

## Sociodemographic correlates associated with health-related incompleteness of Ramadan fasts in Great Britain: a cross-sectional study

Dr Faraz Mughal, *General Practitioner and Honorary Clinical Research Fellow, University of Warwick, Coventry. NIHR In-Practice Fellow, Research Institute for Primary Care and Health Sciences, Keele University, Staffordshire.*

Dr Mohammed Jawad, *Public Health Policy Evaluation Unit, Imperial College London,*

Dr Ataf Sabir, *West Midlands Regional Clinical Genetics Unit and Birmingham Health Partners. Birmingham*

Dr Asim Yusuf, *Black County Partnership NHS Foundation Trust, West Midlands.*

**Correspondence:** f.mughal@keele.ac.uk

**Keywords:** Health, Ramadan, fasting, Muslim

**Grant information:** The authors declare no grants were involved in supporting this work.

**Competing interests:** The authors declare no competing interests.

### Abstract

Ramadan fasting has recently resulted in fasts exceeding 19 hours in daily duration. This study examines the sociodemographic correlation of health-related incompleteness of Ramadan fasting, hypothesising that longer fasting times and more demanding lifestyles increased health-related incompleteness of Ramadan fasts.

A cross-sectional study of mature Muslims deemed religiously eligible to fast was conducted utilising an electronic self-completed questionnaire in Ramadan (July) in Great Britain in 2015. The main outcome measure was missing at least one fast due to self-reported health reasons, excluding menses, pregnancy, breastfeeding, or travel related incompleteness of fasts.

Analysis of 1,973 completed responses revealed that correlates: female sex (compared to males: AOR (adjusted odds ratio) 1.71, 95% CI (confidence interval) 1.31-2.24), reduced religiosity (e.g. least religious compared to most religious: AOR 8.67, 95% CI 3.89-19.30), increased intensity of daily activity (most active compared to most sedentary: AOR 1.89, 95% CI 1.21-2.93), reduced length of fast (fasting <17 hours per day compared to >20 hours per day: AOR 2.76, 95% CI 1.29-5.87), having a comorbidity (AOR 3.73, 95% CI 2.45-5.67), and taking medication (AOR 4.92, 95% CI 2.50-9.69) were all significantly associated with missing at least one fast due to self-reported health reasons.

Fasting a longer fast (17-20 hours, or >20 hours) was not significantly associated with incompleteness of one fast due to health reasons. An increased intensity of daily activity proved to be significantly associated with incompleteness of one fast due to health reasons. Further validated research is crucial in developing this evidence base.

## Introduction

In Islamic tradition, observant Muslims engage in fasting; entailing complete abstention from food, drink, and sexual activity from dawn to dusk during the month of Ramadan.(1) This is a religious injunction that applies to all post-pubescent, mentally capacious Muslims who do not qualify for a scripturally-mandated exemption. These exemptions include: menses and physical hardship brought on by travel or impaired physical capability due to age, acute or chronic illness, the need to take medication, and pregnancy and nursing. (1) In all cases there should be a reasonable fear of adverse consequence for the exemption to apply, which may relate to the onset, exacerbation, or delay in health recovery. This should be determined by a qualified health professional in cooperation with a qualified religious scholar. The premise of this exemption is the Quranic verse fragment: 'God wants ease for you, not hardship.' (2) The pre-dawn (suhur) and fast-opening (iftar) meals offer the Muslim times in the day to safely manage their health when fasting.

It is estimated there are 1.6 billion Muslims (23% of the world population) globally, and over 3 million reside in the United Kingdom (UK).(3, 4) The Muslim calendar is lunar and each solar year Ramadan moves forward by around 11 days. (5) In non-equatorial countries such as the UK, Ramadan will fall in the spring and summer months over the next decade, resulting in fasts that will last up to 21 hours in duration. In 2025 Ramadan will begin around March 1st. Recently, a question has been raised about whether the length of the fast in and of itself might result in a community-wide perception of unreasonable hardship on the part of those fasting; another possible religiously-mandated means of exemption from fasting.(6) Observing a summer Ramadan fast with the scripturally-mandated criteria (dawn-dusk) entails a long fast in high-latitude countries. This has led to the issuance of a recent legal opinion (fatwa) permitting artificial shortening of the fast to a maximum of 16 hours.(6)

Research currently shows that fasting is of little harm for the observer. Among Ramadan observers there has been no associated increase in incidence of cardiovascular disease, in the frequency and severity of common gastrointestinal symptoms (except constipation), and no significant impact identified upon mood, fatigue, and quality of life.(7-9) Fasting has been shown to significantly improve daytime sleepiness, fatigue, mood, and reduce low-density lipoprotein and fasting blood glucose levels. (9, 10) There are risks however, that fasters must be aware of specifically in diabetic patients; hypoglycaemia, hyperglycaemia, and dehydration.(1) Common problems such as headache, constipation, and lethargy, can be combatted by substantial fluid intake outside of the fasting time.(1) The majority of research currently conducted in this area however does not include

fasts that are more than 18 hours in length.

## Methods

### Design, sample, and setting

A cross-sectional study of Muslims in Great Britain was performed from the 1st to the 20th of July 2015 (14th of Ramadan to a few days after completion of Ramadan). An electronic anonymous self-completed questionnaire was piloted and amended before dissemination. The questionnaire was disseminated over email, social media (Facebook and Twitter), and WhatsApp's messaging service, using snowball sampling methods.

### Questionnaire and measures

The questionnaire consisted of 11 items that gathered the following sociodemographic characteristics: age, sex, location in Ramadan, Muslim status (Muslim of less than three years or not), self-reported health, religiosity, occupational shift, intensity of daily activity, length of fast, medication taking, and co-morbidities.

Religiosity was determined by enquiring about a person's prayer status on a five-point Likert scale ranging from 'I rarely miss any of the five prayers or tahajjud (the night prayer)' to 'I usually pray once a week'. Occupational shift was sought by using a five-point Likert scales ranging from 'I work fixed hours during the day' to 'I work primarily nights'. Intensity of daily activity was derived from four options (light activity indoors, light activity outdoors, strenuous activity indoors and strenuous activity outdoors). Length of fast; <17 hours, 17-20 hours, or >20 hours in duration were chosen according to religious legal positions in the UK. The remaining seven characteristics were categorised as per Table 1.

The outcome measure of missing at least one fast due to health reasons (illness, need to take medication, concerns about pregnancy, worries about exams) was derived from four options (missed none, missed some, missed one, and missed all). This measure did not include menses or travel-related fast incompleteness.

### Statistical analysis

We described the sample using frequency counts and percentages. In a bivariate analysis, we conducted chi squared analysis for differences in proportions to test the association between our outcome measure (missing at least one fast due to health reasons) and sociodemographic characteristics. A forced, multivariable logistic regression model adjusted for all independent variables then measured the association between our outcome measure and sociodemographic characteristics, with a particular focus on whether the length of fast was associated with missing at least one fast due to health reasons.

Due to low numbers, observations were removed if the respondent was not based in the UK during Ramadan (n=50) or if the respondent was pregnant or breastfeeding in Ramadan (n=14). The final sample therefore consisted of 1,973 responses.

All statistical analyses were conducted on Stata 12.0 (StataCorp).

### Ethical statement

Ethical approval was not sought but ethical standards in accordance to the Declaration of Helsinki were maintained during the process of this study.

## Results

### Characteristics of sample

Table 1 presents the characteristics of the sample. Over half of respondents were aged 26-45 years (59.4%), were female (55.1%), and were located in South/Mid England or Wales during Ramadan (71.4%). The majority were not new to Islam (98.4%) and most were of good self-reported health (81.2%). Nearly 10% reported a comorbidity and 3% relayed taking medications.

In those fasting, self-reported beneficial weight loss was seen in 56.8% (n=1156), reduced stress in 66.6% (n=1356), increased happiness in 74.8% (n=1523), improved concentration in 40.9% (n=834), and increased performance at work in 33.8% (n=689) during Ramadan.

### Bivariate analysis

Table 1 also presents the results of the bivariate analysis. Except for geographical location during Ramadan, all independent variables were significantly associated with missing at least one fast due to health reasons in Ramadan. This included increased age, female sex, being new to Islam, having poor health (in the form of poor self-reported health, having a comorbidity or taking medications), reduced religiosity, less variable occupational shift patterns, increased intensity of daily activity, and reduced length of fast.

### Multivariate analysis

In our fully adjusted model (Table 2), six variables were independently associated with missing at least one fast due to health reasons: female sex (compared to males: AOR 1.71, 95% CI 1.31-2.24), reduced religiosity (e.g. least religious compared to most religious: AOR 8.67, 95% CI 3.89-19.30), increased intensity of daily activity (most active compared to most sedentary: AOR 1.89, 95% CI 1.21-2.93), reduced length of fast (fasting <17 hours per day compared to >20 hours per day: AOR 2.76, 95% CI 1.29-5.87), having a comorbidity (AOR 3.73, 95% CI 2.45-5.67), and taking medication (AOR 4.92, 95% CI 2.50-9.69).

## Discussion

### Summary and explanation of findings

This cross-sectional study of 1,973 Muslims in Great Britain showed the factors independently significantly associated with missing at least one fast due to self-reported health reasons were: less religiosity, greater intensity of activity, having a comorbidity, taking medication, being female, and counter-intuitively choosing a shorter fasting period (<17 hours). We know that Muslims who could be exempt from fasting, still insist on fasting. (11) Muslims hold fasting to be an important aspect of their life. Upholding fasting in Ramadan benefits one's overall health and so missing fasts due to health reasons for some, could impact one's physical, emotional, psychological, and spiritual state. (11, 12)

When excluding women who were pregnant, breastfeeding, and on menses, being female was associated with missing at least one fast due to health reasons. There is difficulty in explaining this due to the lack of literature on this association, highlighting a need for future research to explore this further. Practical steps to consider have been suggested when counselling women who intend to fast in Ramadan. (13)

Faith and God-consciousness (Taqwa) are foundations of Islam and subsequently influence one's actions. The Ramadan fast is generally a challenge for those observing, endeavouring to balance work and home life, whilst also wanting to please God by adhering to this tenet of faith (observing Ramadan is a pillar of Islam). An explanation of the association between reduced religiosity and missing a fast due to health reasons could be grounded in an assumption that less practising (numbers of prayers performed daily) Muslims are more likely to end a fast due to health complaints such as headache or tiredness, whereas more practising Muslims may persist with similar health complaints, finding ways to manage the day's fast with deep resolve to complete the fast. This is limited by the difficulty that patients are not be able to distinguish between a serious and a non-serious complaint when fasting.

It has been found that the physical activity of fasters reduces in Ramadan as they attempt to conserve energy and excel in religious practices. (14, 15) Energy balance is well maintained and body fluid is better maintained in those active against those sedentary during Ramadan. (16) The length of fasting in 2015 and being very physically active could explain why physically active fasters are nearly twice likely to miss one fast due to health reasons than those who were sedentary. Physically demanding occupational roles may also impact on non-completion of fasts. Patients with co-morbidities may fast; cancer, acid-reflux, chronic liver disease, and diabetes, and symptoms

of these illnesses can increase when fasting. (11, 17-19)

Dependant on the symptom severity experienced by the observer, they may choose to annul or miss fasts to control their symptoms. Those taking medication were nearly 5 times more likely to miss a fast due to health reasons than those not. Patients may need to take daily medication for conditions such as asthma, epilepsy, and mental illness, which may interfere with their ability to safely fast. (20) The dosage timings can be altered to support the fasting person, however, there may be situations where this would increase the risk of harm to the patient or not be possible due to the pharmacodynamics of the medication resulting in the person being unable to fast. (20) Medication could also have been used where fasting symptoms such as headache or dyspepsia occur and thus annul the fast.

Fasting a longer fast (17-20 hours or >20 hours) was not associated with incompleteness of fasts due to health reasons. Fasting a shorter fast (<17 hours compared to >20 hours) however resulted in nearly 3 times more likelihood of incompleteness of a fast due to health reasons. This may be elucidated by the choosing of a (non-mainstream) shorter fast as this is perceived to be less physically demanding, going away from community practice and mosque timetables, and thus less likely to complete the shorter fast because their threshold for perception of hardship is lower. (21) Alternatively, more unwell patients may have chosen this shorter fast and thus are more likely to break it due to health reasons. Only a small minority of observers chose this type of fast.

### **Strengths and limitations**

This is the first study to our knowledge examining sociodemographic correlates for incompleteness of fasts due to health reasons in Ramadan. A strength lies in the large number of responses which gave us the ability to perform sub-group analyses and potentially generalise our findings to Great Britain. Although not validated, our questionnaire was piloted through fifteen students of Islam which helped improve its content validity and reliability. The outcome measure of incompleteness of a fast due to health reasons was not exclusively limited to ill health, but also may have included 'worries about exams' (for younger fasters), 'the need to take medication' and 'concerns about pregnancy'. These are not specific health outcomes but could serve as proxy health measures.

### **Implications for practice and research**

These results are important for clinicians as they provide healthcare professionals with possible factors that may result in incompleteness of fasts due to self-reported health reasons for patients. It thus enables clinicians to provide advice and assist patients in formulating acceptable and negotiated health-plans where patients can maximise their ability to fast safely during the month of Ramadan. It can

also promote and strengthen self-management of fasting for the patient which in turn heightens patient confidence and enables patients to undertake Ramadan fasting.

We recommend that patients with co-morbidities and on regular medication see their General Practitioner/family medicine doctor prior to Ramadan to discuss whether they can fast safely and to establish a safe medication regime. (1, 20, 22) We also encourage clinicians to advise patients in intense manual labour to liaise with their employer to negotiate realistic occupational changes during Ramadan to help facilitate fasting. Guidelines tailored for general practice would benefit primary care considering 90% of patient consultations occur in general practice.(23)

This is the first study to examine what factors influence the incompleteness of fasts in Ramadan. There is an urgent need for validated research to further examine and understand what factors influence the incompleteness of fasts and how the length of the fast may affect fasting, specifically the incompleteness of fasts in those who adopt a shorter fast. It is also important to incorporate validated spiritual scales in future Ramadan research. (24)

### **Conclusion**

In conclusion, we found that fasting a longer fast (17-20 hours or >20 hours) was not significantly associated with incompleteness of one's fast due to health reasons. Those who fasted an unorthodox and chosen less than 17 hour fast were more likely to incomplete a fast for health reasons. Those fasters who are female (excluded on menses, travelling, pregnant and nursing), less religious, with greater physical daily activity, have co-morbidities, and take medication were all significantly associated with the incompleteness of at least one fast due to self-reported health reasons. Future validated research is crucial in developing this important evidence base.

### **Acknowledgements**

FM is funded by a National Institute for Health Research (NIHR) In-Practice Fellowship. The views expressed in this paper are those of the author and not necessarily those of the NHS, the NIHR, or the Department of Health and Social Care.

The Public Health Policy Evaluation Unit at Imperial College London is supported by funding from the NIHR School of Public Health Research

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**Table 1: Percentage of missed fasts due to self-reported poor health in Ramadan, by sociodemographic characteristics, % (n)**

Characteristics		Full sample	Missed at least one fast
<b>TOTAL</b>		<b>100.0 (1973)</b>	<b>19.6 (387)</b>
Age (years)	14-25	29.1 (575)	<b>19.8 (114)</b>
	26-45	59.4 (1171)	<b>18.4 (215)</b>
	46-65	10.9 (215)	<b>24.2 (52)</b>
	>65	0.6 (12)	<b>50.0 (6)</b>
Sex	Male	44.9 (886)	<b>14.7 (130)</b>
	Female	55.1 (1087)	<b>23.6 (257)</b>
Location during Ramadan	South/Mid England or Wales	71.4 (1409)	19.5 (274)
	Northern England/Scotland	28.6 (564)	20.0 (564)
New Muslim	No	98.4 (1941)	<b>19.4 (376)</b>
	Yes	1.6 (32)	<b>34.4 (11)</b>
Self-reported health	Good health	81.2 (1601)	<b>16.8 (268)</b>
	Some health problems	17.3 (341)	<b>29.9 (102)</b>
	Significant health problems	1.6 (31)	<b>54.8 (17)</b>
Religiosity	0 (most religious)	4.6 (90)	<b>12.2 (11)</b>
	1	43.1 (851)	<b>12.0 (102)</b>
	2	31.1 (613)	<b>18.4 (113)</b>
	3	9.6 (189)	<b>31.2 (59)</b>
	4	5.3 (105)	<b>41.0 (43)</b>
	5 (least religious)	6.3 (125)	<b>52.8 (66)</b>
Occupational shift	0 (least stable)	27.2 (537)	<b>23.1 (124)</b>
	1	10.8 (212)	<b>24.5 (52)</b>
	2	54.1 (1067)	<b>16.9 (180)</b>
	3	1.8 (36)	<b>19.4 (7)</b>
	4 (most stable)	6.1 (121)	<b>19.8 (24)</b>
Intensity of daily activity	0	48.8 (961)	<b>18.1 (174)</b>
	1	30.9 (609)	<b>18.2 (111)</b>
	2	12.9 (254)	<b>23.2 (59)</b>
	3	7.5 (147)	<b>28.6 (42)</b>
Length of fast	>20 hours	15.7 (309)	<b>17.8 (55)</b>
	17-20 hours	82.1 (1619)	<b>19.3 (312)</b>
	<17 hours	2.3 (45)	<b>44.4 (20)</b>
Comorbidity	No	90.9 (1793)	<b>16.4 (294)</b>
	Yes	9.1 (180)	<b>51.7 (93)</b>
Taking medication	No	96.9 (1911)	<b>17.8 (343)</b>
	Yes	3.1 (62)	<b>71.0 (44)</b>

**Bold: p<0.05 for chi squared difference in proportions**

**Table 2: Correlates missed fasts due to self-reported poor health**

Characteristics		AOR (95% CI)
Age (years)	14-25	1.00
	26-45	1.13 (0.82, 1.55)
	46-65	1.46 (0.92, 2.31)
	>65	2.63 (0.55, 12.58)
Sex	Male	1.00
	Female	1.71 (1.31, 2.24)***
Location during Ramadan	South/Mid England or Wales	1.00
	Northern England/Scotland	0.96 (0.73, 1.27)
New Muslim	No	1.00
	Yes	1.25 (0.51, 3.03)
Self-reported health	Good health	1.00
	Some health problems	0.97 (0.68, 1.37)
	Significant health problems	1.39 (0.55, 3.52)
Religiosity	0 (most religious)	1.00
	1	1.29 (0.62, 2.68)
	2	2.23 (1.07, 4.66)*
	3	4.73 (2.16, 10.29)***
	4	7.43 (3.24, 17.05)***
	5 (least religious)	8.67 (3.89, 19.30)***
Occupational shift	0 (least stable)	1.00
	1	1.34 (0.84, 2.12)
	2	0.76 (0.57, 1.03)
	3	0.38 (0.13, 1.11)
	4 (most stable)	0.72 (0.41, 1.27)
Intensity of daily activity	0	1.00
	1	0.92 (0.69, 1.24)
	2	1.13 (0.78, 1.65)
	3	1.89 (1.21, 2.93)**
Length of fast	>20 hours	1.00
	17-20 hours	1.06 (0.74, 1.51)
	<17 hours	2.76 (1.29, 5.87)**
Comorbidity	No	1.00
	Yes	3.73 (2.45, 5.67)***
Taking medication	No	1.00
	Yes	4.92 (2.50, 9.69)***

Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001; Model adjusted for all variables in the Table