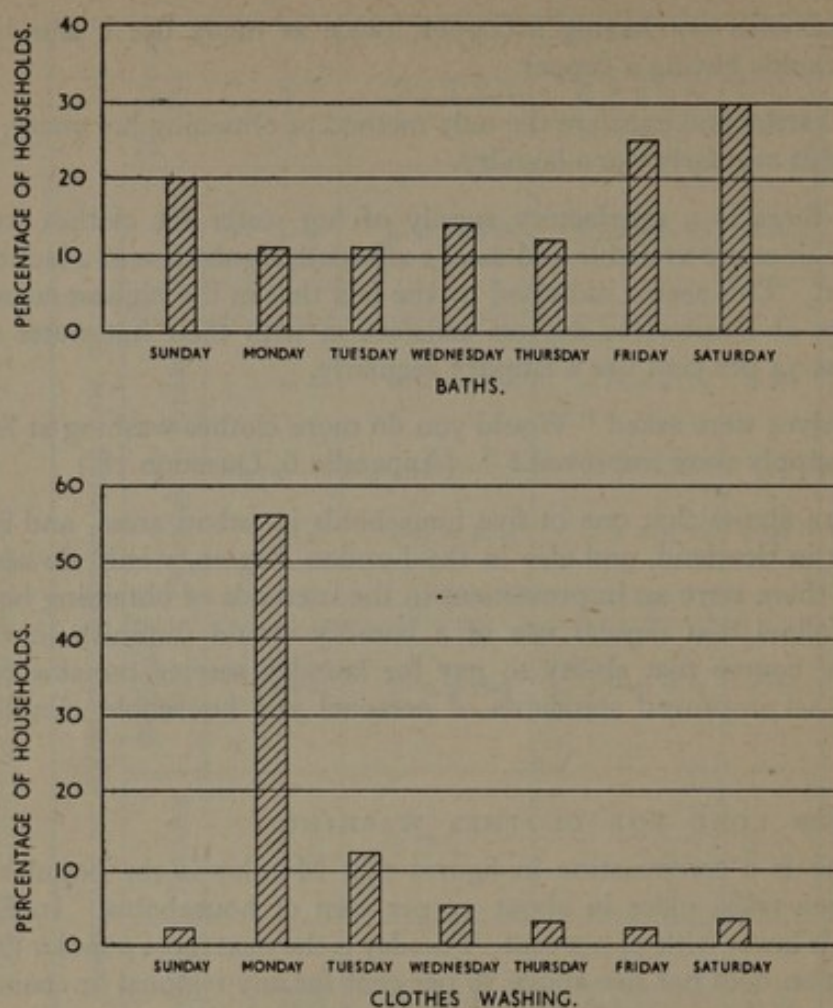


FIG. 5. BULK REQUIREMENTS

Daily Load

Tables 11 and 15 refer

No regular Bath-day—42 per cent of Households

No special Wash-day—28 per cent of Households

Temperature of Hot Water—I

THE SAMPLE

In the national surveys no attempt was made to obtain information on the temperatures at which hot water is used. To obtain some information on this aspect a small scale "temperature survey" was carried out during April-July, 1947. It was not practicable to obtain a random sample of persons or of households for this survey, and volunteers were invited mainly from members of the staff of the Chief Scientific Adviser's Division living in the London Region. Participation was restricted to individuals who considered that the facilities for hot water used by their respective households were satisfactory.

The appliances used were :

- inset fire
- fire with oven
- independent boiler
- single point gas geyser
- multi-point gas geyser
- immersion heater

Temperature readings were made on eight successive occasions for (1) baths and (2) dish-washing after a main hot meal.

The sample for the bath water readings comprised 97 persons of both sexes, and included adults of all age groups as well as children of ten years of age and over.

The sample for the dish-washing water measurements comprised 33 households of various types and sizes.

BATH WATER TEMPERATURE

Figure 6 shows the temperature of bath water actually used and found to be satisfactory by the groups of people using the different appliances. The temperature given for each person is the mean of eight readings. The mean for a group of people using one type of appliance is shown in the relevant histogram, and the grand or overall mean covering the whole sample is also shown.

There is no significant difference between the mean temperature relating to any one appliance and the grand mean relating to all.

The mean satisfactory temperature used for bath water for the sample as a whole was 105°F . with a standard deviation of 4°F .

TEMPERATURE OF WATER FOR DISH-WASHING

Figure 7 shows the temperature of water found satisfactory for dish-washing.

The mean satisfactory temperature used for dish-washing was 118°F . with a standard deviation of 10°F . It is necessary to consider the mean figure of 118°F . from the point of view of sterilization :

“ Bacteriological cleanliness of crockery can only be achieved by rigid attention to every detail of personal and kitchen hygiene. However thorough may be the preliminary removal of food residues from the utensils by soap or other detergents the rinse-water rapidly becomes heavily contaminated unless it is sufficiently hot and very frequently changed. If the final rinse is in very hot (not less than 180°F .) clean water, the crockery is practically sterilized and will quickly dry in the air without needing the application of an infected drying cloth.”⁽³⁾

The gap between the mean figure of 118°F . and 180°F . raises important issues. A temperature of 140°F . is usually accepted as adequate for domestic hot water supplies. At temperatures higher than this, troubles with scale are accentuated in hard-water districts, and heat losses from cylinders and pipework are greatly increased. In addition, there is a risk of scalding, and crockery at high temperatures becomes difficult to handle.

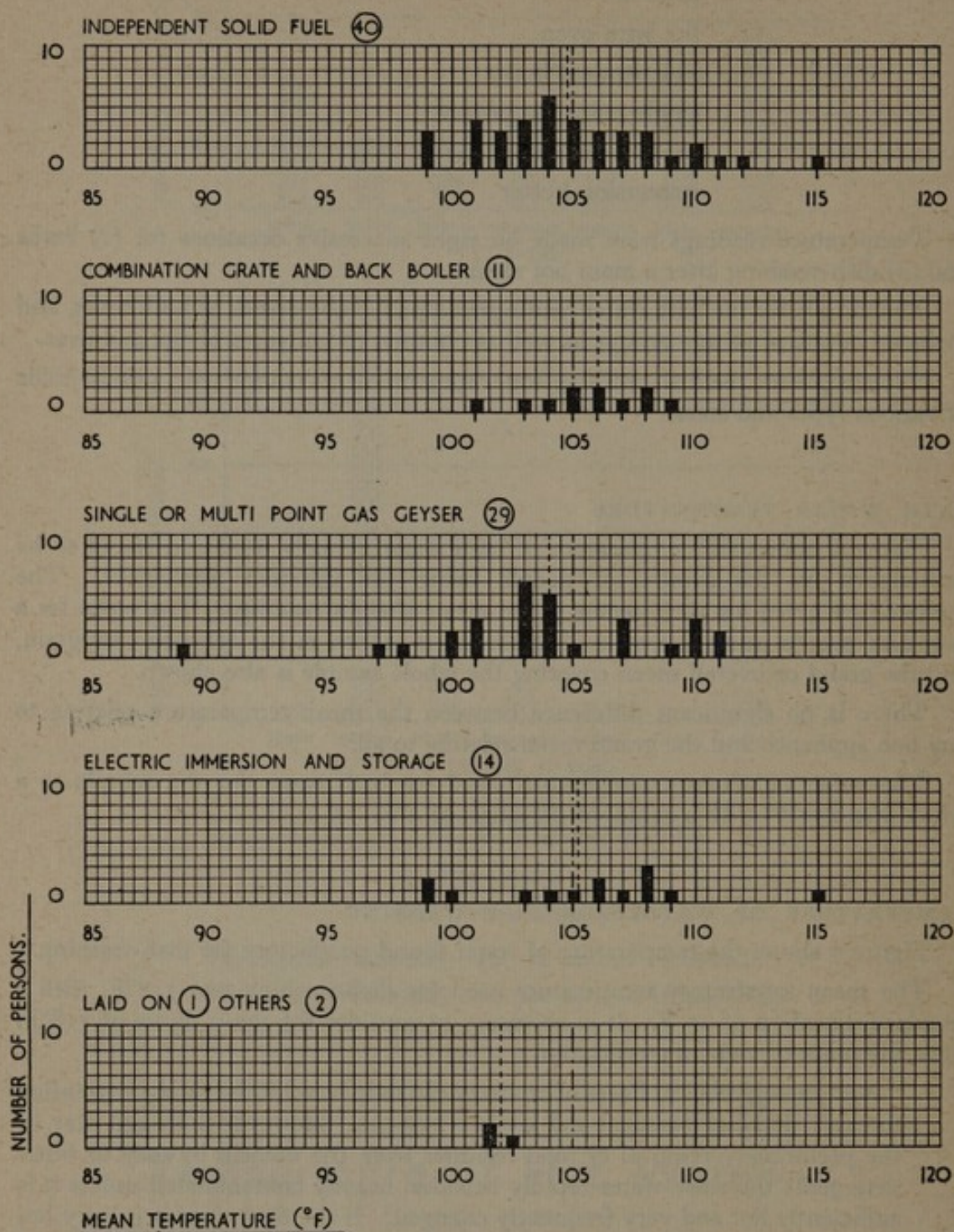


FIG. 6. TEMPERATURE OF WATER USED FOR BATHS

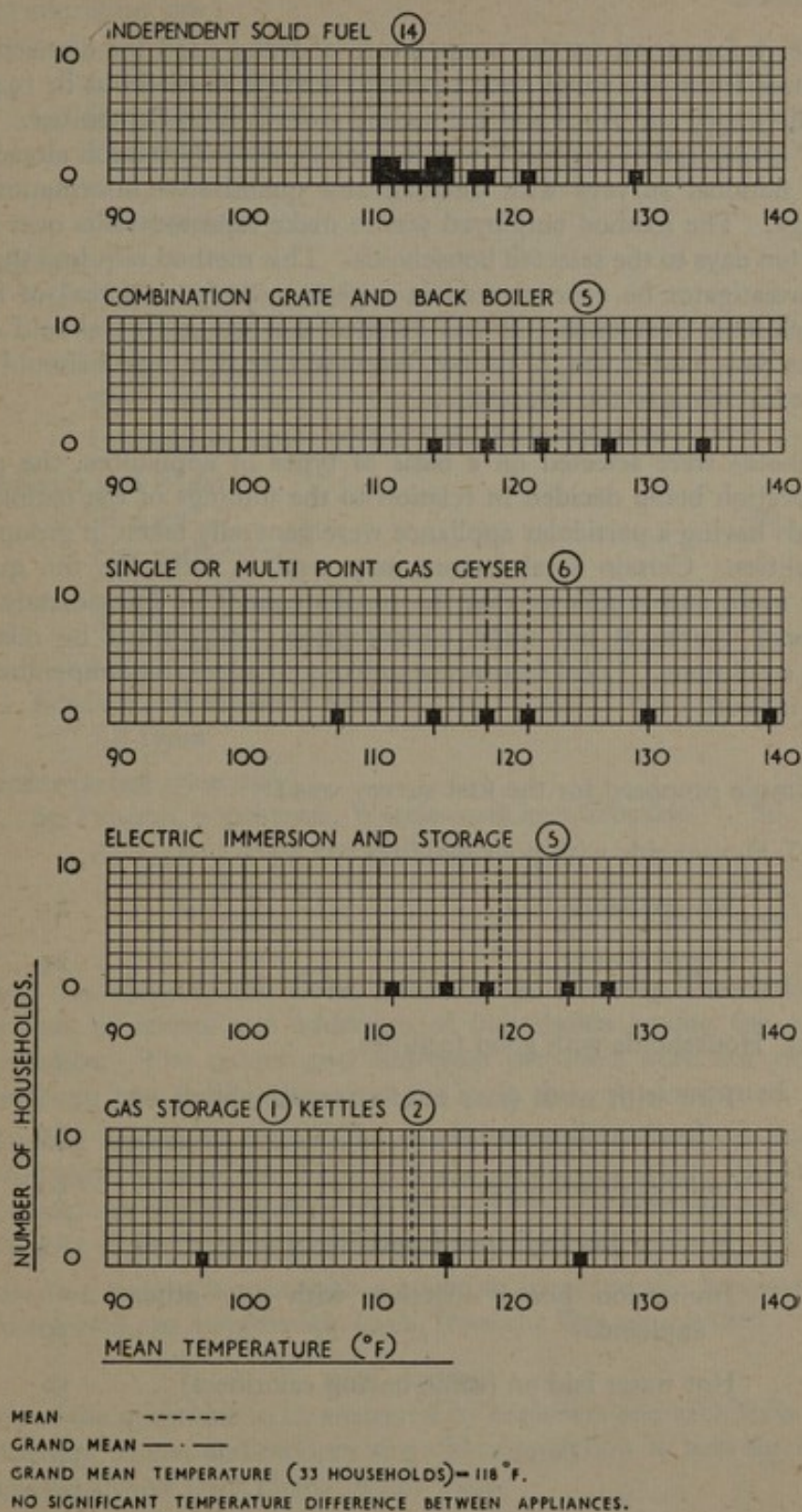


FIG. 7. TEMPERATURE OF WATER USED FOR DISH-WASHING

Temperature of Hot Water—II

THE SAMPLE

Further information on the temperature of water used for domestic purposes was obtained from two small scale intensive surveys carried out in 1948, the first between February and April and the second from July to September. The object of these "consumption surveys" was to supplement information already obtained from the national surveys with detailed and quantitative information about hot water usage. The method employed was to make repeated visits over a period of a week to ten days to the selected households. This method required that the effort of each investigator be concentrated in a given area for a period of about three weeks, including week-ends. It was decided that the survey should cover eight continuous days, and it was, of course, essential that this period should commence on a day convenient to the housewife.

Households were selected on a basis of types of appliances, the proportions and the location being decided in relation to the findings of the national surveys. Households having a particular appliance were generally taken in groups in two or three localities. Certain local factors may tend to influence the quantities of hot water used, and it follows that the results cannot be immediately applied to give national figures of hot water consumption; they must be related to the particular conditions. Local factors are unlikely to affect the temperature at which the water is used.

The sample proposed for the first survey was :

(1) Households with poor facilities :

No appliance	..	..	..	..	..	25
Coppers only	..	..	..	..	..	25

(2) Households with good facilities

Fire with oven (<i>i.e.</i> , modern combination or free standing stove)	..	..	..	..	75
Independent boiler	..	..	..	..	50
Modern gas appliance (piped to bath)	..	..	..	..	25
Immersion heater together with any other appliance	..	..	..	..	50
Hot water laid on (some having calorifiers)	..	..	..	..	50
Total	..	..	..	..	300

For each type of appliance the sample was divided between urban and rural areas in the proportion obtaining for that type in the national survey.

The quotas given to each investigator were generally somewhat in excess of

the number of completed records required, as allowance had to be made for some failures due to sudden illness or other contingencies during the test.

Regional allocation was :

Scotland

Dundee and Clyde Areas	..	..	..	68
Hot water laid on				
Fire with oven				
Copper only				
No appliance				

Northern

Manchester and Leeds Areas	..	..	..	74
Hot water laid on				
Independent boiler				
Fire with oven				
Immersion heater with a solid fuel appliance				

Midlands and Wales

Cardiff Area	..	..	..	..	30
Fire with oven					
Copper only					
No appliance					

South and East

Reading and Watford Area	..	..	..	80
All types				

London (urban areas only)

St. Pancras, Southwark, Wandsworth and Croydon	86
All types except fire with oven	

Total	338
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Approach was made to the Local Authority or Housing Association in each locality for lists of names and addresses of households having the appropriate type of appliance. The names and addresses provided were not restricted to low-income group households, though in the main these predominated.

The Housing Authority deleted the names of those housewives known to be employed full-time outside the home and also addresses where conditions were such that normal use of the dwelling was improbable, *e.g.* through cases of serious illness or sharing of facilities by more than one household.

The following note was sent with a covering letter, to the housewives whose names were selected, on a systematic basis, from the lists as provided :

HOT WATER

One of the questions to be answered by engineers and architects when planning new homes and modernizing old ones is, how to heat the water. Housewives always want plenty of hot water.

Housewives, we think, should know best how much hot water they use for their housework, and for all the family's washing and bathing. So we are asking some of them in various parts of the country to say just how much this is, and how hot it should be. It is wasteful to have more hot water than is necessary, but everyone wants to have enough.

Would you be willing for a week to keep a record of the hot water used in your home, whether it is just warm, hot or boiling ; for what purpose it is used ; also whether there is enough or whether more is needed ?

Someone from the Chief Scientific Adviser's Division of the Ministry of Works will be calling to see you on If you will help in this inquiry, she will be able to tell you more about it, and how we shall be able to compare the quantities of hot water used in various households by taking some simple measurements.

Once good relations had been established the response from housewives in general was excellent ; this was maintained throughout both surveys. There were cases, however, where because of suspicion or antagonism on the part of either the housewife or her husband, co-operation could not be obtained.

For the summer survey (July–September) it was decided that 80 per cent of the winter sample would suffice.

Table 16 shows the numbers of completed records obtained for each type of appliance.

It will be seen from Table 12 that 70 per cent of the housewives from the winter survey assisted for the summer survey. Of the 30 per cent who did not continue, some were away from home, others had moved or were employed outside the home full-time, one housewife had died, while others, for various reasons, were unwilling to give the necessary time and thought to a second inquiry. Substitute households were obtained and, with the allowance made for failures, the actual summer sample was 85 per cent of the winter sample. In general, the same investigators took part in the summer survey, and, with a few exceptions, households were revisited by the investigator already known to them.

TABLE 12. CONSUMPTION SURVEYS—THE SAMPLES

TYPE OF APPLIANCE	Proposed sample	NUMBER OF HOUSEHOLDS IN SAMPLE :			
		WINTER SURVEY	SUMMER SURVEY (80 per cent of winter sample)		
			Households re-visited	Substitute households	Total
No appliance	25	20	15	6	21
Copper—the only appliance	25	37	25	3	28
Fire with oven	75	74	58	7	65
Modern gas heater (piped to bath)	25	25	14	4	18
Independent boiler	50	54	33	8	41
Immersion heater with a solid fuel appliance	50	60	51	7	58
Hot water laid on : Direct supply } Calorifiers }	50	44 12	24 8	12 4	36 12
Total	300	326	228	51	279

Note.—Allowance had to be made in the quotas for some housewives being unable to continue assisting throughout the course of the test.

In comparing the actual sample with the proposed sample, it is interesting to note that the number of households with coppers only was higher than was expected; in certain households where it was understood that the families had no appliance, it was found that they were, in fact, using coppers.

The percentage distribution of households of various sizes in the consumption surveys is compared with those in the national survey in Figure 8. It will be seen that the average household size in the consumption surveys was slightly larger than that of the national sample, but that differences in household size between the winter and summer consumption samples are not substantial. The histograms indicate that the mode occurs at 3 persons in the national sample and at 4 persons in the consumption samples.

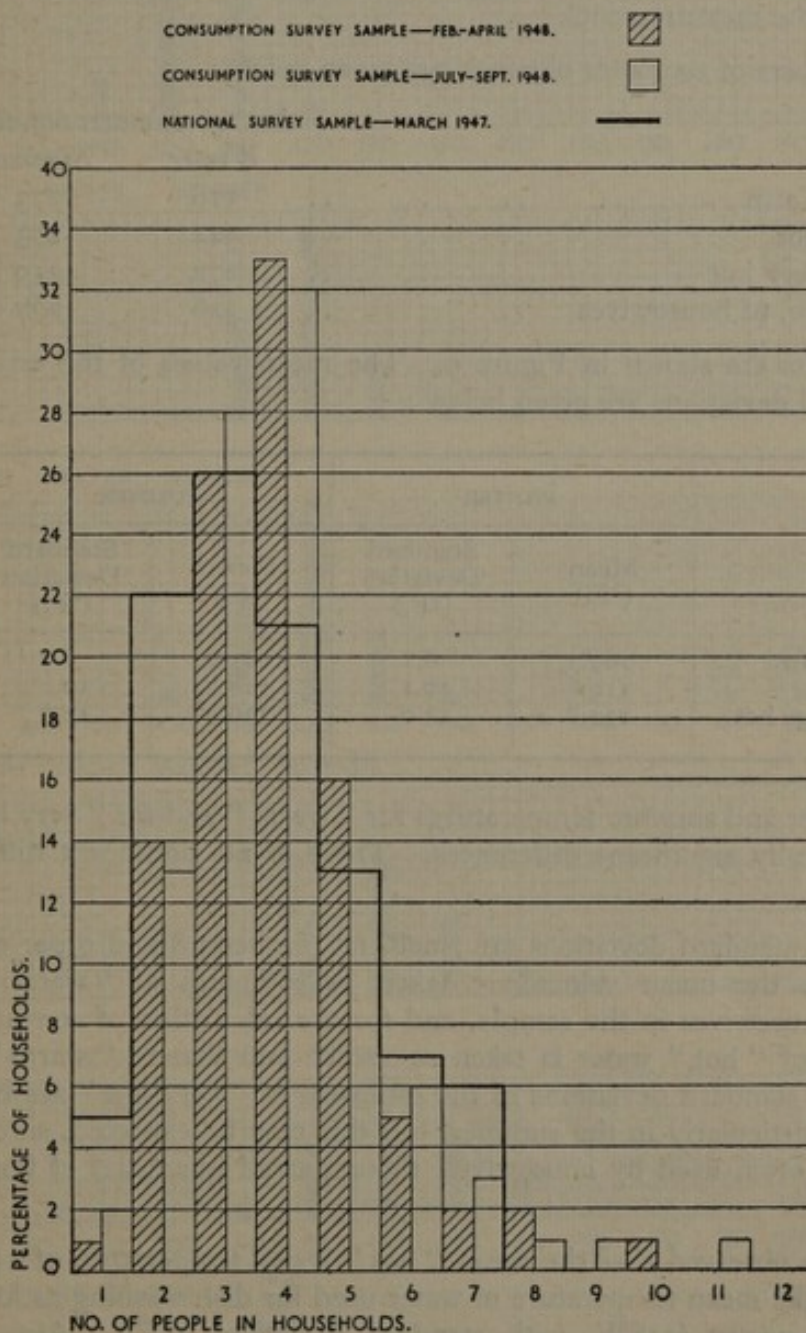


FIG. 8. PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY NUMBER OF MEMBERS

WARM, HOT AND VERY HOT WATER

The temperature of the water used was recorded as "warm", "hot" and "very hot". At the commencement of each of the surveys housewives were asked to pay special attention to the "feel" of the water used for various purposes, and to compare their own assessment of "warm" and "hot" with that of the other members of the household. Temperature measurements were taken of "warm", "hot" and "very hot" water used according to the housewife's assessments. The "very hot" water category was included to obtain the possible range covered by the assessment "hot". The estimate of "very hot" could be regarded as an upper limit to the estimate of "hot". It was, however, found in the temperature survey, reported in the previous section, that first measurements of the temperatures of water used for dish-washing differed by only 1°F. from the means of all the measurements.

The numbers of estimates obtained are given below :

						<i>No. of estimates obtained</i>	
						<i>Winter</i>	<i>Summer</i>
Warm	..	..	..	..	..	318	273
Hot	..	..	..	..	..	324	273
Very hot	..	..	..	..	..	272	259
No. of housewives	..	..	..	..	..	326	277

The results are shown in Figure 9. The mean values of the estimates and their standard deviations are given below :

	WINTER		SUMMER	
	Mean (°F.)	Standard Deviation (°F.)	Mean (°F.)	Standard Deviation (°F.)
Warm ..	103.3	8.1	105.8	6.7
Hot ..	119.6	10.1	119.8	10.1
Very hot	132.8	12.0	136.9	17.6

The winter and summer temperatures for "warm" and for "very hot" water show statistically significant differences. There is no significant difference for "hot" water.

Since the standard deviations are small, *i.e.* between 8 and 9 per cent of the temperatures, the mean values are taken as estimates of "warm and hot" for all the housewives in the sample, and for the calculation of consumption the temperature of "hot" water is taken as 120°F. and that of "warm" water as 105°F. The standard deviations of the estimates of "very hot" are higher than the others, particularly in the summer, but this may be expected, since very hot water is not often used by housewives, though small quantities of boiling water are used.

It will be observed that the mean "hot" water temperature of 120°F. is 2° higher than the mean temperature of water used for dish washing as found in the temperature survey (118°F. with standard deviation 10°F.). Also the mean "warm" temperature of 105°F. is identical with the mean temperature of water used for bathing (105°F. with standard deviation 4°F.).

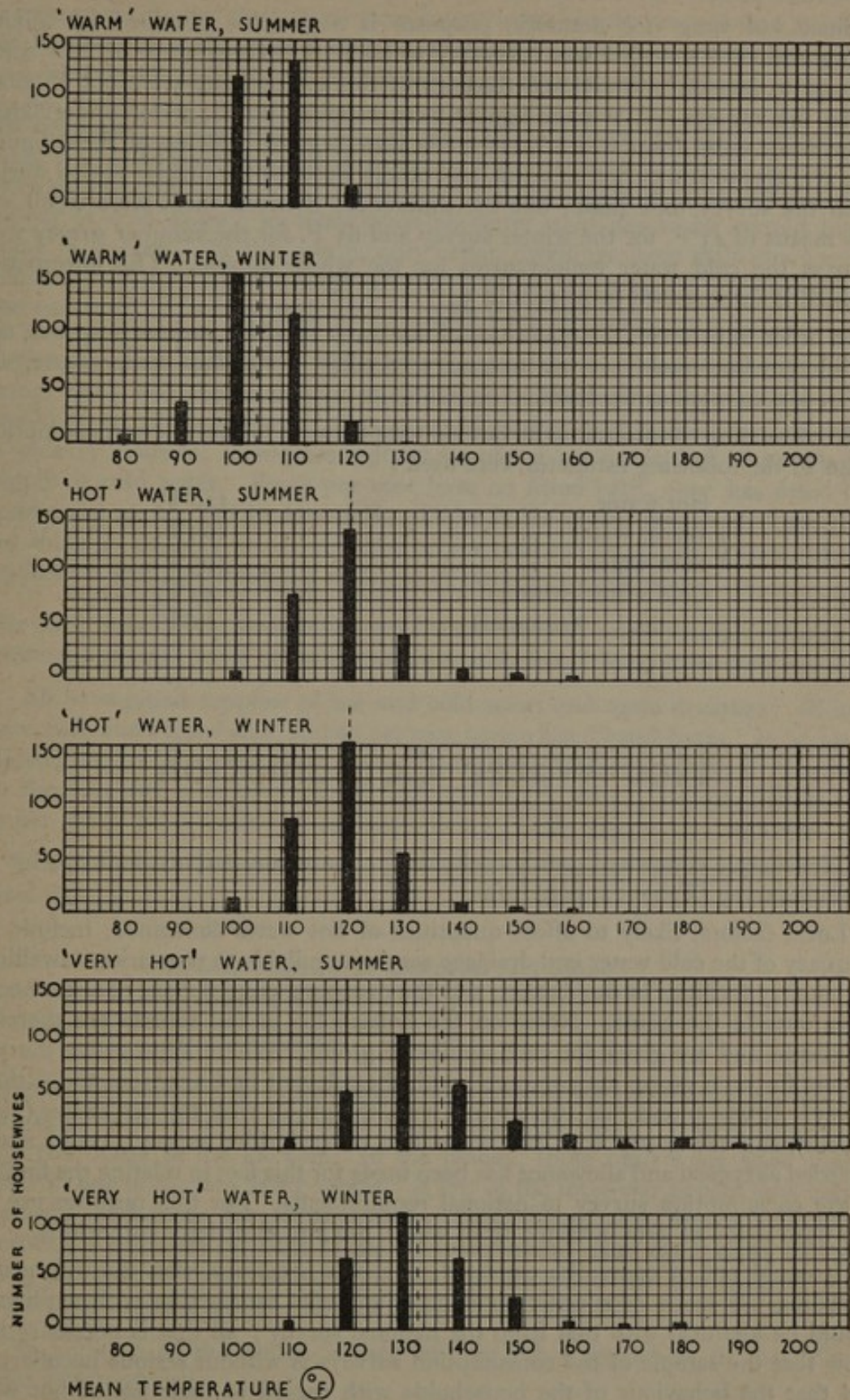


FIG. 9. HOUSEWIVES' ESTIMATES OF TEMPERATURE

TEMPERATURE BASIS FOR COMPARISON OF QUANTITIES OF HOT WATER USED

Since hot water for domestic purposes is sometimes obtained by mixing boiling and cold water, it was necessary to know the temperature of cold water supplied to houses.* Individual readings of this temperature were not obtained during the surveys but average figures were supplied by the water undertakings of the main areas from which households were selected. Some of these figures were averages over a period of years, and others were for the precise period during which the survey took place, but the differences between them were small and their means of 43°F. for the winter survey and 61°F. for the summer survey were taken as the cold water temperatures for the whole sample. The information obtained is summarized in Appendix 3.

In order to compare the quantities of hot water used for various purposes, and by different households, it was necessary to adopt a standard temperature, and 140°F. was selected as the basis.

In converting consumptions at various temperatures to equivalent consumptions at 140°F. the following estimates were used :

Hot water	..	..	..	..	120°F.
{ Warm water	..	..	..	..	105°F.
{ Bath water	..	..	..	..	105°F.
Cold water (winter)	..	..	..	..	43°F.
do. (summer)	..	..	..	..	61°F.

Hot Water Consumption

THE SAMPLE

The sample comprised 326 households for the winter survey, and 279 for the summer survey (Table 12, page 30).

Local factors, likely to affect quantities of hot water consumed, include the adequacy of the cold water and drainage services available to the various dwellings, the laundry facilities in the district, and the part-time employment of some housewives outside the home. Notes on the households of the sample are therefore of interest and are given for each appliance group. Where appropriate the particulars for each group are compared with the relevant findings from the national survey. It was found that two groups, viz., the group with the gas heater (piped to bath), and the group with hot water laid on (calorifier supply), could not be regarded as typical and allowance has been made for this fact in relating the findings of the consumption survey to national requirements. For this purpose use has also been made of data obtained from water, gas and electricity authorities.

It could not of course be expected, nor is it necessary, that the information regarding use made of specific appliances, and also satisfaction with appliances, should be identical with that from the national survey; all that is necessary is to show that the sample of the consumption surveys is without serious peculiarities, and that the behaviour of the households with regard to their use of hot water can be expected to be sufficiently representative for the purpose of the inquiry.

* This also has a bearing on the relative degrees of satisfaction afforded by water heating appliances in winter and in summer—see page 9.

Although questions regarding economic circumstance were excluded from the consumption inquiry the reports from interviewers clearly showed that, in general, the households of the groups with no appliances and with coppers only were less well off than the majority of the households of the remaining groups.

No appliances. The households are all living in dwellings built before 1914; these are either tenement flats in towns or small cottages in country areas. None has a piped supply of hot water, and most of the cottages are also without a piped supply of cold water; in these cases all water used has to be carried into the home in buckets. In this group, only urban dwellings have main drainage, and neither urban nor rural dwellings have fitted baths; there are no fitted hand-basins, and one-third of these households are without a fitted sink.

Copper the only appliance. Half these households are living in dwellings built before 1914, and the remainder in dwellings built between 1919 and 1939; the dwellings are either tenement flats or small terrace houses in towns, or cottages in country districts. None has a piped supply of hot water, but all have a piped supply of cold water. Forty per cent have no fitted bath, none has fitted hand-basins, and 25 per cent have no sink. Those in the towns have main drainage, but not those in country areas. Forty-five per cent of the coppers were solid fuel appliances, and the remainder were gas or electric wash-boilers.

Fire with oven. The households are living either in semi-detached houses built between 1919 and 1939, or in temporary prefabricated bungalows built since 1945.

All have piped supplies of hot and cold water and main drainage; all have a fitted bath and a fitted sink, and 95 per cent have a fitted hand-basin. In 20 per cent of cases the hot water tanks and in 8 per cent the hot pipes are lagged. The figures for the fires with oven group in the national sample were: hot water tanks lagged 17 per cent; pipes lagged 16 per cent (Part I, Table 41).

Some of these households also had other appliances; in order of frequency these were:

- gas boiler
- electric wash boiler and solid fuel copper
- immersion heater
- gas water heater.

Independent boiler. The households with independent boilers occupy houses or flats built between 1919 and 1939, and some since 1945. Nearly half are flats with the boiler in the kitchen. In the houses, those built since 1946 have the boiler in one of the two living rooms. A few of the inter-war houses have cesspool drainage inadequate for requirements; these households find it necessary to restrict the numbers of baths taken for this reason. Hot water tanks are lagged in 33 per cent of cases, and the pipes in 20 per cent. In the national sample 21 per cent of tanks and 16 per cent of pipes were lagged.

In addition to the boiler, households use other appliances in the following order of frequency:

- gas wash boiler
- electric wash boiler
- immersion heater.

Wet refuse is burned on the boiler by 50 per cent of housewives in winter and by 74 per cent in summer. The wet refuse comprises mainly potato peelings and other vegetable waste.

Immersion heater with a solid fuel appliance. Most of the households with immersion heaters occupy temporary prefabricated bungalows built since 1945, though there are a few living in semi-detached houses built before 1939. All have piped supplies of hot and cold water to sink, hand-basins and bath, and all have main drainage. It should be pointed out that in the temporary prefabricated bungalows the practice was to install the immersion heater high up in the cylinder, and only the top is lagged; this is not good practice.

The proportions of immersion heaters installed in conjunction with solid fuel appliances are as follows :

with inset fires	..	..	..	88 per cent
with independent boilers	..	..	..	12 per cent

Hot water tanks are lagged in 72 per cent of cases and pipes in 13 per cent; the proportion of tanks lagged is three times as many as in the national survey.

Housewives indicated that in winter the immersion heater is often used for "topping up".

For the winter survey housewives were unable to give their views on the use of the immersion heater without giving also their views on the solid fuel appliance, but in summer they were better able to distinguish between the performance of the two appliances. It was not, however, possible to obtain separate consumptions when the immersion heater was used alone and when it was used in conjunction with the solid fuel fire, since for bulk requirements housewives tended to light the solid fuel fire.

In addition to the immersion heater and the solid fuel appliance, the following proportions of housewives have wash boilers :

electric wash boiler	..	..	..	48 per cent
gas wash boiler	..	..	..	28 per cent

Gas heater (piped to bath). Most of the households in the group are living in large houses converted into flats, not usually self-contained; 40 per cent of the houses were built before 1914, and the remainder between 1919 and 1939. All have piped supplies of hot and cold water to the bath, nearly all have piped supplies to a hand-basin, and the majority to the sink also. In a few cases the bathrooms are shared with another household. All have main drainage.

In addition to the gas water heater, 4 per cent of the housewives use an electric wash boiler and 30 per cent a gas wash boiler.

However, as most of these households are living in large houses converted into flats, they are to this extent a special group.

Hot water laid on (direct supply). The households in this group all occupy flats, 13 per cent of which were built before 1914, the majority between 1919 and 1939,

and a few since 1945. All have hot and cold piped services to the sink and bath, and 75 per cent to a hand-basin. The pipes are not lagged. Hot water was not always available when housewives needed it. About a third of the households have a gas wash boiler, and a much smaller proportion have electric appliances for water heating.

The housewives in the flats erected since 1945 make full use of a communal laundry attached to the flats; hot water consumption in the communal laundry was not included in the consumptions for the households.

Hot water laid on (calorifiers). The housewives in this group were all selected from the same estate, viz. flats built between 1919 and 1930. All flats have piped hot and cold water to the bath and sink, but in most cases the bath is installed in the kitchen. This gives rise to serious inconvenience, particularly as in many instances it is necessary to use the living room also for sleeping. In all cases the hot water tank and the pipes are lagged. Nearly all these housewives also use an electric wash boiler. A considerable number of the housewives are employed part-time outside their homes. The supply of hot water was generally regarded as satisfactory, although many housewives qualified their replies by saying that this might not be so if it were possible to obtain access to the bath as often as individual members of the family would like.

Use of laundries. It was found that fewer housewives in the consumption survey used a laundry regularly than in the national survey (see page 21). This may be due to the fact that in the consumption survey there was a higher proportion of households with good facilities for water heating than in the national survey, and very few households in the highest economic groups.

Fuel used. For the fires with oven, coal is the main fuel used.

For the independent boilers, the fuels used in summer by various proportions of households are as follows :

coal	..	..	56 per cent
coke	..	..	35 per cent
anthracite	..		5 per cent

In winter 20 per cent of households make use of anthracite.

The proportions of households in the consumption survey using various types of fuels under winter conditions are compared with those in the national survey in Appendix 4.

METHOD OF OBTAINING MEASUREMENTS

The investigator measured all containers used for hot water, arranging with the housewife to do this at times that were convenient for the household.

Bath measurements were grouped into five categories as shown in Figure 10. It was found that the measurements of these baths were appropriate as a means of classification of all sizes of baths in both samples.

SYMBOL	LENGTH	WIDTH AT SHOULDER	WIDTH AT WASTE
A	65	22.5	22
B	65	23	18
C	59	22.5	22.5
D	54	22	21
E	58	22	17.5

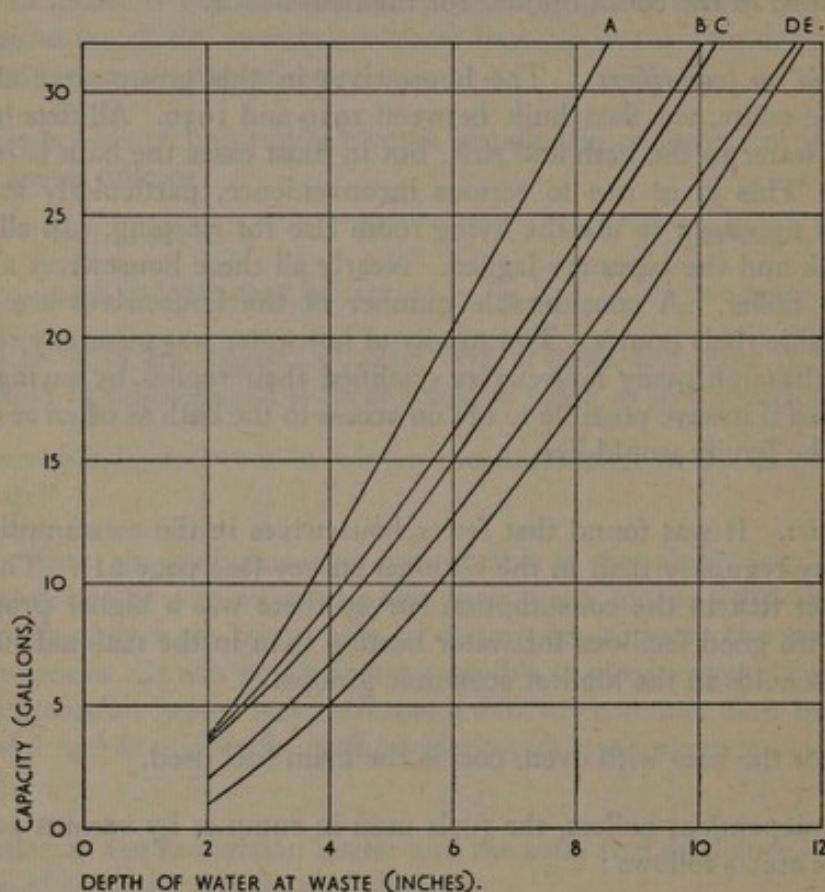


FIG. 10. CAPACITIES OF VARIOUS SIZES OF BATH

Sink measurements were classified according to the sizes shown in Figure 11.

Measurements of coppers and wash boilers were classified according to the sizes shown in Figure 12.

For large receptacles, *e.g.* baths and coppers, the housewife and her family, as appropriate, were asked to measure the depth of water at the time of use, or to mark the water level in such a way that the investigator could measure the depth on her next visit. (Visits were always made daily, and occasionally more frequently.)

For smaller receptacles, *e.g.* pails, buckets, bowls, kettles, pans, etc., the housewife indicated what was meant in her estimation by "full", "half-full", etc., and the investigator measured on this basis.

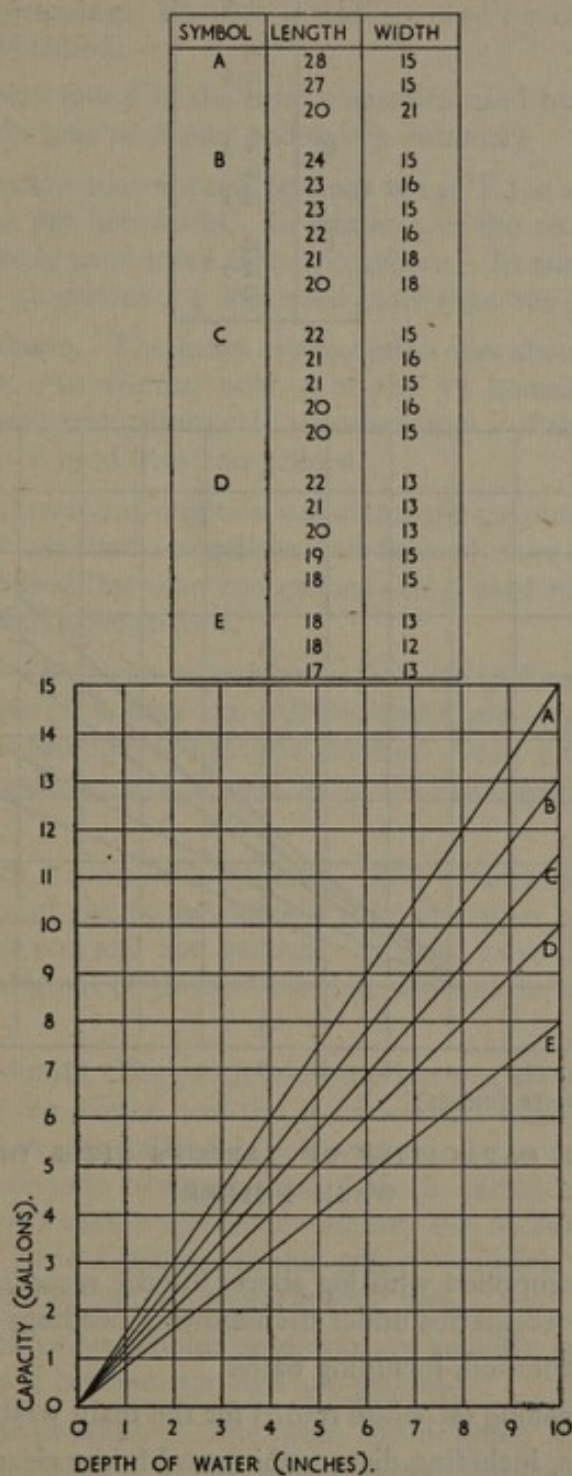


FIG. 11. CAPACITIES OF VARIOUS SIZES OF SINK

SYMBOL	DIAMETER AT RIM.
A	18
B	17.5
	17
	16.5
C	16
	15.5
	15
D	14.5
	14
	13.5
E	13
	12.5
	12

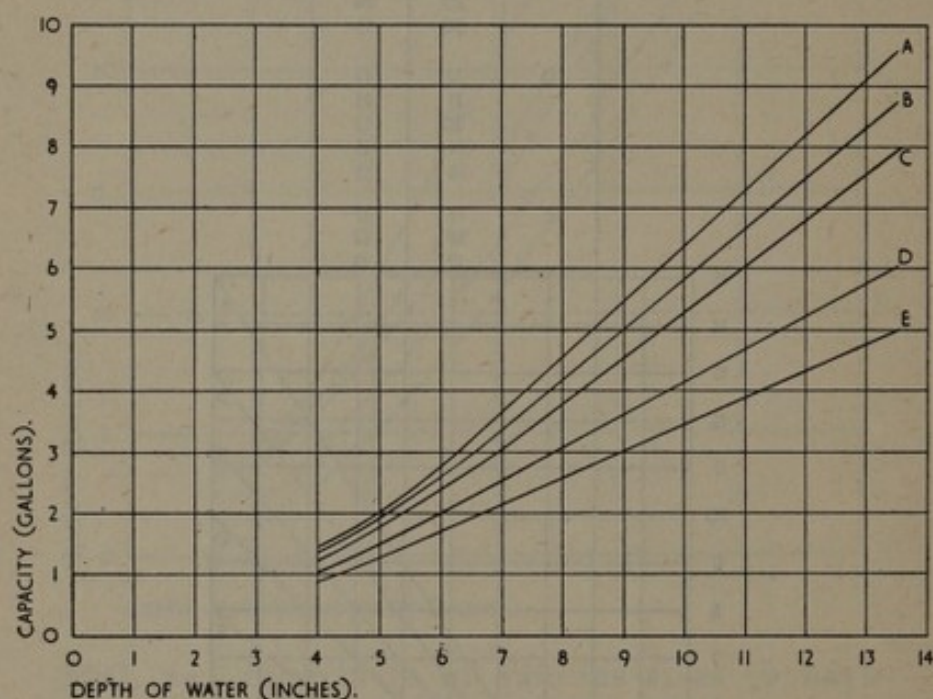


FIG. 12. CAPACITIES OF VARIOUS SIZES OF COPPER OR WASH BOILER

Housewives were supplied with log sheets for the recording of the frequency of use of the various receptacles under the following headings :

- personal ablution, including baths
- clothes washing (separate return for the main wash-day)
- other uses, including dish-washing and house cleaning.

No attempt was made to determine the quantities of hot water used in the preparation and cooking of food, or for tea making. A trial showed that the quantities involved were relatively too small to justify special attention.

Two pilot inquiries were carried out prior to the surveys in order to test the method to be employed in obtaining the data, and from these inquiries, means were devised whereby the reliability of the records could be assessed.

QUANTITIES OF HOT WATER USED PER WEEK

The quantities of hot water (in terms of equivalent gallons at 140°F.) relate to use over seven consecutive days. No measurements were taken while water was "running hot", nor of water lost by the slopping over of receptacles, or waste by taps left running or dripping. Further, quantities used for flushing down of baths and sinks were not obtained.

Great variation was found in the total quantities used by different households for the two test weeks (one in winter and one in summer).

No appliance. The mean consumption (gallons at 140°F.) in summer and in winter was about 73 gallons per household. In winter 9 of the 20 households used less than 50 gallons; 5 only used more than 100 gallons. In summer, 7 of 21 households used less than 50 gallons; 4 only used more than 100 gallons.

Copper the only appliance. The mean consumption was about 130 gallons in both winter and summer. In winter, only 4 of the 37 households used less than 50 gallons; 5 used over 200 gallons. In summer, only 2 of the 28 households used less than 50 gallons; 6 used over 200 gallons.

Fire with oven. The mean consumption was about 260 gallons. In winter, 7 households out of 74 used less than 100 gallons and 12 used more than 400 gallons. In summer 5 out of 65 used less than 100 gallons and 8 used more than 400 gallons. One of these used over 1,000 gallons.

Independent boilers. The mean consumption was 250 gallons in winter. Eight of the 54 households used less than 100 gallons, and 8 used more than 400 gallons. In summer, mean consumption was 300 gallons. Only 3 of the 41 households used less than 100 gallons, and 8 used more than 400 gallons. One used over 1,000 gallons.

Immersion heater with a solid fuel appliance. The mean consumption was about 270 gallons. Only 2 of the 60 households used less than 100 gallons in winter, but 13 used between 100 and 200 gallons; 11 used more than 400 gallons. In summer, 19 households out of 58 used less than 200 gallons, and 8 used more than 400 gallons.

Gas heater (piped to bath). The mean consumption was about 260 gallons in both winter and summer. In winter, 4 of the 25 households used less than 100 gallons, and 4 used more than 400 gallons. This variation is more likely to be due to differences in the economic circumstances of the householders than to any other factor. Table 13 shows that in the winter inquiry the consumption of bath water for households of 4, 5 and 6 persons in this group was high when compared with other households, for example, those using solid fuel.

In summer, all the 18 households used over 100 gallons; only 1 used more than 400 gallons, but 7 used between 300 and 400 gallons.

Hot water laid on (direct supply). The mean consumption was about 420 gallons. Only 3 of the 44 households in the winter survey used less than 200 gallons; 10 used over 500 gallons and of these 2 used over 1,000 gallons. Three of 36 households in summer used less than 200 gallons; 7 used over 500 gallons and one of these used over 1,000 gallons.

Hot water laid on (calorifiers). The mean consumption was about 190 gallons. In winter, 2 of the 12 households used less than 100 gallons and only one used over 300 gallons.

DOMESTIC HOT WATER SUPPLY

TABLE 13. AVERAGE HOT WATER CONSUMPTION FOR BATHS—EQUIVALENT GALLONS PER WEEK AT 140°F.

HOUSEHOLD SIZE	NO APPLIANCE		COPPER ONLY		FIRE WITH OVEN		INDEPENDENT BOILER		IMMERSION HEATER WITH A SOLID FUEL APPLIANCE		GAS HEATER		HOT WATER LAID ON (direct supply)		HOT WATER LAID ON (calorifiers)	
	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
1	—*	—	2	—	—	—	27	—	—	—	—	—	—	—	—	—
2	5	5	40	23	64	94	92	103	83	101	47	—	153	184	—	—
3	12	14	53	33	76	—	97	165	130	165	80	—	232	257	63	162
4	16	42	79	84	93	119	189	234	169	194	103	145	247	386	74	113
5	22	23	99	102	123	154	172	233	237	177	241	241	336	270	119	143
6	53	—	62	85	160	168	173	179	—	126	200	132	—	—	—	—
7	—	8	61	82	222	268	251	446	189	—	228	181	—	—	142	—
8	—	—	80	86	216	162	888	—	—	—	—	243	335	371	—	—
9	—	—	82	164	204	471	—	—	—	—	—	—	—	—	—	—
10	—	—	60	—	365	370	—	—	—	—	—	—	—	—	—	—
11	—	—	60	—	275	282	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	600	—	—	—	—	—	—	—	—	—	—	—
14	—	—	—	—	—	1,016	—	—	—	—	—	—	—	—	—	—
Average consumption for baths, all sizes of household.	13	9	52	72	137	179	167	208	159	169	161	193	240	313	89	132
No. of households.	20	21	37	28	74	65	54	41	60	58	25	18	44	36	12	12

* Top figure relates to all households of this size.
 Lower figure relates to households of this size where baths are taken at home.
 When one figure only is shown all households take baths at home.

In summer, all households used over 100 gallons and one out of 12 used over 300 gallons. Access to the bath was restricted for these households, as the bath was in the kitchen.

The lowest and highest consumptions for each appliance group are shown in Figure 13. It will be seen that even for a given size of family (4 people) and a given appliance, there is very substantial variation in consumption (Figure 14).

The average hot water consumption per household ranges from 77 gallons a week in winter and 69 gallons a week in summer for households with no appliances to 428 gallons a week in winter and 408 gallons a week in summer for households with hot water laid on (direct supply). It is thus the type of heating installation which governs consumption and not the season.

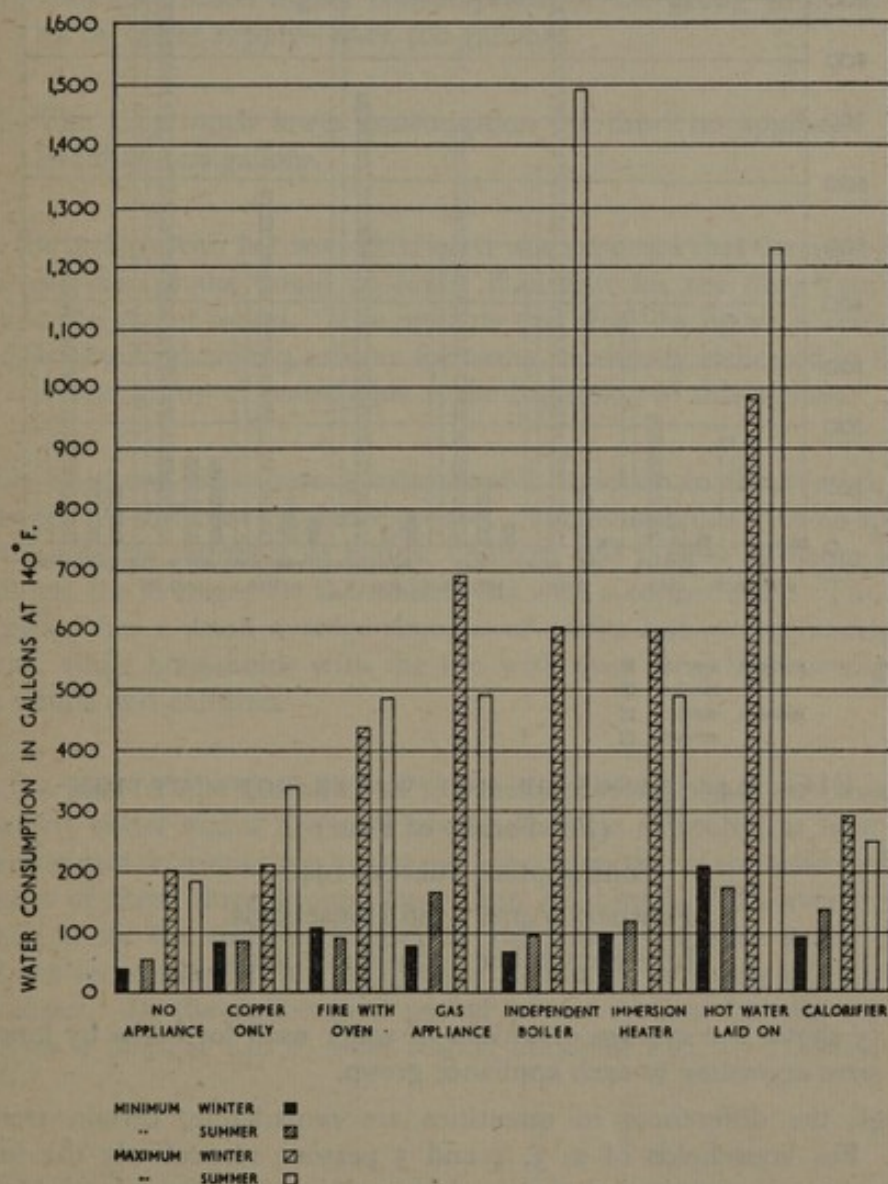


FIG. 13. RANGE OF HOT WATER CONSUMPTION
(Total Sample)

Consumption Surveys 1948 :

February–April 326 Households

July–September 279 Households

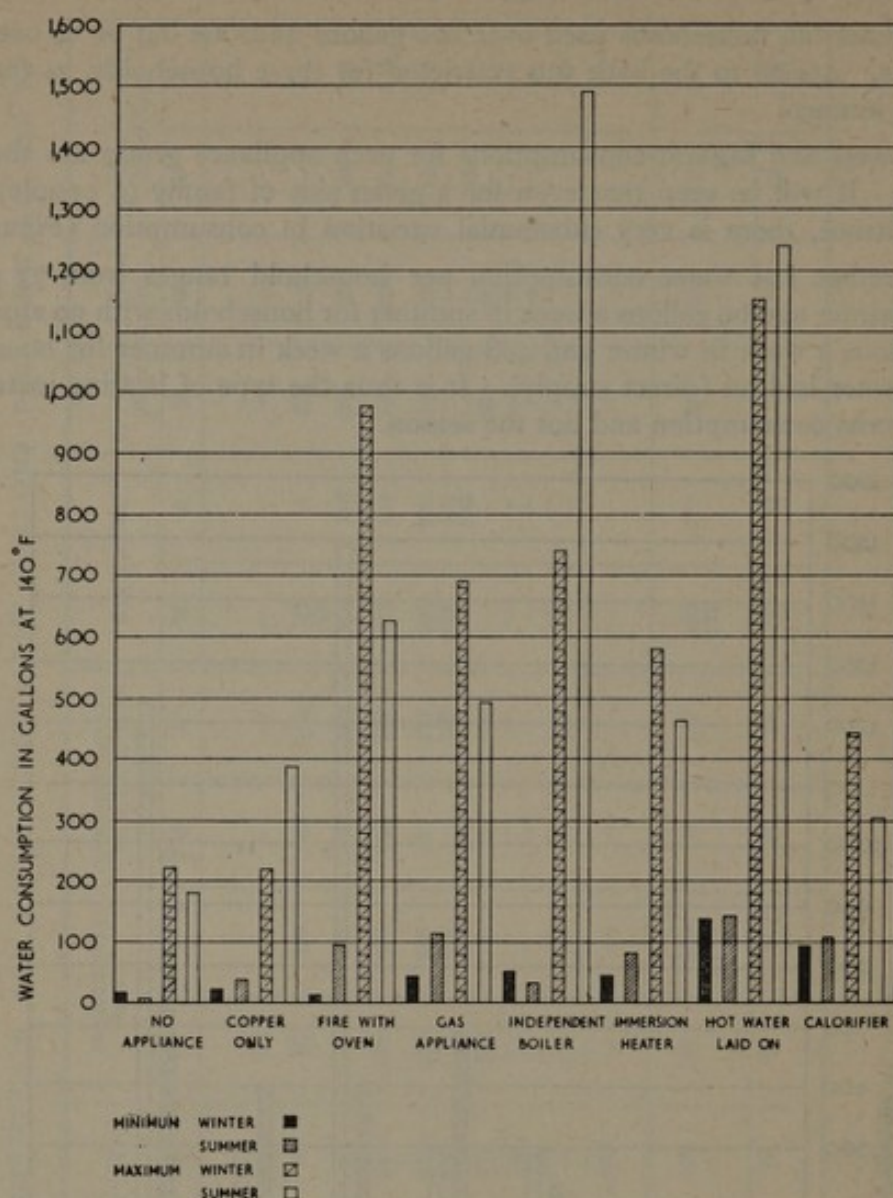


FIG. 14. RANGE OF HOT WATER CONSUMPTION
(For Family of Four)

Consumption Surveys 1948 :

February–April 326 Households

July–September 279 Households

Table 13 shows the average quantities of water used for baths by households of various sizes according to each appliance group.

Although the differences in quantities are remarkable, certain trends are indicated. For households of 2, 3, 4 and 5 persons respectively the following order for increase in quantity is maintained for each household size for the following appliance group :

- no appliance
- copper only
- { fire with oven
- { independent boiler
- hot water laid on (direct supply)

Table 14 shows the average hot water consumption (for both summer and winter conditions) per household, for each type of appliance, together with the average family composition.

Three broad levels of hot water consumption are immediately apparent from this table :

- (a) The close relation of the fire with oven, the independent boiler, the immersion heater, and the modern gas appliance group to the recommendation of the Egerton Report, viz., 250 gallons per week.
- (b) The very much higher consumption for the group with hot water laid on by direct supply—over 400 gallons.
- (c) The very much lower consumption for the “no appliance” groups—less than 100 gallons.

For the groups with hot water laid on it was expected that the average quantity for the calorifier group would be lower than that for the direct supply group, but not to the extent found. It is possible that this low figure is directly related to the difficulty of obtaining privacy for baths, as already indicated in the remarks on the calorifier group of households at the beginning of this section.

Table 14 shows that there is considerable variation in the average household size between the different appliance groups. The households with no appliance are small, the average numbers of adults, children and infants all being lower than, for example, the averages for the households with a copper only. The immersion heater group has a small average number of adults but a large average number of infants, while households with the fire with oven have high average numbers of both adults and children.

On the basis of the similarity of the method of supply of hot water from an independent boiler and a fire with oven,* and the difficulty, at least in winter, of obtaining data on immersion heater use apart from that of the solid fuel appliance, the results of these three groups have been combined. The average hot water consumption for the combined group is 268 gallons—similar to the quantity of 250 gallons recommended in the Egerton Report for a family of two adults and two children. In the unoccupied period of the Abbots Langley heating trials 250 gallons a week at 140°F. were readily obtained with all methods of heating water.⁽⁵⁾

STANDARDIZED CONSUMPTION FOR A FAMILY OF FOUR IN RELATION TO THE EGERTON REPORT

Table 14 also shows standardized hot water consumption for a family of two adults and two children, one being an infant, for each of the appliance group.

* Only modern types of fires with oven were included in the consumption survey.

TABLE 14. SUMMARY OF HOT WATER CONSUMPTION—EQUIVALENT GALLONS PER WEEK AT 140°F.

TYPE OF APPLIANCE	NUMBER OF HOUSEHOLDS	AVERAGE FAMILY COMPOSITION			AVERAGE HOT WATER CONSUMPTION	STANDARDIZED HOT WATER CONSUMPTION FOR 2 ADULTS, 1 CHILD AND 1 INFANT
		Adults	Children	Infants		
(1) No appliance	21	2.39	0.29	0.31	73	84 ± 11*
(2) Copper only	37	3.14	0.76	0.31	131	131 ± 13
(3) Fire with oven	74	3.10	0.90	0.48	264	245 ± 12
(4) Independent boiler	54	2.51	0.96	0.68	272	268 ± 22
(5) Immersion heater with a solid fuel appliance	60	2.16	0.49	0.92	272	293 ± 11
(6) Gas heater	25	2.45	0.82	0.86	263	258 ± 20
(7) Hot water laid on (direct supply)	44	2.42	0.64	0.57	418	428 ± 32
(8) Hot water laid on (calorifier)	12	2.95	0.67	0.67	186	171 ± 19
Results of groups (3), (4) and (5) combined ..	188	2.62	0.77	0.68	268	267 ± 8

* Standard errors of the estimates.

Comparisons with the Egerton recommendation are :

	Gallons at 140°F. per week	Proportion of Egerton recommendation
No appliance	84	0.34
Copper only	131	0.52
Fire with oven	245	0.98
Independent boiler	268	1.07
Immersion heater with a solid fuel appliance	293	1.17
Gas heater	258*	1.03*
Hot water laid on (direct supply) ..	428	1.71
Hot water laid on (calorifier)	171*	0.68*
Combined group (independent boiler, fire with oven and immersion heater with a solid fuel appliance)	267	1.07

The standardized consumptions can be corrected for small differences in family size or composition for appliances in the combined group only. The allowances to be made are : for an adult ± 52 gallons ; for a child over five years ± 48 gallons, and for an infant ± 72 gallons. For example, the standardized consumption for a family of two adults and two children both over five years using an independent boiler is $(268 - 72 + 48)$ or 244 gallons ; for a family of three adults and two children (one being an infant) using a fire with oven the quantity is $(245 + 52)$ or 297 gallons. Such calculations should only be made for families of near size and composition to the standard.

One general observation is necessary. It is frequently contended, and with justification, that carrying out an experiment of this kind is liable to cause housewives and their households to deviate from their normal routine. It is possible that in some households in the consumption survey the number of baths taken during the two survey periods was higher than average. Certain housewives suggested that the carrying out of the tests and the consequent need to record their consumption had made them more careful than usual in their use of hot water during the test weeks. The daily reports from the investigators, who adapted themselves very easily to the ways of the households and, by the completion of the second survey were well acquainted with the housewives, show that for each appliance group as a whole there is a strong likelihood that variations from the normal practice of households were in general slight.

COMPARISON WITH OTHER DATA

The Egerton Recommendations

The Egerton Committee (the Heating and Ventilation (Reconstruction)

* Sample cannot be considered typical.

Committee of the Building Research Board of the Department of Scientific and Industrial Research) made the following observation in their report :⁽⁴⁾

It is extremely difficult to estimate either the requirements of a household for hot water or the use that will be made by an average family of a convenient supply of hot water when it is available. In making provision for this service, it is necessary to avoid the extremes which lead to an inadequate supply for the more liberal user on the one hand, or an excessive installation and running cost for the less liberal user on the other hand. The recommendation adopted is based upon reasonable requirements for a family of four persons—two adults and two children.

The installation should be capable of supplying 250 gallons of water at 140°F. weekly. Facilities should be provided to give a supply at 140°F. for washing dishes and for laundry purposes, and a means of conveniently bringing about 7 gallons of water to the boil ; cold water may be added when necessary for other purposes such as baths and washing.

The above quantity of water would provide approximately sufficient hot water for a total of 7 full hot baths a week, for 10 washes per day (at a washbasin), for normal washing-up requirements, for 10 gallons a week for house cleaning, and for 50 gallons a week for laundry.

The consumption surveys showed that with some of the appliance groups (fire with oven, independent boiler, immersion heater in conjunction with a solid fuel appliance) the Egerton recommendation was remarkably close to the actual requirements. Where water heating was comparatively difficult (no-appliance and copper only groups) consumption was, as expected, greatly reduced, but, with a direct supply of hot water laid on, consumption was almost double that recommended by the Egerton Committee.

In the consumption surveys, where hot water required for specific purposes only was measured, the sample was too small to permit valid comparisons of quantities for each item of use, although adequate for comparisons for total use for baths, and for comparison between adults' and children's usage for some of the appliance groups.

Information from Water Authorities

Records of hot water consumption in dwellings have been taken by a number of water authorities in England and Scotland, in connection with another inquiry carried out for the Ministry of Health. The figures, in so far as they relate to hot water consumption in houses and flats, are, with permission, summarized below. The records were taken over various periods and relate to a wide variety of houses and flats. No information is available as to family compositions, *i.e.* the proportions of adults and children, or as to the temperature at which hot water was used, so that the figures must be regarded as typical only. Subject to these reservations, they may be compared with the results of the consumption survey, and with the Egerton recommendation of approximately 9 gallons per head per day at 140°F., or 250 gallons per week for a family of 2 adults and 2 children ; the available data in some cases did not permit the estimation of a consumption for 4 persons.

The figures are as follows :

WATER AUTHORITIES IN ENGLAND

HOUSES

	No. of dwellings	Average No. of occupants	Hot water consumption gal./head/day	Standardized consumption for 4 persons gal./week
Back boiler	31	5.1	5.5	210
Back boiler with immersion heater	9	4.2	7.3	203
Independent boiler	13	3.5	10.8	308
Independent boiler with immersion heater	4	4.5	9.1	224
Immersion heater only	7	5.3	4.5	147
Weighted averages, all houses ..	64	4.6	6.6	223
Hot water laid on (direct supply)	300	4.0	15.7	440

FLATS

	No. of dwellings in sample	Average No. of occupants	Hot water consumption gal./head/day	Standardized consumption for 4 persons gal./week
Back boiler	43	4.9	4.2	112
Independent boiler	2	3.0	6.8	—
Independent boiler with immersion heater	18	3.8	6.6	178
Immersion heater only	1	2.0	8.4	—
Weighted averages, all flats ..	61	4.5	4.9	132
Hot water laid on (direct supply)	289	2.7	17.3	336
Hot water laid on (calorifiers) ..	21	3.6	12.4	—

WATER AUTHORITIES IN SCOTLAND

HOUSES

	No. of dwellings in sample	Average No. of occupants	Hot water consumption gal./head/day	Standardized consumption for 4 persons gal./week
Back boiler	22	3.6	8.4	294

FLATS

Back boiler	12	2.9	8.6	246
Hot water laid on (direct supply)	237	1.9	26.0	—

General deductions from the figures supplied by the English and Scottish Water Authorities are :

- hot water consumption per head decreases as the number of occupants increases,
- for similar conditions of occupation, hot water consumption is less in flats than in houses. (This may be due to less laundry work being carried out in flats, owing to drying difficulties),
- consumption with hot water laid on is much greater than with local appliances. Consumption with local calorifiers in each dwelling is about three quarters of that with direct supply; this proportion is considered to be more realistic than the proportion of two-fifths derived from the consumption survey, in which the flats with calorifier supply had baths installed in the kitchens—a factor which greatly restricted their use.

Information from Gas Authorities

(a) The distribution of households lacking facilities for the proper provision of hot water is given in Part I and indicated in the Introduction to this Report (Figures 1 and 2). The experience of an inquiry in one particular locality may be cited. The North Thames Gas Board and Market Research, in a count of 19,000 interview cards, found that 34 per cent of the households having a gas supply, and located in an area running north of the Thames from Staines and Northwood to Dagenham, and from Brentwood and Grays to Southend, have no means of heating water—gas, electrical or solid fuel—except kettles or buckets on a cooker. Analysis showed that this applied to 10 per cent of houses occupied by single families, 24 per cent of self-contained flats, and 64 per cent of dwellings in divided houses, *i.e.* old houses now occupied by more than one family, but not structurally altered.⁽⁶⁾

(b) In a paper presented to the Institution of Gas Engineers⁽⁷⁾, estimates of hot water consumption were given as follows :

LOWER STANDARD USE		
Gal. delivered at 140°F.		Gal. at usable temperature (rounded figures)
$56 \times \frac{3}{4} = 42$	Small wash-up or diluted for ablution ..	55
$21 \times 1 = 21$	Washing up	20
$7 \times 2\frac{1}{2} = 17\frac{1}{2}$	In sink or bucket for house cleaning and incidental laundry	25 to 30
<hr/>		
80½		
$4 \times 10 = 40$	Child's bath, 5 in. to 6 in. depth	50 to 70
$2 \times 15 = 30$	Adult's bath, 7 in. to 8½ in. depth	40 to 55
<hr/>		
150½		
$2 \times 5 = 10$	Laundry boiling	10
<hr/>		
160½		200 to 240
<hr/>		
HIGHER STANDARD USE		
$24 \times \frac{1}{2} = 12$	Generally as above, with more generous allowance of small amounts and baths.	20
$56 \times \frac{3}{4} = 42$		40
$42 \times 1 = 42$		55
$7 \times 3\frac{1}{2} = 24\frac{1}{2}$		30 to 40
<hr/>		
129½		
$8 \times 15 = 120$		160 to 220
<hr/>		
249½		
$2 \times 5 = 10$		10
<hr/>		
259½		315 to 385
<hr/>		

The ranges given for the larger amounts are due to the variation from winter to summer in the temperature of the cold water used for dilution. To give the 220 and 350 gal. standards of service in summer only, less gallons at 140°F. are required. Although water for boiling laundry (and perhaps also some of that used for culinary purposes) may be drawn from the hot-water supply, it is more convenient to keep this item separate. The amounts at 140°F. for which consumptions are worked out in the tables are therefore :

Lower standard :	150 gal. average all the year
	145 gal. summer only.
Higher standard :	250 gal. average all the year
	240 gal. summer only.

The consumption surveys show an average usage intermediate between the lower and higher standards postulated.

C. H. Purkis⁽⁸⁾ states that the gas consumption of a large number of consumers indicates that the average consumption of hot water at 140°F. is about 70 gallons per household per week, irrespective of the size of the household. The consumption surveys, however, showed a consumption in the gas appliance group approaching the Egerton recommendation; but, as most of the households in the gas appliance sample were living in large houses converted into flats, they were to that extent a special group.

Information from Electricity Authorities

The British Electrical Development Association regard as typical a consumption of 140 gallons per week at 140°F. for a family of two adults and two children, with 250 gallons as high.⁽⁹⁾

The "Electrical Review"⁽¹⁰⁾ estimates the weekly consumption of electricity in a small house, for an immersion heater in summer, to be 50-55 kWh. If the tank were well lagged this might provide as much as 180-220 gallons per week at 140°F.

R. Grierson and F. Jackson⁽¹¹⁾ quote weekly consumptions at 140°F. of "low" 160 gallons and "high" 250 gallons, for a family of four using electric immersion heaters.

Other Information

J. C. Weston⁽¹²⁾ suggests for houses of about 1,000 sq. ft. area the following equivalent consumption per week:

Solid fuel appliances	..	..	..	250 gallons at 140°F.
Gas appliances	..	..	..	150 gallons at 140°F.
Electric appliances	..	..	..	150 gallons at 140°F.

These figures obtained from the Abbots Langley experimental housing estate of the Building Research Station (where the households consist of two adults and two children), and from other sources, show good agreement for solid fuel appliances with the Egerton recommendation. Weston suggests that for consumption in excess of 250 gallons per week during the summer, solid fuel is likely to be cheaper than gas or electricity at the prices then quoted (coke 90s. a ton, gas 1s. a therm, electricity 3d. kWh.) but that for consumption of less than 200 gallons the cost with electricity or gas is likely to be lower than with solid fuel. The consumption per person per day, with gas and electric appliances, is 5 gallons, which agrees well with the "immersion heater only" figure of the Water Authorities of 4.7; the latter figure is based on a very small sample.

The "pattern of behaviour"⁽⁵⁾ carried out during the *unoccupied phase* of the tests at Abbots Langley for the same size of household allowed the following usage:

10 baths per week at 105°F.: 17 gallons per bath. (The average quantity was estimated to allow for the smaller quantities used for children's baths.)

12 washes per day at 110°F.: 1 gallon per wash (at a wash basin); dish-washing: 3 times per day at a range of 120°F.-140°F.: 1 gallon each time.

House-cleaning and incidentals: 3 gallons daily at 140°F.; laundry: 50 gallons at 140°F.

Total : 250 gallons at 140°F., plus means of bringing 8 gallons to the boil.

If allowance is made for each person to bath on alternate days, the total consumption would increase to 290 gallons at 140°F., and if a bath on five days a week per person is accepted, the total consumption would increase to 353 gallons at 140°F.

Summary and Conclusions

The distribution of appliances and facilities is summarized in Part I, Tables 42-44 (pages 43-47) and is indicated briefly in the Introduction to this Report (see Figures 1 and 2).

The relation between consumption and use of hot water and the appliances available is given in Tables 1, 2, 5, 13 and 14 and Figures 4, 5 and 13 of this Report.

The amount of hot water adequate for an average household is considered on pages 45 to 51. An average household is taken as one comprising two adults and two children. Briefly, the national position is that the estimated requirement for a household of 4 persons is between 250 and 300 gallons of hot water per week at 140°F., and that at the time of the survey nearly two-thirds of households were using only about half or less than this quantity due partly to absence of satisfactory facilities for water heating and partly to running costs.

SATISFACTION WITH APPLIANCES

Relative degrees of satisfaction with various appliances in winter are discussed in Part I.

In general, appliances are found to be more satisfactory for water heating in summer than in winter ; the space heating function of many appliances, however, in very hot weather causes serious inconvenience.

Among the piped appliances, the immersion heater is considered satisfactory by the highest proportion* of housewives, both in summer and in winter, though the number of housewives having them is relatively small. For solid fuel appliances, the relative degrees of satisfaction in summer of households having various types are :

independent boiler 81 per cent ; inset fire or back boilers 76 per cent ; and fire with oven 73 per cent. The high level† of satisfaction regarding the performance of gas and electric coppers (or wash boilers) shows that these appliances are efficient for the purpose for which they are designed ; it does not mean that the copper is considered a satisfactory method of heating for all purposes, and it was not possible from this inquiry to assess the strength of feeling regarding poor facilities.

SEASONAL USE OF APPLIANCES

Seasonal variation in use of appliances is found to be :

solid fuel appliances	..	nearly all used daily in winter ; one-third used daily in summer ;
electric storage heater	..	as many used each day in either season but at fewer times during the day in summer ;
electric immersion heaters		twice as many used daily in summer as in winter ;
coppers	.. ..	more frequent use in summer.

* 88 per cent of those having them.

† 90 per cent of those having them.

On balance it is found that fewer appliances are used for all purposes in summer than in winter, but there is no marked variation in the total number of appliances used for heating bath water in either season. (Part I, Table 11 and Table 4 of this Report.)

TEMPERATURES AT WHICH HOT WATER IS USED

The average temperature of "hot" water used shows no seasonal variation: 120°F. both in summer and in winter. The average temperature of "warm" water used is 105°F.; this is identical with the average temperature of the water used for bathing. "Very hot" water is rarely used; for dish washing the average temperature used is 118°F. The temperature of the cold water available, however, shows considerable seasonal variation. (Appendix 3.)

In order to compare the quantities of hot water used for various purposes by different households it was necessary to adopt a standard temperature, and 140°F. was selected as the basis. (Page 34.)

AMOUNTS OF HOT WATER USED

Great variation is found in the amounts of hot water used. Measurements of quantities used by households for specific purposes only, at an equivalent temperature of 140°F. show a range of from less than 50 gallons to over 1,000 gallons a week (Figure 13). Within these extremes, however, there is a discernible pattern of behaviour.

The number of hot baths taken in a week may be regarded as a measure of seasonal variation in view of the quantity of water required per bath. A bath with water to a depth of 7 inches only may require up to 25 gallons according to the size of the bath (Figure 10).

Although more hot baths are taken in summer than in winter the general pattern is similar for both seasons (Table 5) and the quantities of hot water used at a comparative basis of temperature of 140°F. by households of average size show no strong seasonal variation.

The percentages of households covered by the national surveys taking various numbers of baths per person are:

		<i>Summer</i>	<i>Winter</i>
Five or more baths weekly	..	7	5
Four to two baths weekly	..	39	29
One bath weekly	.. ..	46	59
Less than one bath weekly	..	8	7

There is no significant variation in this general pattern between households in urban and rural districts, though there is some variation between regions and considerable difference between economic groups (Table 5 and Appendix 1, Table B).

RELATION BETWEEN CONSUMPTION AND TYPE OF APPLIANCE

The average equivalent consumption of hot water at 140°F. per household ranges, according to the type of appliance, from 77 gallons a week in winter and 69 in summer for households with no appliances (*i.e.* all water heated in kettles or pans), to 428 gallons a week in winter and 408 in summer for households with

hot water laid on by direct supply (Table 14). The seasonal variation in consumption with any particular appliance is thus relatively unimportant in comparison with the great differences occurring with different methods of obtaining hot water. The greater total demand for hot water in summer, however, is of major importance to water undertakings, particularly as their records appear to indicate that complementary cold water consumption increases with an increase of hot water consumption.

Consumption at the rate of 250 gallons per week at 140°F. would, if used at a mean temperature of 110°F., provide :

in winter, with a cold water temperature of 43°F. : 362 gallons at 110°F.

in summer, with a cold water temperature of 60°F. : 400 gallons at 110°F.

Three broad average levels of weekly hot water consumption for households of average size are found to be :

- (a) Less than 100 gallons for households having no appliance.
- (b) 270 gallons for households having various types of solid fuel appliances.
- (c) Over 400 gallons for households having hot water laid on by direct supply.

The methods of heating for the three groups—fire with oven, independent boiler and immersion heater with a solid fuel appliance—were considered to be sufficiently similar to justify consideration as a combined group ; it was not possible during the winter test periods to obtain data on immersion heater use apart from that of the solid fuel appliance, while in summer the solid fuel appliance was generally used when bulk quantities were required.

Weekly consumption at 140°F., standardized for families of two adults and two children, one being an infant, for each type of appliance are given below :

	<i>Equivalent gallons per week at 140°F.</i>	<i>Proportion of Egerton recommendation</i>
(a) No appliance	84	0.34
(b) Copper only	131	0.52
(c) Fire with oven	245	0.98
(d) Independent boiler	268	1.07
(e) Immersion heater with a solid fuel appliance	293	1.17
(f) Gas heater	258*	1.03*
(g) Hot water laid on (direct supply) ..	428	1.71
(h) Hot water laid on (calorifier) ..	171*	0.68*
(i) Combined group (c), (d) and (e) ..	267	1.07

The standardized consumption can be corrected for small differences in family size or composition for appliances in the combined group only. The allowance to be made are : for an adult ± 52 gallons ; for a child over five years ± 48 gallons ; and for an infant ± 72 gallons (page 47).

The figures given above are derived from the consumption surveys. Com-

* (See page 47.)

parative figures from certain other sources (see pages 66-68) are as follows :

	<i>Equivalent gallons per week at 140°F.</i>	<i>Proportion of Egerton recommendation</i>
(j) Solid fuel appliance	250	1.00
(k) Inset fires	140	0.56
(l) Gas appliances	140	0.56
(m) Gas appliances (low level consumption)	70-100	0.28-0.45
(n) Electrical appliances	140	0.56
(o) Electrical appliances (high level consumption)	250	1.00
(p) Hot water laid on (direct supply) ..	445	1.78
(q) Hot water laid on (bathroom used by average of 2 persons only) ..	728	2.91
(r) Hot water laid on (calorifiers) ..	347	1.49

RELATION BETWEEN CONSUMPTION AND ACCESS TO A BATH

Access to a bath is a factor affecting consumption. It is found when the two calorifier samples are compared that the consumption for households where the bath is installed in the kitchen is 171 gallons as against 347 gallons for households with a separate bathroom, *i.e.* 1 : 2.

Access to a bath is dependent not only on the location of the bath, but also on the number of users. For households having average sizes of 4, 3-4 and 1-2 persons respectively, the average weekly consumptions in gallons per person with hot water laid on (direct supply) are 107, 111 and 182 ; so that the greater the number of users, the less water per person is used.

RELATION BETWEEN CONSUMPTION AND LENGTH OF TIME APPLIANCES ARE IN USE

It is, of course, expected that consumption should be markedly affected by the length of time appliances are in use. Tables 1 and 2 show that, for households having solid fuel appliances, the type of appliance used most constantly is the independent boiler, the next being fires with oven, and least of all inset fires. Of these, independent boilers are found most frequently in households in the highest economic group. The average consumption for households having these types of appliances are :

for independent boilers	268 gallons per week
for fires with oven	245 gallons per week
for inset fires	140 gallons per week

RELATION BETWEEN CONSUMPTION AND THE COST OF WATER HEATING

No specific inquiry was made, in any of the surveys, into the cost of water heating. In any case, it is usually difficult to separate the costs of water heating from the costs of space heating, whether or not space heating is required when hot water is needed. The great variations found in the quantities of hot water used by households are closely related to the method of water heating, the length of time appliances are in use, and the availability of facilities for taking baths; factors which in themselves are related to economic circumstances.

Some evidence is available which suggests that for consumption in excess of 250 gallons per week during the summer, solid fuel is likely to be cheaper than gas or electricity at the prices operating at the time of the field work, and that for consumptions below 200 gallons the cost for electricity or gas is likely to be lower than that for solid fuel.⁽¹²⁾ Although prices have in the intervening period increased, the ratios have remained substantially unaltered and the conclusions are probably still justified.

HOT WATER CONSUMPTION ON A NATIONAL BASIS

The average weekly consumption of hot water at 140°F. for households of 4 persons is summarized on a national basis, and with rounded figures, as follows:

	<i>Percentage of households (national basis)</i>	<i>Equivalent gallons per week at 140°F.</i>
No appliance	about 15	less than 100
Copper only	nearly 30	130
Gas and electrical appliances (no solid fuel)	about 20	150
Solid fuel appliances (fires with ovens and independent boilers 270; inset fires 140)	nearly 35	250
Hot water laid on (direct supply) ..	about 1	450
Hot water laid on (calorifiers) ..		350

The difference in consumption with fires with ovens and inset fires can be related to differences in duration of times for which these appliances are in use. While the same proportions of these two types of appliances are alight during the afternoon and evenings in summer, only 37 per cent of inset fires are alight in the morning as against 52 per cent of fires with ovens. (Table 2).

The Egerton recommendation has proved to be reliable for estimating reasonable requirements according to present standards of living.

With improved facilities, however, 64 per cent of households may be expected to take more baths, and the average number of baths is likely to increase from the present figure of just under 2 per person per week, to at least 3 per person per week. An increase to a bath per person every second day would raise the weekly consumption per household to 300 gallons and a further increase to five baths per person per week would raise the figure to 350 gallons.

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Appendix I

FURTHER INFORMATION ON THE NUMBER OF BATHS TAKEN

Table A shows the number of hot baths a week taken by persons aged 5 years and over. More hot baths are taken in summer than in winter, the average number of hot baths per person per week being 2 in summer and 1.6 in winter. In either season between one half and two thirds of people take only one hot bath a week. In summer only 8 per cent and in winter only 5 per cent of people take a hot bath nearly every day, and at the other end of the scale 4 per cent of persons in summer and 6 per cent in winter take less than 1 bath per week or no bath at all.

Table A shows the data analysed by district and region, and then by sex and age groups. The differences shown between rural and urban areas are so small that no variation from urban to rural areas on a basis of season is indicated. For each region the average number of hot baths per person is slightly higher in summer than in winter. Of all regions the frequency is lowest in Scotland, where there are least facilities.

For children, the average number of hot baths taken per week, 2.9 in summer and 2 in winter, is higher for those aged 5 to 14 years than for any of the corresponding adult age groups. More children than adults take a daily hot bath, 20 per cent more in summer and 10 per cent more in winter.

Fewest baths are taken by people aged 55 years and over. The low average of 1.3 baths per week in winter for persons aged 55 years and over is reflected in the household average for different types of households. In 21 per cent of the households where all members are aged 50 years and over less than one bath a week per person or no bath is taken. In 12 per cent of households where the housewives are aged 50 years or over, again, less than one bath a week per person or no bath is taken. The proportion taking *no* baths remains steady for ages 5-54 years at about 4 per cent in winter (it is lower in summer), but for the oldest age group it rises to 14 per cent.

Table B gives the data analysed according to the economic groups. Here considerable differences are shown. Hot baths are taken daily by 20 per cent of persons in the highest economic group but only 1 per cent of persons in the lowest economic group (up to £3 weekly wage rate, March, 1947). The average number of baths per person per week varies from 1 for the lowest to 3 for the highest economic group.

In Table C the use of hot (or warm) water for baths for children under five years of age is shown according to age and economic group.

The giving of a daily bath to infants under one year of age is common practice, but as age increases hot baths are given less frequently until at four years of age only 41 per cent of children are given a daily hot bath. Children under five years of age have an average of 5 baths per week. Variations in the frequency are found for the economic groups; 57 per cent of children in the two lowest economic groups (up to £4 weekly wage rate, March, 1947), but 88 per cent of children in the highest group are given a daily bath.

TABLE A. NUMBER OF HOT BATHS A WEEK TAKEN BY PERSONS
AGED 5 YEARS AND OVER IN WINTER AND IN SUMMER

	NUMBER OF PERSONS AGED 5 YEARS AND OVER		PERCENTAGE OF PERSONS AGED 5 YEARS AND OVER TAKING :						AVERAGE NUMBER OF BATHS PER PERSON PER WEEK
			7 or more baths	4-6 baths	3 baths	2 baths	1 bath	less than 1 bath	
DISTRICT									
Urban ..	15,698	W	5	3	6	15	66	5	1.6
		S	7	6	9	21	53	4	2.0
Rural ..	3,891	W	7	4	5	12	64	8	1.7
		S	10	4	7	26	49	4	2.1
REGION									
Scotland ..	2,083	W	4	2	4	10	67	13	1.3
		S	6	3	7	17	63	4	1.7
North ..	5,501	W	4	5	6	15	67	3	1.7
		S	10	7	10	20	49	4	2.2
Midlands and Wales	4,382	W	6	3	6	13	67	5	1.7
		S	5	5	8	22	59	1	1.8
South and East	4,324	W	6	2	4	14	68	6	1.6
		S	7	2	8	25	52	6	1.9
London ..	3,299	W	6	4	8	17	58	7	1.8
		S	10	8	11	25	42	4	2.3
SEX									
Male ..	9,101	W	6	4	5	14	66	5	1.7
		S	8	6	9	22	51	4	2.1
Female ..	10,488	W	4	3	5	15	66	7	1.5
		S	7	5	9	22	53	4	2.0
AGE GROUP									
5-14 years	2,743	W	10	4	7	16	58	5	2.0
		S	20	10	10	15	44	1	2.9
15-24 years	2,852	W	3	4	6	14	70	3	1.6
		S	7	5	8	23	54	3	2.0
25-34 years	3,535	W	4	4	6	17	65	4	1.6
		S	7	5	10	25	52	1	2.0
35-44 years	3,189	W	6	4	6	17	63	4	1.8
		S	9	6	9	25	50	1	2.2
45-54 years	3,010	W	4	3	5	14	70	4	1.6
		S	7	4	11	24	50	4	2.0
55 and over	4,260	W	3	2	3	10	68	14	1.3
		S	3	2	6	21	59	9	1.5
No. of persons aged 5 years and over in sample	19,589	W	5	3	5	15	66	6	1.6
		S	8	5	9	22	52	4	2.0

TABLE B. NUMBER OF HOT BATHS A WEEK TAKEN BY PERSONS
AGED 5 YEARS AND OVER IN WINTER
(Analysed by economic groups)*

ECONOMIC GROUP	NUMBER OF PERSONS IN SAMPLE AGED 5 YEARS AND OVER	PERCENTAGE OF PERSONS AGED 5 YEARS AND OVER TAKING :						AVERAGE NUMBER OF BATHS PER PERSON PER WEEK
		7 or more baths	4-6 baths	3 baths	2 baths	1 bath	less than 1 bath	
I	1,511	1	1	2	7	70	19	1.0
II	1,438	1	2	4	9	71	13	1.2
III	9,196	3	3	3	12	73	6	1.4
IV	5,820	5	4	7	19	62	3	1.8
V	1,624	20	9	14	23	32	2	3.0
TOTAL ..	19,589	5	4	5	14	66	6	1.6

TABLE C. NUMBER OF TIMES CHILDREN UNDER 5 YEARS ARE
BATHED PER WEEK IN WINTER

	NUMBER OF CHILDREN IN SAMPLE	PERCENTAGE OF INFANTS BATHED PER WEEK :						AVERAGE NUMBER OF BATHS PER CHILD PER WEEK
		7 or more times	4-6 times	3 times	Twice	Once	less than once	
AGE								
Under 1 year	381	96	1	1	1	1	—	7
1 year ..	311	81	6	6	3	4	—	6
2 years ..	361	62	8	9	8	13	—	5
3 years ..	378	48	8	10	14	19	1	5
4 years ..	317	41	9	12	14	21	3	4
ECONOMIC GROUP (all children under 5 years)								
I and II ..	162	57	5	8	9	18	3	5
III	925	63	6	7	9	14	1	5
IV	532	67	8	9	8	8	—	6
V	129	88	3	3	1	3	2	6
TOTAL ..	1,748	66	6	8	8	11	1	5

* For definitions see Table 6 and Part I, page 2.

Table D shows that, of households where one method only of heating water is used, the proportion in which bath-water is sometimes shared is largest for the households dependent solely on coppers (21 per cent) or on kettles and pans (16 per cent), *i.e.* households without a piped supply of hot water. Among households where hot water is laid on there is no evidence of the sharing of bath water, while for all other households with a piped supply of hot water the percentage of households where bath water is shared is 7.5 per cent.

Table E shows the average number of hot baths per week per person aged 5 years and over. The table provides the supporting data for the comment regarding the numbers of baths on page 14.

Table F shows the size of baths used for children under 5 years of age.

Tables G and H show where baths are taken. Most use is made of public baths by young people, and more use is made of them by men and boys than by women and girls.

TABLE D. SHARING OF BATH WATER IN WINTER

TYPE OF APPLIANCE	NUMBER OF HOUSEHOLDS IN SAMPLE USING ONE METHOD ONLY FOR WATER HEATING	PERCENTAGE OF HOUSEHOLDS IN SAMPLE IN WHICH BATH WATER IS SOMETIMES SHARED IN WINTER
STORAGE HEATERS		
Solid fuel		
Inset fire	563	6
Fire with oven ..	1,114	9
Independent boiler	369	6
Electric		
Storage	86	8
Immersion	199	5
		7.4
INSTANTANEOUS		
Gas		
Single-point ..	367	9
Multi-point ..	72	4
		8.2
COPPERS		
Solid fuel	311	23
Gas	329	21
Electric	52	13
		21.3
Kettles and Pans ..	1,100	16
Hot water laid on ..	37	—
Number of households in sample	5,997	11

NOTE.—For households having a piped supply of hot water (excluding those with hot water laid on) the percentage is 7.5.

TABLE E. AVERAGE NUMBER OF HOT BATHS PER PERSON PER WEEK
AGED 5 YEARS AND OVER

	NUMBER OF HOUSEHOLDS IN SAMPLE		PERCENTAGE OF HOUSEHOLDS IN WHICH THE AVERAGE NUMBER OF BATHS PER PERSON AGED 5 YEARS AND OVER IS :			
			5 or more	2-4	About 1	Less than 1
DISTRICT*						
Urban	4,801	W	5	29	59	7
Rural	1,196	W	7	26	58	9
REGION						
Scotland	644	W	2	23	59	16
North	1,677	W	4	32	59	5
Midlands and Wales ..	1,308	W	5	30	58	7
South and East	1,331	W	5	23	64	8
London	1,037	W	8	31	54	7
BATHROOM						
Own	2,793	W	9	40	50	1
Shared	457	W	5	30	60	5
None	2,747	W	1	16	69	14
Number of households in sample.	5,997	W S	5 7	29 39	59 46	7 8

* For definitions see Table 6 and Part I, page 2.

TABLE F. SIZE OF BATH USED FOR CHILDREN UNDER 5 YEARS
OF AGE

AGE	NUMBER OF CHILDREN IN SAMPLE	PERCENTAGE OF CHILDREN BATHED IN :	
		Baby bath, sink, wash basin, etc.	Full size bath
Under 1 year ..	381	95	5
1 year	311	80	20
2 years	361	68	32
3 years	378	57*	42
4 years	317	46*	51

* There is no record for 1 per cent of children in the under 3 years group, nor for 3 per cent of children in the under 4 years group.

TABLE G. WHERE BATHS ARE TAKEN IN WINTER

	NUMBER OF HOUSEHOLDS IN WINTER SAMPLE	PERCENTAGE OF HOUSEHOLDS TAKING :			
		All baths at home	Some or all at public baths	Some or all elsewhere	No baths
DISTRICT					
Urban	4,801	79	11	5	5
Rural	1,196	83	2	8	7
REGION					
Scotland	644	52	28	9	11
North	1,677	80	8	9	3
Midlands and Wales	1,308	84	4	7	5
South and East ..	1,331	89	2	2	7
London	1,037	79	12	3	6
ECONOMIC GROUP* ..					
I	667	63	10	4	23
II	476	74	10	5	11
III	2,619	76	13	8	3
IV	1,757	88	5	5	2
V	478	96	2	2	—
Number of households sample.	5,997	80	9	6	5

* For definitions see Table 6 and Part I, page 2.

TABLE H. WHERE BATHS ARE TAKEN IN WINTER

	NUMBER OF PERSONS AGED 5 YEARS AND OVER IN SAMPLE	PERCENTAGE OF PERSONS AGED 5 YEARS AND OVER TAKING :			
		All baths at home	Some or all at public baths	Some or all elsewhere	No baths
DISTRICT					
Urban	15,698	83	8	4	5
Rural	3,891	87	1	4	8
Scotland	2,083	59	20	8	13
North	5,501	86	6	5	3
Midlands and Wales	4,382	89	3	3	5
South and East ..	4,324	90	2	2	6
London	3,299	82	8	3	7
ECONOMIC GROUP					
I	1,511	68	10	4	18
II	1,438	75	7	5	13
III	9,196	81	9	5	5
IV	5,280	91	3	3	3
V	1,624	96	1	1	2
SEX					
Male	9,101	83	8	5	5
Female	10,488	85	6	3	7
AGE GROUP					
5-14 years ..	2,743	89	5	2	4
15-24 years ..	2,852	82	10	6	3
25-34 years ..	3,535	82	9	6	4
35-44 years ..	3,189	84	7	5	4
45-54 years ..	3,010	87	6	3	4
55 years and over ..	4,260	81	4	3	13
Number of persons aged 5 years and over in sample.	19,589	84	6	4	6

NOTE : Some of the percentages add up to 101.

Appendix 2

A NOTE ON THE USE OF WASH-HOUSES

From the point of view of the design of dwellings there is need for further information on where and how housewives do their clothes washing and further study of the use of kitchens is required. Although it was inadvisable to extend the present inquiry to cover the design aspect of the problem, it was possible to examine one particular aspect, *i.e.* the provision and use of a wash-house.

Access to a wash-house is possible for 17 per cent of households. Such a feature is more common in rural areas than in urban districts, rare in the London Region, and most common in Scotland, where about 40 per cent of households have the use of a wash-house. Wash-houses are frequently found in connection with blocks of flats or tenement dwellings (33 per cent).

Of those households who own or have access to a wash-house, 22 per cent in winter and 16 per cent in summer do not use them. The proportion of households not using the wash-house increases where wash-houses must be shared with other households.

TABLE I. USE OF WASH-HOUSES

	NUMBER OF HOUSEHOLDS IN SAMPLE		PERCENTAGE OF HOUSEHOLDS :		
			Wash-house used	Wash-house not used	No wash-house
DISTRICT					
Urban	4,801	W	10	4	86
Rural	1,196	W	26	4	70
REGION					
Scotland	644	W	26	15	59
North	1,677	W	17	4	79
Midlands and Wales	1,308	W	14	2	84
South and East ..	1,331	W	10	2	88
London	1,037	W	3	2	95
AGE OF DWELLING					
Pre-1914	4,095	W	17	6	77
Post-1918	1,902	W	5	1	94
TYPE OF DWELLING					
Detached house ..	764	W	26	3	71
Semi-detached house	1,782	W	11	2	87
Terrace house ..	2,730	W	11	3	86
Block flat or tenement	398	W	21	22	57
Other flat	323	W	8	4	88
Number of households in sample.	5,997	W	14	3	83
	NUMBER OF HOUSEHOLDS WITH WASH-HOUSE FACILITIES				
Own wash-house ..	696	W	85	15	
		S	89	11	
Shared or communal ..	343	W	63	37	
		S	75	25	

Appendix 3

THE TEMPERATURE OF COLD WATER

REGION	Place of measurement	WINTER MEASUREMENT		SUMMER MEASUREMENT	
		Period	Mean temperature	Period	Mean temperature
Scotland Glasgow ..	Glasgow Mains	March and April 1948	43°F.	August and September, 1948	59°F.
North Leeds ..	Headingley Mains	8th to 24th March, 1948	42°F.	16th August to 14th September, 1948*	59°F.
Manchester	Service Reservoirs	March and April, 1931-1940	42°F.	July and August, 1931-1940	59°F.
London ..	Street Main, W.1	March and April, 1927-1933	47°F.	August and September, 1927-1933	66°F.
		Mean ..	43°F	Mean ..	61°F.

* The periods given above are precise periods for the time of year of the survey in all regions. The temperatures for London appear to differ significantly from the others.

Appendix 4

FUELS USED

	PERCENTAGE OF HOUSEHOLDS USING :	
	In National Survey*	In Consumption Survey**
Solid fuel only	40	18
Gas only	17	11
Electricity only	2	—
Solid fuel and gas	17	16
Solid fuel and electricity	5	20
Gas and electricity	1	1
Solid fuel, gas and electricity	2	10
No water heating appliance ..	15	6
Hot water laid on	1	17
Number of households in sample (winter conditions)	5,997	326

* March, 1947.

** February—April, 1948.

Appendix 5

ADDITIONAL INFORMATION ON THE DISTRIBUTION OF APPLIANCES

(1) *North Thames Gas Board*

Additional information on the distribution of appliances has been provided by the North Thames Gas Board for their area. It cannot be expected that the information regarding a particular part of any region should be similar to that obtained for the region as a whole from a nation-wide sample.

Results may also be affected by variation in definition of appliances. Further, in the figures supplied, appliances no longer used are excluded ; this can be expected to relate particularly to solid fuel coppers. It would be expected that the gas figures, in view of the nature of the sample, would be higher for the Gas Board's sample than for the National sample. Nevertheless, the comparison is of interest and is as follows :

PERCENTAGE OF HOUSEHOLDS WITH:

<i>March 1947 National Survey London Region (Part 1, Table 5)</i>				<i>Area of the North Thames Gas Board (Per hundred domestic gas consumers)</i>			
SOLID FUEL				SOLID FUEL			
Inset fire ..	10	}	15	Back boiler ..	..	..	18
Fire with oven ..	5			(fire with range)			
Independent boiler ..	..		17	Independent boiler ..	..	..	16
Copper .. ..	..		13	Copper .. ..	..	..	7
GAS				GAS			
Multi-point heater ..	3	}	4	Multi-point heater ..	..	..	5
Storage heater ..	1			(including storage heater circulator)			
Single point geyser* ..	..		17	Single point heater :			
				to bath ..	..	10	}
				to sink ..	..	7	
Copper .. ..	..		13	Copper .. ..	..	..	29
ELECTRIC				ELECTRIC			
All water heating appliances	11			All water heating appliances	7		
				(excluding all-electric dwellings)			

The above figures show a high concentration of gas coppers in the area of the North Thames Gas Board ; apart from this, the two sets of figures do not show wide divergencies.

* Some households have more than one single point geyser.

Comparative figures relating to households having various numbers of appliances are as follows :

PERCENTAGE OF HOUSEHOLDS WITH:

			<i>National Survey</i>	<i>Area of the North Thames Gas Board (Per hundred domestic gas consumers)</i>
No appliances	..	..	15	33
(London Region only	..	..	22)	
One appliance	..	..	47	38
Two appliances	..	..	34	24
Three or more appliances	..	..	4	5
			<hr/> 100	<hr/> 100

In the area covered by the North Thames Gas Board a very large amount of old housing, including conversion, is found in addition to considerable modern housing. Again these figures show the trends expected.

(2) *British Electricity Authority*

Additional information on the distribution of appliances that have been provided by the British Electricity Authority. The information covers about one-third of the domestic consumers of electricity and relates to the year 1946.

The comparison is as follows :

PERCENTAGE OF HOUSEHOLDS WITH:

			<i>National Survey Part 1, Table 5 March 1947</i>	<i>British Electricity Authority 1946</i>
ELECTRIC				
Storage heaters	..	..	3 }	2.2 }
Immersion heaters	..	..	4 }	5.4 }
Coppers	..	..	4	3.6

It can be assumed that the identification of electrical appliances for the Survey of the British Electricity Authority is accurate. The interviewers for the National Survey were given full descriptions of the types of appliances likely to be encountered during the inquiry ; they were, however, dependent on the housewives' description of the appliances in those cases where access to view was not possible. The results, however, show good agreement. The agreement is less satisfactory for the percentages of unlagged tanks with immersion heaters : National Survey 74 per cent, British Electricity Authority 45 per cent. The Social Survey interviewers were again dependent on the information supplied to them by housewives.

Appendix 6

INSTRUCTIONS TO INTERVIEWERS AND THE QUESTIONNAIRE USED IN THE NATIONAL SURVEYS

This Appendix gives the actual instructions to interviewers and the questionnaire used for the summer inquiry during August and September, 1948. A similar questionnaire was used for the main survey of March, 1947, with the omission of Question 5.

SURVEY OF DOMESTIC USE OF HOT WATER IN SUMMER INSTRUCTIONS TO INVESTIGATORS

Types of appliance

In your work on this enquiry you are likely to encounter 13 types of appliances for heating water. These appliances are divided into 4 main groups :

A. *Solid fuel*—coal, coke, anthracite or wood.

1. Inset fire. No cooking. An inset fire is one built into a wall, as opposed to an independent boiler. If this is the source of hot water it will usually have a *back* boiler, but the boiler may be found at the side.
2. Fire with oven. This again is an inset fire, with water boiler attached either at the side or the back, but it has a range or an oven in addition. This distinguishes it from No. 1.
3. Independent boiler (Ideal). This boiler stands on its own—that is, it is not inset or built into a wall. It is a closed-in stove intended primarily for water heating. It may or may not have a front which opens in order to heat the room a little. "Ideal" is the brand name of one type of independent boiler, and is given as an example only. There are other brand names.
4. Copper. This will be known variously as a copper, or set-pot, or washing boiler. It is a built-in appliance with a lid on the top and a place for coal, coke, etc., underneath. It is intended primarily for boiling clothes.

If you find any kind of solid fuel water heating appliance which is not covered by one of these four definitions, treat it as the appliance which it most nearly resembles and put a full note at the back of the questionnaire.

B. *Gas*

5. Single point instantaneous. This is a "geyser" or "Ascot" type of appliance, in which the water is heated as soon as the gas is turned on. The hot water passes through the appliance at once, and is not and cannot be stored anywhere for use later. A single point instantaneous gas appliance feeds one tap only.
6. Multi-point instantaneous heater is the same type as the above, but feeds more than one tap.
7. Storage heater. This type of gas heater supplies hot water to a storage tank and is drawn off to the bath, sink, etc., from the storage tank. As its name implies, the water can be heated in advance and stored until needed.

In this way it differs from 5 and 6, where the heat is not turned on until the water is actually needed.

8. Circulator. This is a device for heating water in a hot water tank (or cistern) which is also connected with a coal fire. Gas can be used whether the fire is alight or not, but it is not a special storage heater for use with gas only. It must be combined with appliances 1, 2 and/or 3.
9. A gas copper (or washing boiler). It is intended primarily for washing clothes. It has a lid at the top and gas jets below. There is usually a tap on the boiler by which it can be emptied, but the water does not flow into the sink or the bath.

If you find any kind of gas heated appliance which is not covered by one of these five definitions, treat it as the appliance which it most nearly resembles and put a full note at the back of the questionnaire.

C. *Electric*

10. Storage heater. This is comparable to No. 7; that is, it is a water storage tank which is heated by electricity only. The water can be heated before it is needed, stored, and drawn off as required.
11. Immersion or calculator. This is comparable to the gas circulator (8); it is a subsidiary method of heating water in a tank or cistern which is also connected with a coal fire. The immersion heater or circulator can be used whether the coal fire is alight or not. This type of heater can be found only with appliances 1, 2 and/or 3.
12. Copper. This is similar to a gas copper and coal copper; that is, with a lid on the top; the water is heated by electric elements. *Do not* confuse it with an electric washing machine, in which we are not interested.

If you find any kind of electric water heating appliance which is not covered by one of these three definitions, treat it as the appliance which it most nearly resembles, and put a full note on the back of the questionnaire.

D. *Hot water laid on*

13. With this system, there is no appliance in the dwelling itself. The hot water is heated and laid on from outside the dwelling. (For example, a large block of flats, where the hot water supply may come from coke boilers in the basement; or hot water obtained by "district" heating.)

If there is none of the above sources in the dwelling, this means that the housewife will heat her water for baths, washing, etc., entirely by putting kettles and pans on a fire, gas ring, etc. In other words, she has no special appliances.

The Questionnaire

Question 1. "Which of the following appliances have you for heating hot water?"

This is the basic question, and must be asked most carefully and the answers recorded equally carefully. Note that we are concerned with the appliances for heating water for everything but cooking. We are not concerned with the way in which a housewife boils kettles to make tea, etc.

To indicate the presence of any one of these appliances put a bold tick in the grid immediately below the types description of the appliance.

Make this tick as bold as possible, because it is going to guide all the succeeding questions on that page. Code 0 is a confirmatory code, and means that none of the appliances from 01 to 10 are installed in the households. It is, however, possible to combine Code 0 with Code 11 or 12.

Question 2. "How many days a week is each appliance used?" Ask this question about each of the appliances from 1 to 10 which you have ticked. Do not ask it for appliances 11 or 12. You will note that Question 1 asked "Which appliance have you?", and there may be an appliance in the house which has not been used for some time. If so, you will enter "0" when you ask question 2. We want you to enquire about *summer use*. The housewife may have an appliance which she uses only in the middle of the winter. If so, you will record "0" in answer to question 2 in relation to this appliance.

If the housewife uses it every day of the week, the answer will be 7. If she uses it at the week-ends only, find out whether her week-end means 1 day, 2 days or 3 days, and enter the answer accordingly. If she is using it less often than once a week, work this out in fractions. For example, if she uses it once a month, the reply will be $\frac{1}{4}$. If she uses it once every 3 weeks the reply will be $\frac{1}{3}$. If she uses it less often than once a month, record "0".

Do not try to establish how much of each day the appliance is used. If the gas geyser is lighted every morning, if only for a few minutes, the reply is that it is used on 7 days a week and your answer is 7. If the coal fire is lighted every day, and kept on for 12 hours, the reply is still 7. The replies should refer to use by the *household*, not by the housewife only.

Note that from this point onwards in the questionnaire you ask questions about appliances which have codes on that particular line. If there is a dash on the line, we do not require an answer to the question for the appliance.

Introduce Q.3 by asking for each of the appliances 1 to 3 (solid fuel): "Is there a piped hot water supply from your inset fire?", "... from your fire with oven", etc. If the answer is "No", do not make any entry. If the answer is "Yes" continue with Q.3.

Question 3. "Is the hot water tank lagged?" If the housewife says "Yes", ring Code 1. If she does not know and cannot be persuaded to go and look, put "D.K." in the appliance column.

Note.—In some parts of the country it is usual to call the hot water tank the hot water "cistern", and you should be quite sure that the housewife knows that you mean the tank or cistern in which the *hot* water is stored, and not the cold water tank. Most houses with solid fuel heating have a cold water tank as well as a hot water cistern, and the cold water tank may itself be lagged (or covered) to prevent freezing. We are not concerned with this; we want to know whether the hot water cistern or tank is protected in order to conserve the heat. The same applies to a hot water pipe.

You may like to note that some households lag their cisterns and pipes

to economise in fuel, because this helps to keep the water hot ; and that other households keep the cistern and pipe unlagged because the latter help to heat rooms through which they pass or in which they are placed.

Question 4. This is asked about appliances with which hot water can be stored—solid fuel fires and boilers ; gas storage heaters and circulators ; electric storage heaters and circulators. The question is, “is the appliance generally alight during the morning, afternoon, evening, overnight, all the time ?” Try to get the housewife to describe her usual practice during the summer months. If the appliance is lighted as a general rule any time in the morning—between 6 o'clock and 1 p.m.—ring code 2. If it is lighted at any time between 1 p.m. and 5 p.m. ring code 3. If between 5 p.m. and 11 p.m. code 4. Code 5 must be ringed only if the appliance is on for the whole of the overnight period from 11 o'clock until 6 a.m. Code 6 on the other hand, means that the appliance is kept alight day and night.

Question 5. “Does use of appliance for water heating in *summer* cause serious inconvenience in any way ? If so, why ? Distinguish between the meaning behind Q.5 and Q.6. Q.5 emphasizes the word “summer”. Q.6 the word “*appliance*” (“Is the appliance unsatisfactory ?”). Thus an appliance may be a bother to light (Q.6), but no more of a bother to light in summer than in winter (Q.5). If informant says that any appliance is a serious inconvenience in summer, place a tick in the appropriate column and write in the reason. Provided the tick is clear, you may write the reason across the other columns.

Question 6. Ask all informants who have one or more appliances, “Is the *appliance* satisfactory ?” Ask the question in six parts, reading each one of the listed reasons. If the housewife finds her appliance unsatisfactory because it is a “bother to light, keep going, adjust”, ring code 1 in the correct appliance column. Ask the next part of the question, and ring code 2 if the appliance “often needs repairing”—and so on. Repeat the questions for *each* appliance in the house. If any other reason is given, tick the appropriate column and write in the reason.

Question 7. Ask *all* informants, “Which method, or methods, do you use for baths ?” If more than one method is used, ring the codes for each method. The housewife may use one or more of the appliances named in answer to question 1 ; she may also heat water in a kettle or pan for baths (washing, etc.).

It is important that we know all the methods of heating water for each of the five named purposes. For example, if the housewife boils kettles on her gas ring in order to wash clothes when her boiler fire isn't alight, both methods will be coded.

If the housewife does not use hot water for one or more of the five named activities, ring the code(s) in the last column.

Note.—Taking a “bath” means getting into a vessel of water, either a fitted or portable bath. “Stand-up baths” or “washing all over” do not count as baths, but as washing (people).

Question 8. "How many hot baths a week does each member of your household take, and where?" Record the composition of the resident household aged 5 years and over. Ring code 1 for a male, code 2 for a female. Enter age to the nearest year. Record relation to housewife (*e.g.* son, brother-in-law, etc.). Be careful that you are not confused about these relationships, *e.g.* "grandma" will often be informant's *mother*.

Include *temporary* absentees (people on holiday, etc.) as residents.

Include children at boarding schools as residents.

Include resident servants and lodgers living as part of the family.

Ask about *absentees* likely to return to the household, who do not live in other private households:

- (a) members of family in forces,
- (b) members of family with resident jobs who live in institutions (*e.g.* nurses)

Record sex, age; enter relation to housewife; enter reason for absence, *e.g.* "Forces", "Nurse in hospital".

Ask the housewife to tell you how many baths a week each resident member of her household takes in summer, and record her answer. If baths are taken once a fortnight, record as $\frac{1}{2}$; if once a month, as $\frac{1}{4}$. If less often than once a month, record as 0. If taken twice a day, the entry will be 14.

Record the baths taken during summer holidays by children at boarding school. Do not ask them about the baths of those entered as absentees.

If the baths are taken at home, ring code Y; if at public baths, code X; if elsewhere (*e.g.* neighbour's house), code 0.

Keep constantly before the informant the fact that you are talking about *hot* baths.

Questions 9 and 10. "Are any of these hot baths shared?" If "Yes", "How many?" If no baths are shared ring code 00. If any are shared enter the number in Q.10.

A "Shared" bath means that two or more people use the same water; they need not get into the bath at the same time. If 2 persons have two baths each per week, and use the same water, the baths shared will be 4. Sharing with child under 5 should be ignored.

Question 11. "At what time(s) of the day are hot baths taken?" If no baths are taken at home, ring code 0. Ask about the usual summer habits of the household, and ring Y, X and/or 9.

Question 12. "On which days of the week are hot baths taken in your household?" If baths are taken on one day only, (*e.g.* Saturday) ring the appropriate code. If on two days, or on one of two days (*e.g.* Friday and/or Saturdays) ring two codes. If on every day, ring code 8.

If baths are not taken on any particular day or days, ring code 9.

If no baths are taken at home, ring code 0. (Check replies with question 8).

Question 13. "How many hot baths a week does each child take and where are they bathed?" Applies only where there are children 0-4 years. Complete details of sex and age (in years only) and relationship to housewife. Include temporary absentees. Record number of baths taken per week. Ask if each child is bathed in "main bath", *i.e.* bath used by adults; or "other", *e.g.* small bath, sink, etc. If one only is used, ring 1 or 2. If both used, ring both codes.

Question 14. "Would your household take more hot baths in summer if the hot water supply were improved?" This refers to household as recorded in question 8, plus any children, and is asked of all informants. Ring 1 or 0.

Note.—Questions 8 to 14 deal in detail with one of the domestic uses for hot water baths. You have recorded present habits and needs; and have given the housewife an opportunity to comment on her supply of hot water for baths (question 14). The next group of questions (15 to 18) deals in a similar way with another use—washing clothes.

Question 15. "Do you use a laundry regularly?" "Laundry" means commercial laundry, or private laundry, *i.e.* washing sent out to a washer-woman. "Regularly" means at least every other time laundry van calls. Very conditional use (say at spring cleaning time only) would be coded "No". The quantity sent is not important in this question. If the answer to Q.15 is "Yes", ask Q.16.

Question 16. "Do you send the same quantity in summer as in winter?" Indicate by ringing the appropriate code whether the housewife sends more, less, or about the same.

Question 17. If there is a regular washing day (or days) ring the day's code or codes. If no regular day, ring code 8. If no washing done at home ring code 9.

Question 18. Ring code for "Yes" or "No".

Question 19. This is a general question summarizing the housewife's opinions on her hot water supply for each of the five listed purposes. Ask the question in five parts. If the housewife is dissatisfied with the hot water for baths ring code 3. If she is satisfied, ask her if she is completely satisfied, *i.e.* can see no room for improvement. If so, ring code 1. If she *can* see room for improvement, she is only moderately satisfied: ring code 2.

Repeat the questions for washing, etc.

Question 20. "How many households are there in your dwelling?" Enter the number of households which live independently of each other in the building. You may get more than one household in an ordinary house, particularly in London and other large cities, where large houses have been partially converted into flats, *i.e.* the flats are not self-contained.

In a block flat, or a s.c. converted flat, it will be unusual (but not impossible) to find more than 1 household. A s.c. flat in a flatted house will not be likely to contain more than 1 household. A flat over a shop

may be one of two or three flats over the same shop, and housing two or three households.

Record the number in the appropriate space to the right of the question.

Question 21. "Have you a heater airing cabinet?" Ring codes 9 or 0.

Question 22. Ask: "Is there a wash-house available? If 'Yes', do you use it in summer?" In other words, "Is there a wash-house in (or adjacent to) the building in which you live, which you could use if you wanted?"

If there is a wash-house available *only* to the household you are interviewing ring codes 1 or 2.

If there is a wash-house which is available to other households also, but where only one housewife can work at one time, ring codes 3 or 4.

If there is a communal wash-house built to serve a number of dwellings (usually flats), and where several housewives can wash at the same time, ring codes 5 or 6.

If there is no wash-house, ring code 0.

There can only be one of these seven codes ringed.

DOMESTIC HOT WATER SUPPLY

Serial No.	Region	District	Interviewer's No.	No Appliance	SOLID FUEL				GAS					ELECTRIC				11	12	For office use
					01	02	03	04	05	06	07	08	09	0X	0Y	10				
					Inset fire. No cooking	Fire with oven	Independent boiler (Ideal)	Copper	Single point instantaneous	Multi-point instantaneous	Storage heater	Circulator	Copper	Hot water laid on	Kettles, pans, etc.					
1. Which of the following appliances have you for heating hot water? (tick under heading)				0																
2. In Summer, on how many days a week is each appliance used?																				
3. Ask informants with piped supply from appliances 01, 02 and 03: Is the hot water tank lagged?				1	1	1														
4. Is the appliance generally alight during:																				
(a) morning (6 a.m. — 1 p.m.)				2	2	2														
(b) afternoon (1 p.m. — 5 p.m.)				3	3	3														
(c) evening (5 p.m. — 11 p.m.)				4	4	4														
(d) overnight (11 p.m. — 6 a.m.)				5	5	5														
(e) all the time				6	6	6														
(f) not used in Summer				7	7	7														
Ask all informants																				
5. Does use of the appliance for water heating in Summer cause serious inconvenience in any way? (If so, why (tick column and state) ...)																				
6. Is the appliance unsatisfactory? (If not, ring 9) ...				9	9	9	9	9	9	9	9	9	9	9	9					
(a) Bother to light, keep going, adjust				1	1	1	1	1	1	1	1	1	1	1	1					
(b) Often needs repairing				2	2	2	2	2	2	2	2	2	2	2	2					
(c) Water does not get hot enough				3	3	3	3	3	3	3	3	3	3	3	3					
(d) Not enough hot water at a time				4	4	4	4	4	4	4	4	4	4	4	4					
(e) Takes too long to get hot				5	5	5	5	5	5	5	5	5	5	5	5					
(f) Have to run water slowly				6	6	6	6	6	6	6	6	6	6	6	6					
(g) Other (state and tick appropriate column)																				
7. Which method(s) of heating do you use in Summer for:				1	1	1	1	1	1	1	1	1	1	1	1					
(a) Baths				2	2	2	2	2	2	2	2	2	2	2	2					
(b) Washing (people)				3	3	3	3	3	3	3	3	3	3	3	3					
(c) Washing (clothes)				4	4	4	4	4	4	4	4	4	4	4	4					
(d) Washing up				5	5	5	5	5	5	5	5	5	5	5	5					
(e) House cleaning																				

For office use only

8. How many hot baths a week does each member of your household take and where?
Composition of family and resident household (ages 5 years and over):

Sex	Age in years	Relation to housewife	No. of hot baths per week	Where taken			Office use
M	F			Home	Public baths	Else- where	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
1	2			Y	X	0	
Absentees				Reason for absence			
1	2						
1	2						

9. Are any of these hot baths shared? No 00
10. If yes, how many? ..
11. At what time(s) of the day are hot baths taken?
- | | |
|-----------------------|---|
| Morning before 1 p.m. | X |
| Afternoon, 1-5 p.m. | Y |
| Evening | 9 |
| None taken | 0 |
12. On which days of the week are hot baths taken in your household?
- | | | | |
|--------------------|---|-----------|---|
| Every day | 8 | Monday | 1 |
| No regular day | 9 | Tuesday | 2 |
| None taken at home | 0 | Wednesday | 3 |
| | | Thursday | 4 |
| | | Friday | 5 |
| | | Saturday | 6 |
| | | Sunday | 7 |

13. How many hot baths a week does each child take and where are they bathed?

Sex	Age in years	Children 0-4 years Relation to housewife	No. of hot baths per week	Place		Office use
M	F			Main bath	Other	
1	2			1	2	
1	2			1	2	
1	2			1	2	
1	2			1	2	

14. Would your household take more hot baths in Summer if the hot water supply were improved? Yes 1 No 0
15. Do you use a laundry regularly? No 0
16. If yes, do you send the same quantity of laundry in Summer as in Winter? More 9 Same 8 Less 7
17. Do you have a regular washing day; if yes, in Summer, which day is it?
- | | |
|-----------------|---|
| Monday | 1 |
| Tuesday | 2 |
| Wednesday | 3 |
| Thursday | 4 |
| Friday | 5 |
| Saturday | 6 |
| Sunday | 7 |
| no regular day | 8 |
| no washing done | 0 |
18. Would you do more washing at home in Summer if your hot water supply were improved? Yes 1 No 0
19. Are you satisfied with your hot water supply in Summer for:
- | | Baths | Washing | | Washing
up | House
clean-
ing |
|----------------------|-------|---------|---------|---------------|------------------------|
| | | People | Clothes | | |
| Completely satisfied | 1 | 1 | 1 | 1 | 1 |
| Moderately satisfied | 2 | 2 | 2 | 2 | 2 |
| Dissatisfied | 3 | 3 | 3 | 3 | 3 |
| No opinion | 4 | 4 | 4 | 4 | 4 |
20. How many households are there in the dwelling?
21. Have you a heated airing cupboard? Yes 9 No 0
22. Is there a wash-house available? If yes, do you use it in Summer?

23. What is the name of your supplier of gas (appliances 05, 06, 07, 08, 09 only)?
-
- electricity (appliances 0X, 0Y, 10 only)
-

Used			
Own	Yes 1	No 2	
Shared	Yes 3	No 2	
Communal ..	Yes 5	No 6	
None	0		

Name Income Grade A 1 B 2 C 3 D 4 E 5 Original informant 1 Change of occupier 2

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