Article

Empowering local communities to make lifestyle changes: is the Health Mela a potential solution?

Watson, Joseph, Satyan, Rajbhandari, Gupta, Romesh, Myers, Martin, Campbell, Robert and Macphie, Elizabeth

http://dx.doi.org/10.1136/bmjnph-2020-000067

BMJ Nutrition, Prevention & Health

Empowering local communities to make lifestyle changes: is the Health Mela a potential solution?

Joseph Watson ,[1,2] Rajbhandari Satyan,[3] Romesh Gupta,[4,5,6] Martin Myers,[7] Robert Campbell,[4] Elizabeth Macphie[8]

To cite: Watson J, Satyan R, Gupta R, *et al*. Empowering local communities to make lifestyle changes: is the Health Mela a potential solution? *BMJ Nutrition, Prevention & Health* 2020;**0**. doi:10.1136/bmjnph-2020-000067

For numbered affiliations see end of article.

Correspondence to
Dr Joseph Watson, Manchester Medical School, The University of Manchester, Manchester M13 9PL, UK;
jd.watson@hotmail.com

Received 31 January 2020
Revised 13 June 2020
Accepted 16 June 2020

ABSTRACT

Background Health Melas are community-led public health events held in the North West of England that provide health information and free health checks. This descriptive observational study evaluates whether Health Melas are able to identify undiagnosed cardiovascular disease (CVD) risk factors in hard-to-reach communities and encourage individuals to make lifestyle changes.

Methods Attendees ≥18 years at three separate Health Melas in 2016–2017 were invited to participate in screening and counselling for CVD risk factors as part of a Health MOT. Information was collected about demographics, CVD risk factors, blood pressure, total cholesterol, blood sugar and attendees' feedback. QRISK2 scoring system was used to estimate CVD risk.

Results 375 attendees completed a questionnaire. The highest proportion (36.9%) of attendees were from areas of the lowest Index of Health Deprivation and Disability quintile; 38.8% were of South Asian ethnicity. Of the attendees who were eligible for a free National Health Service Health Check, 9.1% had received one. Overall, 57.5% of all attendees had a QRISK2 score ≥10% (of whom 56.9% were not on statins), 92.2% of attendees believed the Health Mela will help them to make lifestyle changes, 98.2% said they had improved their understanding of their health, and 99.6% thought the Health Mela was useful. 73.6% of those who had received a previous Health MOT reported making lifestyle changes. There was a positive correlation between South Asian ethnicity and QRISK2 score.

Conclusion This study suggests the Health Melas successfully involve South Asian populations and people from a lower Index of Health Deprivation and Disability. Attendees felt the events were useful, improved understanding of their health needs and encouraged them to make lifestyle changes. High rates of modifiable CVD risk factors were newly identified and a high proportion of attendees were found to be at intermediate to high risk of CVD.

What this paper adds

- This study suggests the Health Melas access South Asian populations and people from a lower Index of Health Deprivation and Disability.
- Health Melas are able to identify high rates of modifiable CVD risk factors along with a high proportion of attendees at intermediate to high risk of CVD.
- Community public health interventions in the style of the Health Mela could be feasible tools for accessing, screening and advising some communities at high risk of CVD.

INTRODUCTION

There is a high prevalence of poor health behaviours in the UK. Almost one-sixth of all UK adults smoke[1]; over three-fifths are overweight or obese[2]; and one-fifth drink excess alcohol.[3] Poor health behaviours contribute to a plethora of diseases, the most significant of which is cardiovascular disease (CVD). CVD is the second biggest cause of death in the UK[4] and the biggest cause of death worldwide.[5]

The primary intervention currently employed by the National Health Service (NHS) to identify individuals at high risk of CVD is the NHS Free Health Check. This service is offered to people aged 40–74 years who do not have coronary heart disease, chronic kidney disease, diabetes, hypertension, atrial fibrillation, past transient ischaemic attack, hypercholesterolaemia, heart failure and peripheral arterial disease, and are not prescribed statins and were not found to be at high risk for CVD on a previous health check. This predominantly takes place in general practice surgeries and local pharmacies.[6] Programme data for 2013–2018 (5-year cumulative)[7] suggest that only 69.7% of the eligible population have been offered an NHS Health Check. Furthermore, of those offered, only 48.5% received one. This is significantly less than the target uptake of 75%.[8] Common suggestions as to the reason for this include lack of awareness or knowledge, misunderstanding the purpose of the NHS Health Check, aversion to preventive medicine, time constraints, difficulties with access to general practices and doubts regarding pharmacies as appropriate settings.[9]

The South Asian population in particular are more likely to experience barriers to accessing healthcare[10] and have a higher incidence of long-term illness and larger disparities in health compared with the general population.[11] This is especially the case for type 2 diabetes and CVD. Migrant South Asians have a fourfold higher risk of developing type 2 diabetes, develop diabetes from a younger age[12] and are at significantly higher risk of having a CVD event compared with Europeans.[13]

Started in 2001, the Health Mela aims to overcome these problems by taking healthcare services to these hard-to-reach people, particularly those from a South Asian background given the aforementioned risks of type 2 diabetes and CVD. The Health Mela does this in the format of free community events incorporating health checks, a health information fair and some form of entertainment such as a performance or workshop. They have been held in local community centres, schools and university grounds and usually take place all day on a Saturday. The Health Mela health check, referred to as a Health MOT (HMOT), uses a similar structure to the NHS Health Checks. It calculates a QRISK2 score which is then communicated to the attendee as their likelihood of having a cardiovascular event within the next 10 years. QRISK2 score is the current National Institute for Health and Care Excellence (NICE) recommended assessment tool for CVD.[14] The word 'mela' is a South Asian term referring to a 'fair' or 'gathering'. Health Melas currently run in eight different locations in the North West of England and are sponsored by public and non-governmental organisation donations.

Two similar programmes of note are a screening programme for CVD in North London described by Rao *et al*[15] and the South Asian Cardiovascular Health Assessment and Management Program (SA-CHAMP) in Alberta, Canada described by Jones *et al*.[16] Similar to the Health Mela, these programmes aimed to primarily screen South Asians for CVD risk factors. They recorded blood pressure, blood glucose and blood cholesterol levels as primary screening measures to determine QRISK2 scores. These studies provide support for the feasibility and value of screening and counselling South Asian communities for CVD risk factors like the Health Mela. The Health Mela hopes to build on these studies to implement a programme in a different geographical context (the North West of England), aiming to extend the programme to a wider audience and reach people from areas of poor health as well as those of South Asian ethnicity.

The last 10 years have seen a growing re-evaluation of public health interventions. The NHS Five Year Forward Plan (2014)[17] states that 'the future health of millions of children, the sustainability of the NHS, and the economic prosperity of Britain all now depend on a radical upgrade in prevention and public health' (p9). This is a reiteration of the NHS 2010–2015 Department of Health report,[18] which advocated 'a paradigm shift in health – away from 'diagnose and treat' towards 'predict and prevent'' (p20). The Health Mela is part of the practical and community-focused response to this directive.

The objectives of this study were the following:

- Assess participation of hard-to-reach communities in Health Melas, defined as South Asian communities and people living in areas with a poorer Index of Health Deprivation and Disability (IHD).
- Assess the utility of Health Melas at encouraging attendees to make lifestyle changes.
- Assess the utility of Health Melas to screen for undiagnosed risk factors, including raised blood pressure, raised blood glucose, raised cholesterol and QRISK2 score.

METHODS

This descriptive observational study analyses data collected from attendees at three separate Health Melas from 2016 to 2017 (Preston 2016; Leyland 2016; Preston 2017). The events were open to the general public, free to attend and advertised through local schools, religious centres, community centres and posters. They took place in a local school (Leyland) and university hall (Preston). An HMOT form was completed by healthcare volunteers for every attendee who participated in a health check. Feedback questionnaires were handed out to every individual who completed a health check. The questionnaires were completed immediately after finishing the HMOT. All adults (≥18 years) who attended HMOT and completed a feedback questionnaire were included in the analysis. HMOTs were not limited to those eligible under the NHS Health Check inclusion criteria, but any adult who wished to receive health advice could attend. Any answer that was illegible or absent was recorded as missing.

The HMOT form included questions on demographics (name, date of birth, gender, ethnicity and general practitioner (GP) details), details of relevant lifestyle and medical history, as well as measurements recorded at the Health Mela. These were height and weight (from which body mass index was calculated), blood pressure (obtained with automatic blood pressure monitor), random glucose and total cholesterol (obtained via on-site finger-prick point-of-care testing), a calculated QRISK2 score, and the health goals and advice discussed during the consultation. Variation in measuring height and weight was reduced by giving the same instructions to each person being measured. This included asking them to remove coats and shoes beforehand. Inaccuracies in measuring blood pressure were reduced by repeating raised readings (systolic blood pressure ≥140 mm Hg). This also reduced the effect of abnormal results due to anxiety people may have felt at having their blood pressure measured. All point-of-care testing was verified, validated and operated by volunteer clinical biochemists from Lancashire Teaching Hospitals Trust, all measuring and counselling were performed by trained medical students from the University of Manchester and the University of Central Lancashire, and all HMOT forms were reviewed by a supervising consultant clinician from

Lancashire Teaching Hospitals Trust. For the purposes of this paper, CVD risk factors are described as suspected (contra diagnosed) due to measurements and counselling being performed by medical students, not registered practitioners. Concerning results were sent to the relevant GP for formal diagnosis and follow-up. An HMOT took approximately 30 min to complete.

The feedback questionnaire included questions on demographics (initials, date of birth, postcode and sex), previous attendance at a Health Mela, whether attendees made lifestyle changes after a previous HMOT, and a 5-point Likert scale of attendees' perception of the usefulness of the HMOT (strongly agree, agree, neutral, disagree, strongly disagree).

The questionnaire and HMOT form were matched using date of birth and initials which were recorded on both sheets. There were no forms with more than one match for date of birth and initials. Data were analysed using StatsDirect and GraphPad Prism. Not all forms were completed uniformly: ethnicities recorded as 'Hindu' were collated as South Asian; illegible or non-existent postcodes were recorded as missing.

Analysis was primarily descriptive and used the *frequencies* and *crosstabs* functions of StatsDirect. A two-way analysis of variance using GraphPad Prism was performed to assess for possible interaction between ethnicity and IHD quintiles on QRISK2 score. Comparisons were only made between people of South Asian and white ethnicity, and people from IHD quintiles 1–4. This was because there were too few attendees of other ethnicities or IHD quintile 5 with complete data to compare reliably (most had a sample size of 1 or 0). Individuals with a known CVD risk factor or on treatment were excluded from analysis of that variable only. Health deprivation was assessed using the IHD. This was obtained by linking attendees' postcode to an associated ranked decile via the English Indices of Deprivation 2015 tool.[19] Individuals were grouped into quintiles of health deprivation. Quintile 1 indicated that an individual was from an area of the most health deprivation and quintile 5 indicated an individual was from an area of least health deprivation. All results were recorded as percentages of the data set available for each variable.

RESULTS

The results included data from a total of 375 people: 145 were from the Preston 2016 Health Mela, 148 were from the Preston 2017 Health Mela and 82 were from the Leyland 2016 Health Mela. Of these, 218 were female, 154 were male and 3 did not disclose their sex. Of the 375 people, 250 (67%) had at least one question or piece of data from their questionnaire or HMOT incorrectly completed or missing. The most common missing data were from feedback questions about attendees' perception of the event. Of the people 56.5% were white British, 38.8% were of South Asian ethnicity (Indian, Pakistani, Bangladeshi), and 5.8% were Afro-Caribbean, other white (other European or North American), Arab or other Asian ethnicity. The highest proportion (36.9%) came from areas with the worst level of health and disability, with fewer attendees coming from areas with better levels of health and disability (see figure 1). Only 1.7% of attendees came from areas in the fifth IHD quintile (the best levels of health and disability). Worsening health deprivation showed a positive trend with newly suspected CVD risk factors (see figure 2). On initial screening, 11.2% of attendees reported having diabetes, 21.8% reported hypertension and 22.5% reported being on statins.

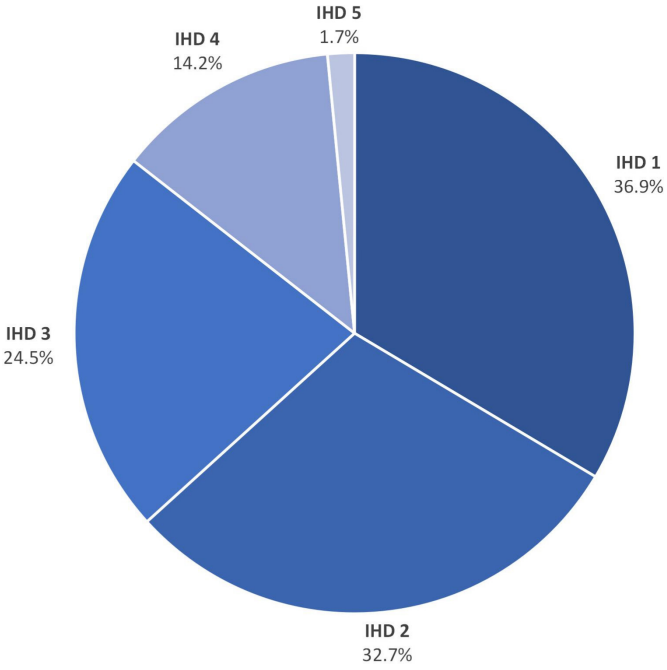


Figure 1 Percentage of Health MOT attendees arranged by Index of Health Deprivation and Disability (IHD) quintiles.

Of the attendees reporting as healthy for a specific variable, 20.0% were identified as having raised systolic blood pressure (≥140 mm Hg), 2.2% had raised random blood glucose (≥11.1 mmol/L) and 20.4% had had raised cholesterol (≥5 mmol/L). In total, 57.5% of all attendees ≥18 years had a QRISK2 score ≥10% and 27.9% had a score ≥20%. If the NHS Health Check exclusion criteria were applied (40–74 years without known CVD risk factors and not on lipid-lowering therapy), 40.8% of attendees had a QRISK2 score ≥10% and 13.4% had a score ≥20% (see table 1). Of attendees under 84 with a QRISK2 score ≥10%, 110 (68.8%) were not prescribed statins.

The questionnaire showed that 99.6% of people either agreed or strongly agreed that the HMOT was useful; 98.2% of people either agreed or strongly agreed that the Health Mela and HMOT have helped them understand their health needs better; and 92.2% of people either agreed or strongly agreed that the Health Mela and HMOT will help them make lifestyle changes. Of the attendees who were eligible for a free NHS Health Check, 9.1% had received one. Of the people, 22.8% had attended a previous HMOT at a Health Mela event. No data were collected on how long ago they had attended

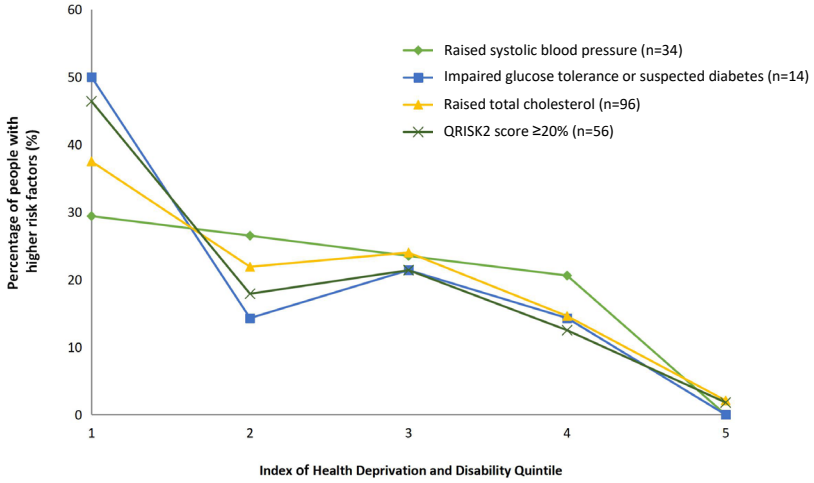


Figure 2 Comparison of new cardiovascular disease risk factors in relation to Index of Health Deprivation and Disability (IHD) quintiles.

these events; however, 73.6% reported making lifestyle changes (see table 2). Of these people, 30% had also attended a health check at either their GP or another healthcare service.

Analysis comparing the effect of ethnicity and IHD quintiles on QRISK2 score suggested attendees of South Asian ethnicity were significantly more likely to have a higher QRISK2 score when compared with attendees of white ethnicity (p=0.019) (see figure 3). There was no statistically significant correlation between higher QRISK2 scores and IHD quintiles (p=0.746). There was no interaction between ethnicity and IHD quintiles (p=0.611).

DISCUSSION

Summary of results

Demographic data of attendees demonstrate that the Health Melas are accessing a high proportion of people of South Asian ethnicity (38.8%). This is in comparison with the local Lancashire population, where only 7.1% are from a South Asian background.[20] Additionally, the highest proportion of attendees were from areas with the worst health deprivation (36.9% were from IHD quintile 1). There was a trend when comparing health deprivation and newly suspected CVD risk factors. It showed that, in general, attendees from areas with worse health

Table 1 Identifying CVD risk factors

Variable identifying healthy individuals	Variable identifying individuals with abnormal readings	People, n (%)
Not prescribed antihypertensives (n=280)	Raised systolic blood pressure (≥140 mm Hg)	56 (20.0)
	Normal systolic blood pressure (<140 mm Hg)	224 (80.0)
Reported absence of diabetes (n=320)	Finger-prick random glucose suggesting diabetes (≥11.1 mmol/L)	7 (2.2)
	Finger-prick random glucose suggesting impaired glucose tolerance (≥7.8 mmol/L)	20 (6.2)
	Finger-prick random glucose suggesting normal glucose (<7.8 mmol/L)	293 (91.6)
Not prescribed statins (n=108)	High finger-prick total cholesterol (≥5.0 mmol/L)	22 (20.4)
	Normal finger-prick total cholesterol (<5.0 mmol/L)	86 (79.6)
QRISK2 score All attendees >18 years (n=301)	High risk (≥20%)	84 (27.9)
	Moderate risk (≥10%–19%)	89 (29.6)
	Low risk (<10%)	128 (42.5)
QRISK2 score Aged 40–74 without known CVD risk factors and not prescribed statins (n=142)	High risk (≥20%)	19 (13.4)
	Moderate risk (≥10%–19%)	58 (40.8)
	Low risk (<10%)	65 (45.8)

CVD, cardiovascular disease.

Table 2 Key results of the feedback questionnaire

Questionnaire questions	Variables	People, n (%)
Was this HMOT useful? (n=236)	Strongly agree	167 (70.8)
	Agree	68 (28.8)
	Neutral	1 (0.4)
	Disagree	0 (0.0)
	Strongly disagree	0 (0.0)
Has this HMOT increased your understanding of health? (n=230)	Strongly agree	142 (61.7)
	Agree	84 (36.5)
	Neutral	4 (1.8)
	Disagree	0 (0.0)
	Strongly disagree	0 (0.0)
Has this HMOT encouraged you to make lifestyle changes? (n=233)	Strongly agree	129 (55.3)
	Agree	86 (36.9)
	Neutral	16 (6.9)
	Disagree	0 (0.0)
	Strongly disagree	21 (0.9)
Have you made lifestyle changes after a previous Health MOT at a Health Mela?* (n=72)	Yes	53 (73.6)†
	No	19 (26.4)

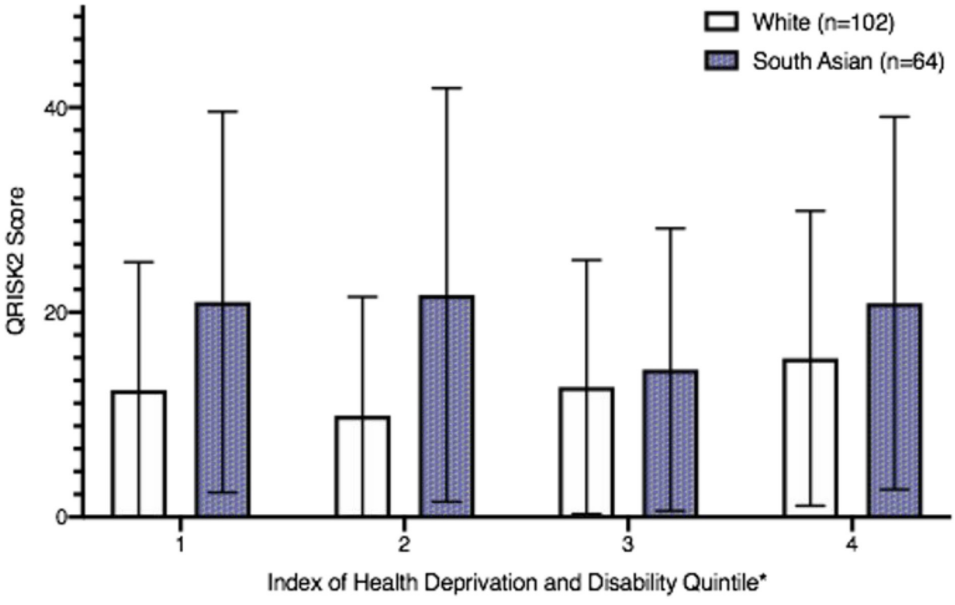
*This question was only asked of those who had attended a previous Health Mela.
†30% of these people had also had Health MOTs at their general practice or somewhere else.
HMOT, Health MOT.

deprivation (lower IHD quintile) had more cases of newly suspected CVD risk factors (see figure 2).

The screening results suggested 27.9% of all attendees ≥18 years were at high risk of CVD (QRISK2 score ≥20%). When the NHS Health Check exclusion criteria were applied, 13.4% of the eligible population were at high risk of CVD. Unlike the NHS Health Check, all attendees over 18 years (contra 40–75 years) were offered an HMOT. This was for several reasons. First, it allowed the screening of those not on appropriate lipid-lowering therapy. NICE guidelines suggest all adults under the age of 84 with a QRISK2 score of greater than 10% should be on statins[21]; however, 68.8% of those screened were not. Second, most people attended as families and therefore it was culturally more appropriate for the whole adult family to participate in the HMOT together. The screening tools available were not appropriate for anyone under 18 years. Third, the programme hoped to provide and reiterate preventive health advice for all attendees, especially as they had exhibited interest in learning about health by nature of attending.

The Health Melas successfully identified new CVD risk factors in many attendees. The results suggested 20.0% of attendees had newly found raised blood pressure and 2.2% had raised blood sugar. For informal comparison, the NHS Health Checks report 12.9% of attendees being at high risk of CVD, 18.5% having newly reported high blood pressure and 0.6% having raised blood sugar.[22]

Analysis of the results suggested attendees of South Asian ethnicity were more likely to have a higher QRISK2 score (see figure 3). Although statistically significant



*Quintile 5 excluded due to insufficient sample size to analyse data

Figure 3 Comparison of the effect of ethnicity and Index of Health Deprivation and Disability quintiles on QRISK2 score.

(p=0.019), the small sample size and large SD limit the value of this finding. Additionally, comparisons were only made between people of South Asian and white ethnicity, and people from IHD quintiles 1–4. This was because there were too few attendees of other ethnicities or IHD quintile 5 with complete data to compare reliably. The small sample size also meant comparison of QRISK2 and ethnicity against IHD quintiles was likely underpowered to detect any meaningful difference (p=0.746 and p=0.611, respectively).

After receiving an HMOT and counselling at the Health Mela, almost all attendees thought the MOT had been useful (99.6%), improved understanding of their health needs (98.2%) and encouraged them to make lifestyle changes (92.2%). Additionally, almost three-quarters of people who had attended a previous HMOT at a Health Mela reported they had made lifestyle changes as a result (73.6%). This feedback suggests the intervention was well received by attendees and they felt previous HMOTs had encouraged them to make lifestyle changes.

These findings highlight the Health Mela's value in its ability to access populations who are at high risk of CVD and have a high prevalence of known and newly suspected CVD comorbidities. Additionally, of those eligible for an NHS Health Check, only 9.1% of attendees had had one, suggesting the Health Melas are screening people not currently accessing national health services.

Comparison with existing programmes

Two similar programmes of particular note are a screening programme for CVD at two Hindu temples in North London described by Rao *et al*[15] and the SA-CHAMP screening South Asians at religious facilities in Alberta, Canada described by Jones *et al*.[16] Similar to the Health Mela, both programmes aimed to screen South Asians for CVD risk factors and calculated a QRISK2 score for participants. However, these programmes exclusively screened South Asians, whereas the Health Mela did not.

There was a large difference in the proportion of attendees found to be at high risk of CVD between the programmes. This difference was likely influenced by the inclusion criteria by each study along with the difference in populations accessed. The programme described by Rao *et al*[15] reported 15% of attendees having a ≥20% estimated 10-year CVD risk, 40% had a ≥10% risk, 0.5% had blood glucose levels in the diabetic range, 52% had elevated blood pressure and 49% raised cholesterol. Compared with the Health Mela, QRISK2 scores ≥10% and suspected diabetes rates were lower, but rates of elevated blood pressure and raised cholesterol were higher. Their lower rates of QRISK2 scores ≥10% were likely due to narrower selection criteria. They only have attendees 30–75 years not on lipid-lowering therapy, and without pre-existing cardiac or cerebrovascular disease, chronic kidney disease, serious mental illness or diabetes. When the Health Mela results were adjusted to these criteria, the QRISK2 scores ≥10% were more similar (13.4% compared with 15%). The programme SA-CHAMP described by Jones *et al*[16] reported 76% of attendees having a ≥20% estimated 10-year CVD risk, 36% had elevated blood pressure, 58% had raised cholesterol and 23% reported diabetes. They did not report the total of those with ≥10% risk. Again, this large discrepancy in results was likely influenced by their different inclusion criteria, which was much broader compared with Rao *et al*[15] and the Health Mela; the study included all attendees over 45 years and did not exclude based on known CVD risk factors. Of the 375 attendees, 100 were rescreened after 6–13 months to assess change in risk factors and found a significant decrease in average total cholesterol but no change in blood pressure.

Overall, although unable to directly compare these three studies due to their variable inclusion criteria and populations, they provide support for the feasibility and value of screening and counselling South Asian communities for CVD risk factors.

Strengths and limitations

This is the first study to describe data from the Health Mela MOTs. Collaboration of data from both the questionnaires and HMOT forms provided multiple variables for cross-analysis; in total 23 variables were recorded from 375 people. It captures both quantitative and qualitative responses, including demographics, contextual information, views and opinions, and health indicators.

An important aspect of this evaluation is the analysis and comparison of variables against IHD quintiles. This has been a useful component to determine the type of populations accessing the HMOTs and the relative health and disability of the areas they come from. Linking patients' results back to their GP facilitated good transfer of care for patients with concerning results. This maximised the use of the screening results beyond the volunteer-led lifestyle counselling and directed patients back into the health system for medical management.

However, the evidence used to determine whether the Health Melas are encouraging people to make lifestyle changes was obtained from subjective qualitative data. Although these data give us a good indicator of people's perception of the HMOT, they do not tell us how effective it is in terms of health outcomes. It is only those returning to a Health Mela who were asked if they had made changes, and this was a subjective response. It is possible that the positive responses given in the questionnaire were a reflection of attendees' experiences as a whole, for example whether they enjoyed the event, whether they were counselled in a polite and friendly way, or whether they appreciated the hard work the volunteers did, rather than its efficacy.

The novel use of community point-of-care testing was a key factor enabling the calculation of a QRISK2 score. However it was not possible to measure a timely high-density lipoprotein level and therefore a default of 1.4 was used instead. Similarly, haemoglobin A1c (HbA1c) is the preferred screening test for diabetes; however, due to cost and time, capillary blood glucose was used instead.

There is large scope for development and accessibility of community point-of-care testing.

A further limitation may have been inaccuracies when measuring people's height, weight and blood pressure. Attempts were made to reduce inaccuracies in these measurements through various standardisation techniques, but these were unlikely to have been sufficient to completely remove variation in measurement taking and therefore accuracy of the results. Certain parts of the HMOT forms were completed by medical students and exhibited varying quality. Some had missing measurements or failed to record what health advice had been given. This may have been owing to the variety of students assisting, ranging from second to fourth year medical students.

Finally, the large amount of missing data meant that despite a total cohort of 375 people, the actual sample size for each variable was often smaller, especially when cross-tabulating several variables (67% of people had at least one missing piece of data). This resulted in the inability to directly compare raw numbers of people, but only compare relative percentages of each sample. The decision to include partial data sets stemmed from the fact that the variables were mostly analysed discretely and therefore complete exclusion would reduce overall sample size, underpowering the study and not using valid data that were available. However, the amount of missing data and discrete evaluation of variables reduce the accuracy and reliability of these results.

Recommendations for future work

This report includes data from three Health Melas; however, there are currently at least five Health Melas each year. Consistent data have only been collected since 2016 and not from all Health Melas. Future analysis of more Health Melas will lend more weight to the results. This will also open up the possibility of matching people between Health Melas in the same location each year to determine changes in their CVD risk over a year.

Follow-up of attendees 6 months after the Health Mela with a questionnaire, asking whether they have made lifestyle changes, would provide an indicator of how many people actually made the changes they agreed since the Health Mela.

A qualitative study assessing the advantages of community-based, volunteer-led screening for CVD in South Asian populations compared with NHS Health Checks could further build on this work.

CONCLUSION

This descriptive observational study suggests the Health Melas access South Asian populations, people from lower IHD and eligible individuals who have not previously attended an NHS Health Check. The vast majority of attendees felt the events are useful, improved understanding of their health needs and encouraged them to make lifestyle changes. High rates of modifiable CVD risk factors including raised blood pressure, cholesterol and blood sugar were newly identified, along with a high proportion of attendees with an intermediate to high risk of a CVD event in the next 10 years. Attendees of South Asian ethnicity were found to be more likely to have a higher QRISK2 score. The reliability of these findings was limited by the descriptive nature of the results and the amount of missing data. Further research is needed to build on this work and determine whether community CVD screening and counselling interventions in this style affect health outcomes.

Author affiliations
[1]Manchester Medical School, The University of Manchester, Manchester, UK
[2]Critical Care, Liverpool University Hospitals NHS Foundation Trust, Liverpool, UK
[3]Diabetes and Endocrinology, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, UK
[4]National Forum for Health and Wellbeing, Bolton, UK
[5]Centre for Research in Health and Wellbeing, University of Bolton, Bolton, UK
[6]School of Medicine, University of Central Lancashire, Preston, UK
[7]Clinical Biochemistry, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, UK
[8]Integrated Musculoskeletal Services, Lancashire and South Cumbria NHS Foundation Trust, Preston, UK

Contributors JW: lead and guarantor of the study, performed data collection, data analysis, data interpretation and manuscript writing. RS: conceptualised the study, assisted with data collection, interpretation and manuscript review. RG: conceptualised the study, assisted with data interpretation and manuscript review. MM: assisted with data collection, data interpretation and manuscript review. RC: assisted with data interpretation and manuscript review. EM: conceptualised the study, assisted with data analysis, data interpretation and manuscript review. All authors approved the final version of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are stored in a private repository and are available on reasonable request with permission of all authors.

ORCID iD
Joseph Watson http://orcid.org/0000-0003-3679-4757

REFERENCES

1 NHS Digital. *Statistics on Smoking - England, 2019 [PAS*. NHS Digital: Government Statistical Service, 2019. https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-smoking/statistics-on-smoking-england-2019
2 NHS Digital. *Statistics on obesity, physical activity and diet, England, 2019*. NHS Digital: Government Statistical Service, 2019. https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-obesity-physical-activity-and-diet/statistics-on-obesity-physical-activity-and-diet-england-2019/part-3-adult-obesity
3 NHS Digital. *Statistics on Alcohol, England 2019 [PAS*. NHS Digital: Government Statistical Service, 2019. https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-alcohol/2019
4 Townsend N, Bhatnagar P, Wilkins E, *et al*. *Cardiovascular disease statistics 2015*. London: British Heart Foundation, 2015.

5 GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the global burden of disease study 2013. *Lancet* 2015;385:117–71.
6 NHS Health Check. NHS Health Check [online], 2019. Available: https://www.nhs.uk/conditions/nhs-health-check/ [Accessed 9 Apr 2020].
7 NHS Health Check. Explore NHS Health Check Data: National Data [online], 2017. Available: http://www.healthcheck.nhs.uk/commissioners_and_providers/data/ [Accessed 25 Jun 2019].
8 Public Health England. NHS Health Check implementation review and action plan [online], 2013. Available: https://www.gov.uk/government/publications/nhs-health-check-implementation-review-and-action-plan [Accessed 25 Jun 2019].
9 Harte E, MacLure C, Martin A, *et al*. Reasons why people do not attend NHS health checks: a systematic review and qualitative synthesis. *Br J Gen Pract* 2018;68:e28–35.
10 Szczepura A. Access to health care for ethnic minority populations. *Postgrad Med J* 2005;81:141–7.
11 Balarajan R. Ethnicity and variations in mortality from coronary heart disease. *Health Trends* 1996;28:45–51.
12 Mather HM, Keen H. The Southall diabetes survey: prevalence of known diabetes in Asians and Europeans. *BMJ* 1985;291:1081–4.
13 Mather HM, Chaturvedi N, Fuller JH. Mortality and morbidity from diabetes in South Asians and Europeans: 11-year follow-up of the Southall diabetes survey, London, UK. *Diabet Med* 1998;15:53–9.
14 National Institute for Health and Care Excellence. CVD risk assessment and management [online], 2019. Available: https://cks.nice.org.uk/cvd-risk-assessment-and-management [Accessed 30 Oct 2019].
15 Rao N, Eastwood SV, Jain A, *et al*. Cardiovascular risk assessment of South Asians in a religious setting: a feasibility study. *Int J Clin Pract* 2012;66:262–9.
16 Jones CA, Nanji A, Mawani S, *et al*. Feasibility of community-based screening for cardiovascular disease risk in an ethnic community: the South Asian cardiovascular health assessment and management program (SA-CHAMP). *BMC Public Health* 2013;13:160.
17 Department of Health. Five Year Forward View [online], 2014. Available: https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf [Accessed 25 Jun 2019].
18 Department of Health. NHS 2010-2015: from good to great. preventative, people-centred productive, CM7775 [online], 2009. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228885/7775.pdf [Accessed 25 Jun 2019].
19 Ministry of Housing, Communities & Local Government. English indices of deprivation 2015: Postcode Lookup. Available: http://imd-by-postcode.opendatacommunities.org/ [Accessed 26 Jun 2019].
20 Lancashire County Council. Lancashire's population by ethnicity, 2011 census of population. Available: https://www.lancashire.gov.uk/media/903536/census-2011-districts-ethnicity.pdf [Accessed 26 Jun 2019].
21 National Institute for Health and Care Excellence. Lipid modification - CVD prevention [online], 2019. Available: https://cks.nice.org.uk/lipid-modification-cvd-prevention [Accessed 30 Oct 2019].
22 Robson J, Dostal I, Sheikh A, *et al*. The NHS health check in England: an evaluation of the first 4 years. *BMJ Open* 2016;6:e008840.