Farmers Have Hearts Cardiovascular Health Programme

Detailed Baseline Report

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Acknowledgements

The 'Farmers Have Hearts' Cardiovascular Health Programme (FHH-CHP) is a unique largescale (n=868) health behaviour change intervention tailored for Irish male farmers. The programme is a transdisciplinary collaboration between the National Centre for Men's Health (NCMH) at IT Carlow, Teagasc, Irish Heart Foundation (IHF), Glanbia Ireland, the Health Service Executive (HSE), University College Dublin (UCD). We would like to recognise the contribution of all partners in the programme.

- Most importantly: we would like to thank all the participating farmers for their time and commitment to the FHH-CHP.

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- The **IHF** planned, supervised and carried out all health checks as part of the programme, the IHF promoted and invited farmers into the baseline health checks at the marts.

- The **NCMH at IT Carlow**, Teagasc and **UCD** collaborated on the quantitative data analysis and scientific dissemination.

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- Whilst supportive of the research, none of these stakeholders had any influence on the content or findings of the study.

Ethical Approval

This research was granted ethical approval from the ethics committee of the Institute of Technology Carlow (IT Carlow).

The FHH-CHP Programme is registered in the International Standard Randomised Controlled Trial Number Register (ISRCTN26792329).

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Farmers with higher risk factors
Clinical measurements

39.8%: Blood pressure ≥140-90 mmHg

46.4%: Total cholesterol ≥5.0 mmol/L   30.7%: HDL–C ≤1.00 mmol/L

44.5%: LDL-C ≥3.0 mmol/L   49.4%: Triglycerides ≥1.7 mmol/L

23.5%: Blood glucose ≥7.0 mmol/L (non-fasting)

85.9%: BMI kg/m2 ≥ 25.0

80.5%: Waist circumference ≥94 cm

Farmers with higher risk factors
Health outcomes and behaviours

9.3%: Smoking

10.3%: Standard drinks per week >17

30.7%: Harmful drinking pattern

32.8%: Physically inactive

13.0%: Stressed ('often'/'all of the time')

34.9%: Wellbeing 'poor' or 'below average'

72.1%: Daily salty/sugary snacks   49.4%: Meat/poultry ≥2x a day

21.9%: Deep fried food ≥3x per week   14.7%: Daily fizzy drinks

79.3%: Intake of fruit and vegetables <5 per day

Background

Farmers Have Hearts - Cardiovascular Health Programme (FHH-CHP) is a comprehensive health intervention targeted at Irish male farmers. The FHH-CHP consisted of a baseline health check, a health behaviour change intervention (health coach by phone and/or M (Mobile)-health by text messages) and a repeat health check at 52-weeks. The overall goal of the programme is to advance public health knowledge through original research that assesses the effectiveness of a health behaviour change programme among Irish farmers in terms of follow-up use of health services; sustainable health behaviour change; and reduced CVD risk.

The FHH-CHP is a collaboration between the National Centre for Men's Health (NCMH) at IT Carlow, Teagasc, IHF, HSE, UCD and Glanbia Ireland. This research programme builds on previous work, 'Farmers Have Hearts' (FHH): a workplace health check programme for farmers which was led out by the Irish Heart Foundation (IHF; see Section 2.1 for a detailed description of the evolution of the FHH programme).

This summary report provides an overview and key findings of the FHH-CHP baseline phase. A comprehensive overview of the baseline results is included in the detailed baseline report.

Overview and Context

- A total of 868 male farmers participated in the baseline phase of the FHH-CHP.

- Data was collected from 12 counties in the South, East and Midlands of Ireland, in 32 different locations between May 2018 – April 2019.

- The research focused on two distinct groups of livestock farmers; those predominantly focusing on cattle and those predominantly producing milk. Data collected from cattle farmers took place at 16 livestock marts (referred to as 'mart' farmers) whilst data collected from farmers with a dairy enterprise took place at 16 Glanbia Ireland branch locations (referred to as 'agri-branch' farmers). Of the total study group, 49.4% (n=429) were 'mart' farmers and 50.6% (n=439) 'agri-branch' farmers.

- Whilst often talked about as a single occupational group, this study demonstrates that farmers are not a homogenous group but rather differ in terms of socio-demographic and farming characteristics.

- Mart farmers were significantly more likely to be older (a higher proportion aged ≥65 years), to be single, to have primary only educational attainment, to be farming part-time, to farm fewer acres (<125 acres), and significantly less likely to be in receipt of help with farming.

- Agri-branch farmers were more likely to be married, to have at least (some) secondary educational attainment, to be farming full-time, to farm more acres (≥125 acres), and to be in receipt of some form of help with farming.

- In relation to health outcomes, a higher proportion of mart farmers had four or more risk factors for CVD compared to agri-branch farmers (79.2% vs 68.8% respectively).

- Understanding the different socio-demographic profiles among farmers is important in terms of tailoring messages to the specific sub-groups. This insight is also valuable for occupational health & safety practitioners who want to reach different groups of farmers with their health & safety campaigns.

Results

Health Status

- The majority (86.6%; n=743) of farmers reported their health as being 'good' or 'very good' which is comparable with the national average of Irish males (85%). The high self-rating of their health status was, for a large proportion of farmers, not reflected in their objective clinical measured and/or self-reported health outcomes of the baseline health check.

General Practitioner

- Most farmers (98.6%; n=846) reported having a General Practitioner (GP) and three in four farmers (73.6%; n=623) reported having visited their GP in the past 12 months. This is higher compared to the national average of Irish males (68%). This contradicts the prevailing view that farmers do not utilise GP services.

- The high level of self-reported GP visits by farmers is incongruent with their low level of awareness of having clinical risk factors for CVD. This suggests that farmers utilise GP services in response to ill-health or injury rather than for the prevention or early detection of disease.

Use of Medication

- Of those farmers who reported already being prescribed medication for high blood pressure (BP; 64.3%; n=166/258), cholesterol (64.0%; n=165/258) and/or blood glucose (10.1%; n=26/258), 47.0% (n=78) had high BP, 17.0% (n=28) elevated total cholesterol (TC), 13.3% (n=22) raised Low-Density Lipoprotein-Cholesterol (LDL-C), 47.9% (n=79) high Triglycerides (TG) levels and 88.5% (n=23) elevated blood glucose.

- This indicates that the farmers risk factors are not adequately controlled despite being on medication.

- Of those farmers (69.0%; n=591/856) who reported not using medication for BP, cholesterol and/or blood glucose, 43.8% (n=256/585) had high BP, 62.6% (n=368/588) elevated TC, 60.8% (n=333/548) raised LDL-C, 57.8% (n=340/588) high TG levels and 29.4% (n=178/588) elevated blood glucose.

- This indicates either a lack of awareness or an incomplete understanding of the condition. The majority of farmers had/ were living with either overweight or obesity. This is vastly higher compared to the national average of Irish men (85.9%; n=701 versus 68% respectively).

- Most farmers (80.5%; n=688) had an 'at risk' waist circumference ,≥94 cm.

Alcohol

- Although the prevalence of excessive weekly alcohol consumption reported to the nurse administering the health check was relatively low (10.3%; n=47), outcomes of a self-administered screening tool for 'harmful drinking' showed a three times higher figure: 30.7% (n=247) of farmers were classified as 'harmful' drinkers. This is lower when compared to 54.3% (non-gender specific) of 18-75 year olds taking part in the National Alcohol Diary Survey 2013. This shows a discrepancy between the face-to-face reported drinking habits and the self-administered instrument. This could be explained by some participants opting for a more favourable answer to provide a good impression rather than the more accurate answer in face-to-face interview situations. This effect is commonly observed in surveys and interviews.

Stress

- One in eight farmers (13.0%; n=104) reported experiencing stress 'often'/ 'very often' to the nurse. However, more than one in three farmers (34.9%; n=286) scored 'poor' or 'below average' on the self-administered short well-being scale.

Activity

- Farmers reported high levels of (occupational) physical activity (PA) with 67.2% (n=473) of farmers meeting the guidelines of being moderately active for at least 30 minutes on five days per week or more. This is higher compared to 54% of the national population of Irish males.

Diet

- In relation to dietary habits, it was found that the majority of farmers (72.1%; n=619) reported consuming salty and/or sugary snacks on a daily basis which is higher than 34% (not gender specific) of the national average.

- One in two farmers (49.4%; n=423) reported eating poultry or meat two or more times a day whilst one in five farmers (21.9%; n=188) reported consuming deep fried food three or more times a week. One in seven farmers (14.7%; n=126) reported drinking fizzy drinks daily which is slightly higher compared to 11% of the national population of Irish males.

- The majority of farmers (79.3%; n=652) reported not meeting the recommended daily intake of ≥5 portions fruit and vegetables. This is higher than 70% of the national population of Irish males.

Key Messages

The results of this baseline phase showed a positive and high level of engagement by farmers in the FHH-CHP with 86.4% (n=868) of farmers who participated in the health checks subsequently volunteered to take part in the programme. Farmers were highly positive about their experience with the baseline health check and were overwhelmingly optimistic about their own health status. A noteworthy finding was the high proportion of farmers who reported having visited their GP in the past 12 months which is higher compared to the national average of Irish males (73.6% versus 68% respectively). This debunks the myth that farmers do not utilise health services.

In relation to health outcomes, the baseline results reinforce previous research findings that Irish male farmers have a higher prevalence of overweight/obesity compared to the national average of Irish males (85.9% versus 68% respectively) as well as one in four farmers (73.9%) having four or more risk factors for cardiovascular disease (CVD). Men who have/who are living with overweight/obesity are at greater risk of developing diabetes and CVD than women at the same Body Mass Index (BMI) levels (Global BMI Mortality Collaboration et al., 2016). Overweight/obesity has also been linked to a higher incidence of injury in farming (King et al., 2016), putting farmers at higher occupation safety risk. It is also well established that having multiple risk factors amplifies the risk of developing CVD. For example, having two risk factors for CVD doubles the risk of developing CVD, whilst having four or more risk factors increases the risk of developing CVD threefold (Yusuf et al., 1998). Additionally, those people with multiple risk factors for CVD have been found to be at higher risk for loss of work productivity (Burton et al., 2005).

The findings also confirm previous research in relation to some positive trends in lifestyle behaviours; namely, high levels of self-reported (occupational) physical activity and a low occurrence of smoking and drinking habits. Interestingly, a difference was found between face-to-face self-reported alcohol consumption compared to self-administered reported drinking habits, with the latter indicating more harmful patterns of drinking. Findings also showed that, for most farmers, the majority of the cooking at home is done by farmers' significant others, for example a wife/partner or family member. A high proportion of farmers reported having poor dietary habits such as daily snacking on high salt/sugar foods, a daily high meat consumption and a lower intake of fruit and vegetables. The latter could explain the discrepancy between high self-reported levels of physical activity and the high prevalence of farmers living with either overweight or obesity.

Cardiovascular health outcomes can be positively impacted by a healthy lifestyle and health behaviour change. For example: a reduction of 5-10 cm in waist circumference, can result in improvements in several CVD risk factors (de Koning et al., 2007), whilst a reduction of 5-10% of body weight is associated with lower TC, LDL-C, TG and blood glucose (Brown et al., 2016). Being moderately physically active for 5 days per week for at least 30 minutes is associated with a 15% reduction in risk for all-cause mortality (Leitzmann et al., 2007). A high consumption of fruit and vegetables also has a protective effect against CVD (Wang et al., 2014).

In conclusion, the findings of this baseline phase of the FHH-CHP are a timely reminder of the urgent need to address CVD risk in the farming population in Ireland and the importance of supporting farmers with health behaviour change to improve their cardiovascular health.

Section 2 - Introduction: The Cardiovascular Disease (CVD) Challenge

The World Health Organization (WHO) estimates that 80% of CVD is caused by adverse lifestyle behaviours, specifically smoking, unhealthy diet and physical inactivity (World Health Organization Regional Office for Europe 2019). These unhealthy behaviours are causally linked to the onset of high blood pressure (BP), elevated cholesterol, Type 2 diabetes and overweight/obesity; all major risk factors for CVD (World Health Organization Regional Office for Europe, 2020). Cardiovascular disease is the second commonest cause of death in Ireland (Central Statistics Office, 2019) and the leading cause of death in Europe and worldwide (World Health Organization, 2019). There are both gendered and social gradient dimensions to mortality and morbidity from CVD (*Rosengren et al.*, 2019). Data on (premature) mortality from CVD both in Europe (World Health Organization European Region Office, 2018) and in Ireland (Central Statistics Office, 2019) shows a higher prevalence in men than in women and, particularly, among men in semi- or unskilled occupations (World Health Organization European Region Office, 2018). Farming in Ireland is a predominantly male occupation with 88% of farm holders and 73% of the agricultural workers being male (Central Statistics Office, 2016). For these reasons, and in response to calls at a health policy level for gender-specific approaches that target 'at risk' population groups of men (Health Service Executive, 2016), this study focused solely on male farmers.

Focusing on Irish farmers' cardiovascular health status is timely: Irish farmers have been found to have a high risk for CVD mortality (*Smyth et al.*, 2013) and morbidity (*van Doorn et al.*, 2017). Cardiovascular disease was found to be one of the main health issues causing disability among farm operators (*Whelan et al.*, 2009). The consequences of CVD impact not only on the wellbeing of farmers but also have financial implications. Cardiovascular disease is linked to absenteeism or inability to work and loss of productivity (*Burton et al.*, 2005; *Grossmeier et al.*, 2015) and can directly impact farm productivity and consequently farm income.

The Farmers Have Hearts Cardiovascular Health Programme (FHH-CHP) is a comprehensive health intervention targeted at Irish male farmers and consisting of:

i. Health checks at marts and agri-branches at baseline and at 52-weeks;

ii. A health behaviour change intervention;

iii. Face-to-face surveys at baseline and 52-Weeks and by phone at 26-weeks.
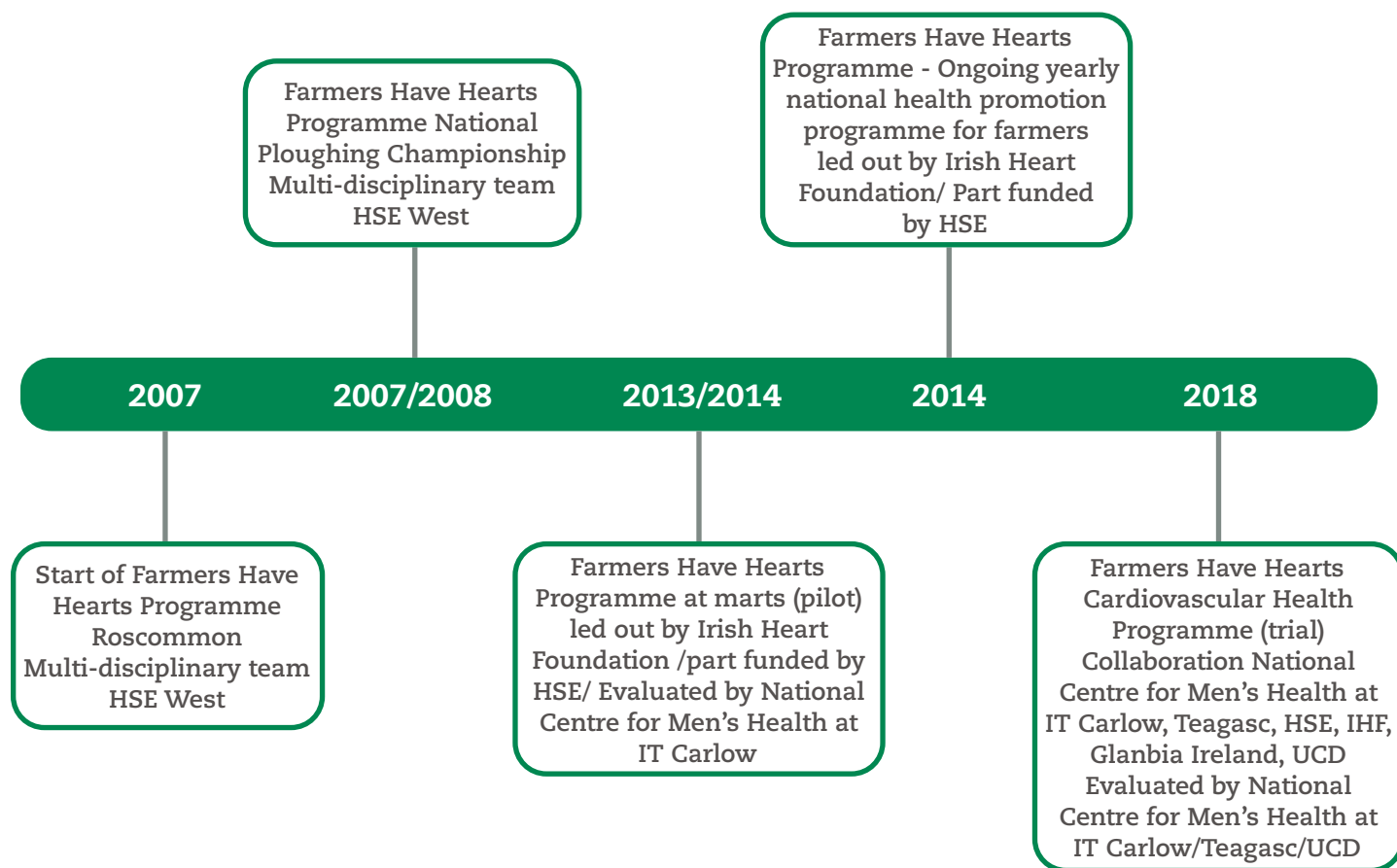
The programme aimed to examine whether cardiovascular health behaviour change interventions targeted at male farmers in Ireland could result in:

• Health behaviour change
• Reduced CVD risk
• Follow-up use of health services
• An improved cardiovascular health status

A detailed description of the methodology is included in Appendix 2.

2.1   The Evolution of the Farmers Have Hearts Programme

Figure 1:- Timeline development Farmers Have Hearts Programme

Farmers Have Hearts Programme National Ploughing Championship Multi-disciplinary team HSE West

Farmers Have Hearts Programme - Ongoing yearly national health promotion programme for farmers led out by Irish Heart Foundation/ Part funded by HSE

| 2007 | 2007/2008 | 2013/2014 | 2014 | 2018 |

Start of Farmers Have Hearts Programme Roscommon Multi-disciplinary team HSE West

Farmers Have Hearts Programme at marts (pilot) led out by Irish Heart Foundation /part funded by HSE/ Evaluated by National Centre for Men's Health at IT Carlow

Farmers Have Hearts Cardiovascular Health Programme (trial) Collaboration National Centre for Men's Health at IT Carlow, Teagasc, HSE, IHF, Glanbia Ireland, UCD Evaluated by National Centre for Men's Health at IT Carlow/Teagasc/UCD

The Farmers Have Hearts (FHH) Programme originated in 2007 as a local multi-disciplinary cardiovascular health check (baseline and repeat at 6 months) and health promotion intervention, run by the HSE West, in workplace settings such as marts as well as community centres, and aimed at rural men in county Roscommon. The health check was carried out by a HSE nurse and this was followed by a lifestyle advice on healthy eating and physical activity provided by a dietician and physical activity professional (*Evans et al.*, 2009a). In 2007 and 2008, the HSE West continued the FHH Programme at the National Ploughing Championship (*Evans et al.*, 2009b). Programme evaluations of both FHH Programmes showed a high prevalence of high BP, elevated cholesterol

and overweight/obesity among farmers. Both evaluations recommended further primary prevention interventions for farmers to promote cardiovascular health (*Evans et al.*, 2009a; *Evans et al.*, 2009b).

In 2013, Health Service Executive (HSE) and the Irish Heart Foundation (IHF) partnered to pilot FHH as a workplace cardiovascular health intervention at marts in four counties: Longford, Cavan, Mayo and Cork for farmers, mart workers and their families. The programme consisted of a single health check carried out by an IHF nurse. As part of the health check, farmers received comprehensive lifestyle counselling based on motivational interviewing techniques from the nurse. The evaluation of this FHH Programme showed a high prevalence of

obesity and multiple risk factors for CVD among farmers, placing them at higher risk for acute cardiovascular events compared to those with less risk factors for CVD (*van Doorn et al.*, 2019). Additionally, the findings showed that although the intervention prompted a high proportion of farmers to contemplate health behaviour change, this did not necessarily translate into real or sustained change for all farmers. The evaluation recommended more follow-up support for farmers to realise health behaviour change to improve their cardiovascular health.

Since 2014, the Farmers Have Hearts Programme, led by the IHF and partly funded by the HSE, has been operating at a national level reaching 1,000 farmers per year.

2018 – present: Working in collaboration, Teagasc and the NCMH at IT Carlow developed a research proposal to undertake a large scale study examining the impact of health behaviour change on farmer's cardiovascular health. Supported by the IHF, HSE, Glanbia Ireland and UCD, the proposal sought to use this knowledge to extend the FHH Programme into a more comprehensive Cardiovascular Health Programme (CHP; see Figure 2 – Flowchart depicting the overview of the research). The roles and responsibilities of each partner are outlined in the acknowledgement section at the start of this report.

Figure 2:- Flow chart Farmers Have Hearts Cardiovascular Health Programme
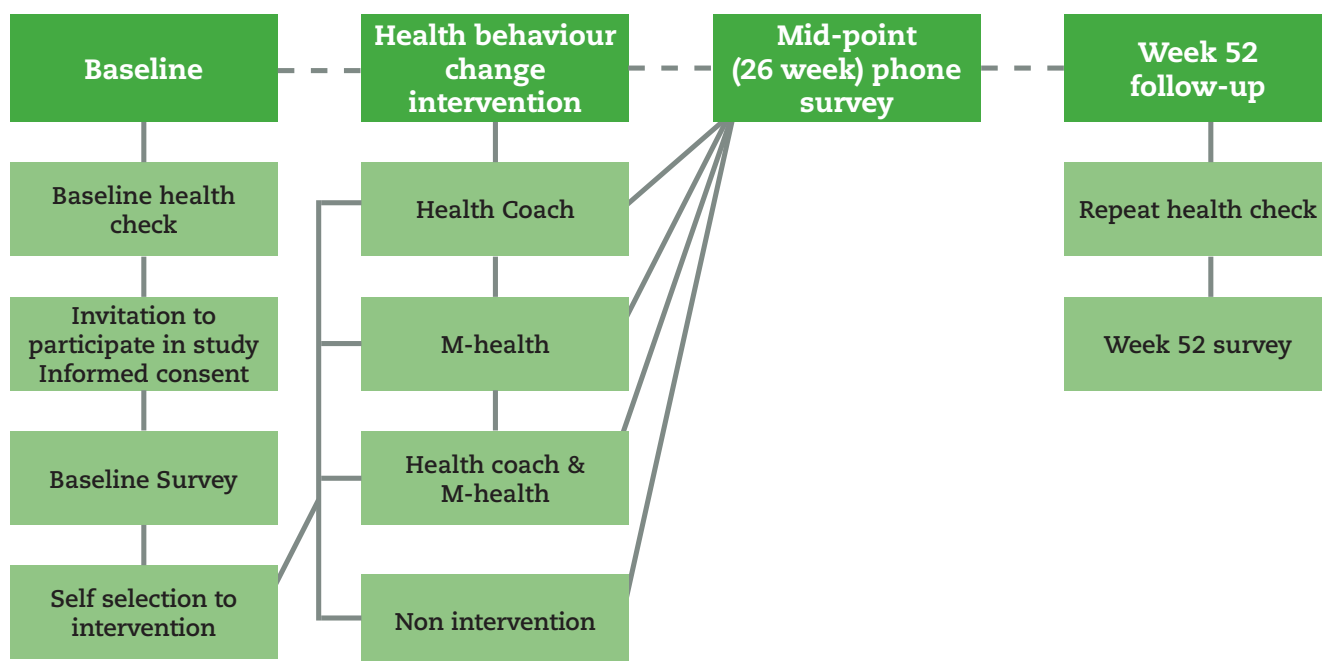
2.2 Programme Methodology Synopsis

The FHH-CHP included four phases (*See Figure 2; Section 2.1*).

a. The baseline phase consisted of a workplace health check (livestock marts or agri-branches) carried out by the IHF. Farmers self-referred to take part in the baseline health check based on an opportunistic approach in the marts and a pre-book system in the agri-branches (a detailed description of the recruitment strategy in the different locations is included in the methodology section in Appendix 2). All farmers received a comprehensive lifestyle counselling based on motivational interviewing techniques from the IHF nurses as part of the health check.

b. After this health check, farmers that met the inclusion criteria (male ≥ 18 years) could self-select into one of three health behaviour change support interventions: (i) an interactive health coaching by phone intervention; (ii) an M-Health intervention using health promoting text messages; and (iii) a combined health coaching and M-Health intervention. Farmers also could opt for a 'non-intervention group'.

c. A mid-point survey was undertaken to check in with participants.

d. All farmers were invited for a repeat health check at 52-weeks which was identical to the baseline health check.

2.3 Farmers Have Hearts Cardiovascular Health Programme - Research Aim

The overall aim of the FHH-CHP is to explore whether taking part in the programme results in (i) sustainable health behaviour change; (ii) reduced CVD risk; and (iii) follow-up use of health services. The focus of this baseline report is to provide an overview of the cardiovascular health status of male livestock farmers from the South, South-East, Midlands and Mid- East of Ireland.

Whilst previous studies have established that farmers, in general, are at high risk of CVD, limited consideration was given to potential social and demographic differences between different groups within the population of farmers. To fill this knowledge gap, this study targeted two sub-groups of farmers: predominantly cattle and predominantly dairy farmers who were recruited from two discrete settings (marts and Glanbia Ireland agri-branches respectively). Both sub-groups, which were roughly equal in size, 429 (49.4%) mart farmers and 439 (50.6%) agri-branch farmers, were compared and contrasted on socio-demographic and farming characteristics and their extent of being at risk for CVD based on having multiple risk factors.

The remainder of this report details some of the key findings from the first two elements of the project; the baseline health check and the baseline survey.

Section 3 - Results

This section describes the main findings from the FHH-CHP baseline phase. This study included 868 male farmers who were recruited in 12 counties in 32 different locations in the period May 2018 – April 2019. The study group consists 429 (49.4%) 'mart' farmers and 439 (50.6%) 'agri-branch' farmers.

The key results are reported and illustrated in the text. The detailed results tables are included in Appendix 1.

3.1 Prevalence of Multiple Risk factors for Cardiovascular Disease

Cardiovascular disease is in many cases the sum of multiple risk factors such as genetics (Piepoli et al., 2016), prolonged high BP (hypertension), high cholesterol, diabetes, overweight/ obesity, smoking, excessive alcohol consumption, physical inactivity, stress and an unhealthy diet. Having multiple risk factors for CVD acts like an accelerator for CVD: people with two risk factors or four risk factors are respectively 2.2 and 3.2 times more likely to develop CVD (Yusuf et al., 1998)

Table 1 summarises results of the baseline health checks and highlights the percentage of participants at risk for each of the CVD risk factors derived. The risk factors include both the objective measured risk (including those who reported already being prescribed medication for high blood pressure, elevated cholesterol and/or diabetes), and self-reported risk factors.

Table 1:- Prevalence of risk factors for CVD (based on ESC guidelines)

Risk factors for cardiovascular health*	All farmers n	Risk factor prevalence n (%)
Blood pressure ≥ 140/90 mmHg*/**	860	430 (50.0)
HDL cholesterol ≤1.0 mmol/L	859	264 (30.7)
LDL cholesterol ≥3.0 mmol/L**	822	501 (60.9)
Blood glucose levels ≥7.0 mmol/L/**/***	861	205 (23.8)
HDL cholesterol ≤1.0 mmol/L	859	264 (30.7)
LDL cholesterol ≥3.0 mmol/L**	822	501 (60.9)
Blood glucose levels ≥7.0 mmol/L/**/***	861	205 (23.8)
BMI kg/m2 ≥ 25.0 Or Waist circumference >102 centimetres (in case of a BMI kg/m2 <25.0)	859	755 (87.9)
Family history of heart disease, stroke or diabetes	799	514 (64.3)
Tobacco use	848	79 (9.3)
Standard drinks per week >17****	455	47 (10.3)
Physically inactive - active on less than 5 days a week AND for less than 30 minutes on active days	704	231 (32.8)
Stressed 'often'/'all of the time'	800	104 (13.0)
Consumption of fruit and vegetables <5 per day	822	652 (79.3)

* It should be noted that risk factor targets are different for all high risk individuals such as people with diabetes, pre-existing CVD diagnosis.

** This is based on those farmers whose health check measurements exceeded the risk factor thresholds and/ or who reported already being prescribed medication for high blood pressure, elevated cholesterol and/or diabetes.

***Note: fasting blood glucose tests are recommended. In case of non-fasting blood glucose measurements, levels ≥7.0 mmol/L were taken as indication of potential risk and these participants were advised to seek further medical examination.

****This is the threshold for men based on Irish guidelines. The threshold for women is 11 standard drinks per week.

In the context of having multiple risk factors for CVD, results showed that the vast majority of farmers (97.8%; n=849) had two or more risk factors for CVD whilst three in four (73.9%; n=642) had four or more risk factors for CVD (Table 2). More mart than agri-branch farmers had four or more risk factors for CVD: 79.2% (n=340) vs 68.8% (n=302).

Table 2:- Multiple risk factors for CVD

Number of risk factors	Multiple risk factors All farmers (n=868) n (%)	Mart (n=429)	Agri-branch (n=439)
0	1 (0.1)	0 (0.0)	1 (0.2)
1	18 (2.0)	8 (1.9)	10 (2.3)
2	63 (7.3)	25 (5.8)	38 (8.7)
3	144 (16.6)	56 (13.1)	88 (20.0)
4	201 (23.2)	98 (22.8)	103 (23.5)
5	216 (24.8)	112 (26.1)	104 (23.7)
6	145 (16.6)	80 (18.6)	65 (14.8)
7	57 (6.6)	33 (7.7)	24 (5.5)
8	19 (2.2)	14 (3.3)	5 (1.1)
9	4 (0.5)	3 (0.7)	1 (0.2)

3.2 Advised to see their GP

Three out of four farmers (74.9%; n=626) were advised to visit their GP based on the results from the cardiovascular health check (Figure 3).

This is broadly similar to the 79.3% from the FHH Programme 2013/14 evaluation (*van Doorn et al.*, 2017).

Figure 3:- Advised to see their GP as a result of the health check
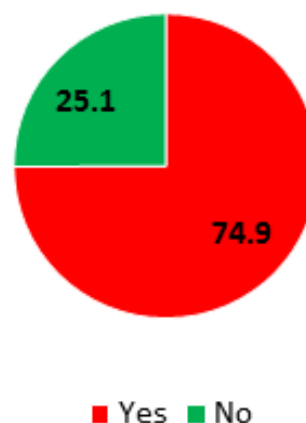
Section 4
Socio-demographic and Farming Characteristics

The mean age of participating farmers was 57.5 (range 22-88) which is identical to the (not gender specified) average age of farmers in Ireland (57 years) in the Annual Review 2016/17 of the Department of Agriculture (*Department of Agriculture Food and the Marine*, 2017). Most farmers (56.9%; n=477) were between 45-64 years of age (Figure 4).

Figure 4:- Age profile

The majority of farmers (78.0%; n= 669) reported being married or co-habiting (Table A3), with just 14.3% (n=123) being single. This is similar to the (not gender specified) findings of the National Farm Survey in which 80.5% of farmers reported being married and 13.2% being single (*Dillon*, 2018). Twice as many mart farmers reported being single compared to agri-branch farmers (19.8%; n=84 vs 9.0%; n=39). Most farmers (55.6%; n=477) reported having lower educational attainment either 'primary or below' (16.9%; n=145) or 'some secondary' education (38.7%; n=332; Table A3).
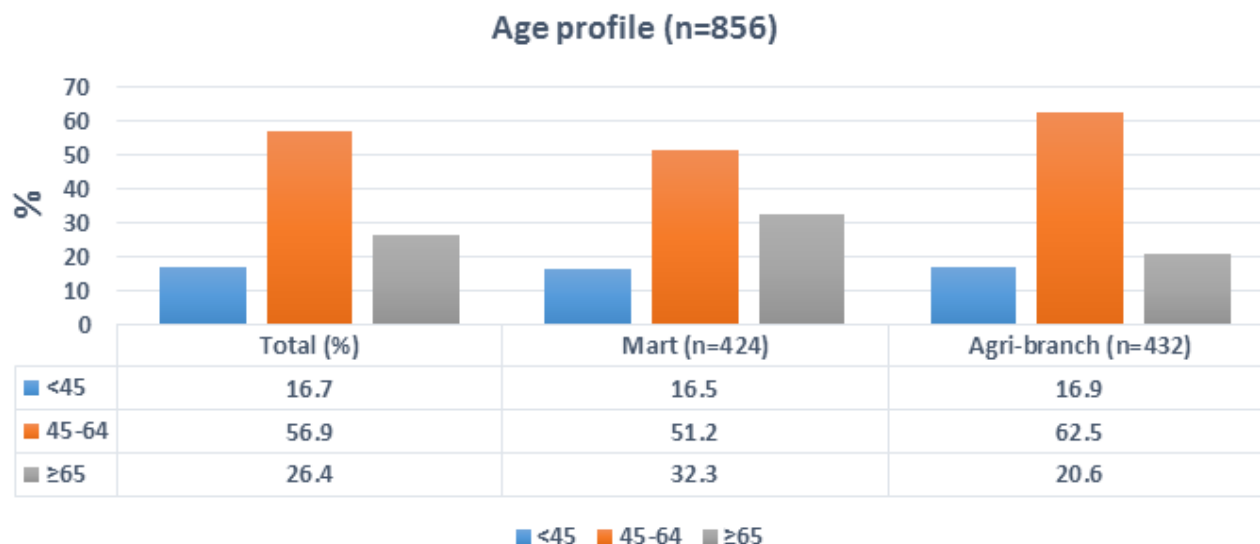
Three in four farmers (73.7%; n=632) reported farming full-time (Table A4). This is higher than the 53% documented in the CSO Farm Structure Survey 2016 (*Central Statistics Office*, 2016). More agri-branch farmers than mart farmers reported farming full-time (84.3%; n=364 v 63.1%; n=268). Farmers reported working on average 55.1 hours per week on the farm. Agri-branch farmers reported working on average more hours on the farm compared to mart farmers (mean 60.4 vs 48.8 hours respectively). The main reported

farming enterprises were dairy (38.0%; n=325), specialised beef (38.7; n=331) and mixed livestock (13.9%; n=119; Table A4). As expected, the majority of agri-branch farmers (62.1%; n=269) reported 'dairy' as their main farming enterprise whilst the majority of mart farmers (56.2%; n=238) reported 'specialised beef' as their main farming enterprise.

Almost one in two farmers (48.1%; n=410) reported farming ≥125 acres (Table A4). Almost twice as many agri-branch than mart farmers reported farming ≥125 acres (60.4%; n= 261 vs 35.4%; n=149).

One in five farmers (21.0%; n=179) reported having a General Medical Scheme Card or GP visit card (Table A5). This is somewhat lower than the national average of 26.8% of Irish men ≥16 years (*Central Statistics Office*, 2017). Three out of four farmers (75.0%; n=641) reported as having private health insurance which is substantially higher than the national average of 43.3% (not gender specified; (*Central Statistics Office*, 2017).

Section 5
Self-reported Health Behaviours

This section describes farmers' self-reported health behaviours in relation to prompts and reasons to engage in the health check, self-rating of health, use of GP services, prescribed medication use for BP, cholesterol and/or diabetes, and medication adherence.

5.1 Prompts and Reasons for Engaging in Farmers Have Hearts Cardiovascular Health Behaviour Change Programme - Baseline Health Check

Three out of four farmers (76.5%; n=656) reported that they took part in the cardiovascular health check on their own initiative (Table A6) whilst others reported as having been encouraged by the IHF staff (7.9%; n=68) or by their wife/partner (7.5%; n=64). 'Curiosity' (40.9%; n=350), 'convenience of location' (36.9%; n=316) and 'concerned about health' (34.1%; n=292) were the top three reasons provided for taking part in the health check.

The vast majority of farmers (97.6%; n=837) rated their experience of the health check as eight out of ten or higher (Figure 5).

Figure 5:- Rating of health check experience on a scale of 1-10

Rating of health check experience on a scale of 1-10 (n=858)
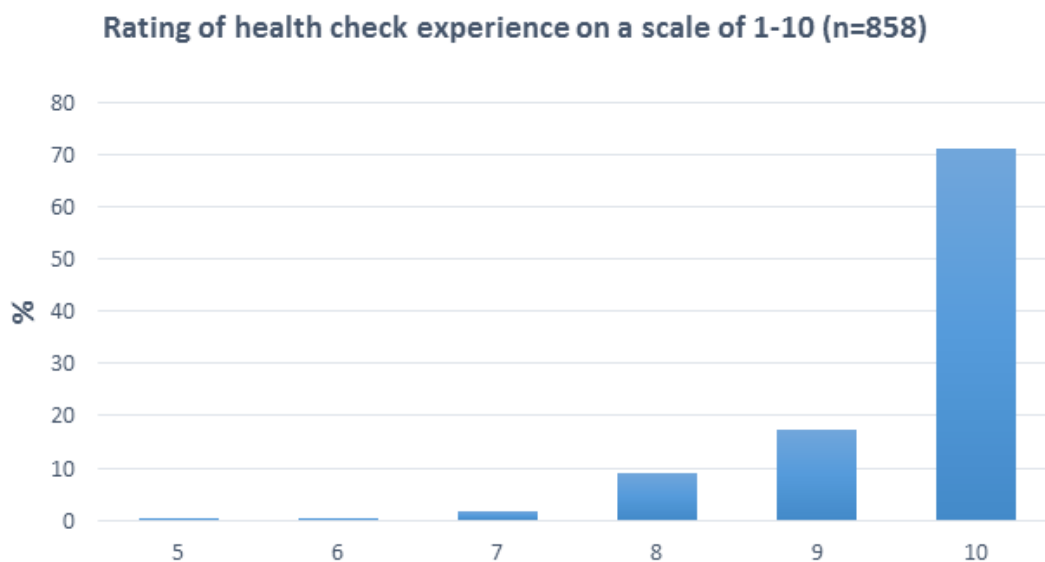
'Friendly staff and nurse' (25.4%; n=214), 'informative' (19.3%; n=163), 'comprehensive' (18.5%; n=156) and 'good explanation given' (16.7%; n=141) were the most quoted reasons for farmers' positive experience (Table A6). A very few farmers (0.5%; n=4) reported having had a negative experience.

5.2 Self-reported Health Rating

The vast majority of farmers (92.6%; n=794) rated the importance of their health as eight out of ten or higher (Table A7). The majority of farmers (86.6%; n=743) reported their health as being 'good' or 'very good' (Figure 6). This is comparable with the Healthy Ireland Survey 2019 in which 85% of male participants rated their health as 'good' or 'very good' (Department of Health 2019). In the current study, almost one in seven farmers (13.4%; n=115) reported their health as 'fair' or 'bad'.

Figure 6:- Self-reported health rating

How good is your health in general? (n=858)
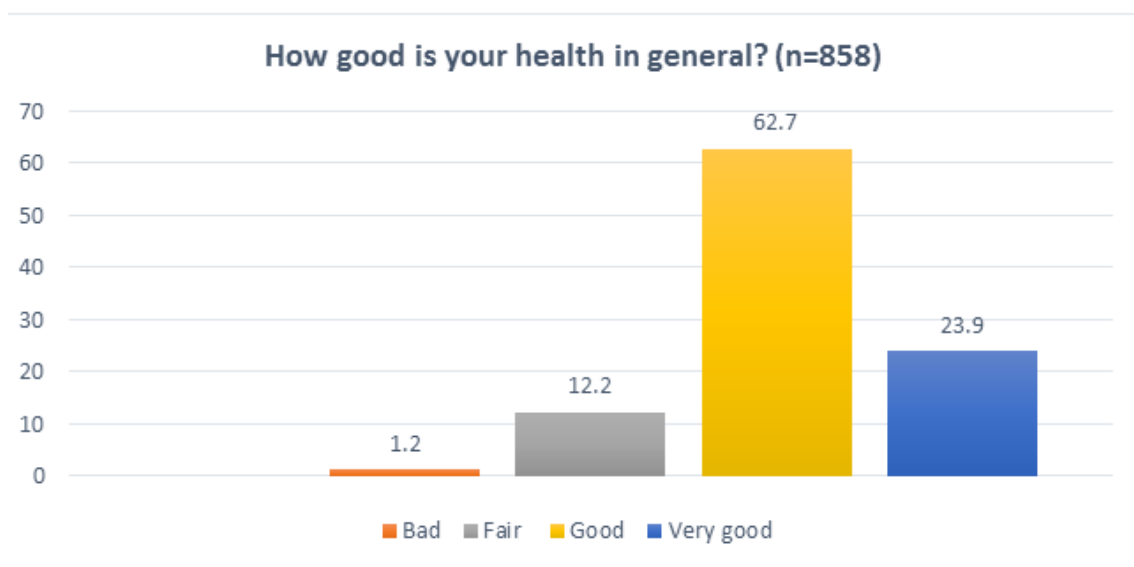
5.3 Use of GP services

The vast majority (98.6%; n=846) of farmers reported as having a GP (Table A8). Three out of four farmers (73.6%; n=623) reported having visited their GP within the past year (Figure 7). This is higher than the national average of 68% of Irish men who reporting visiting their GP in the past year (*Department of Health,* 2019) This is also higher compared to Irish research on low back pain among farmers published in 2013 which showed that just 46% of participating farmers had visited their GP the past year (*Osborne et al.*, 2013).

Figure 7:- When was the last time you visited your GP?
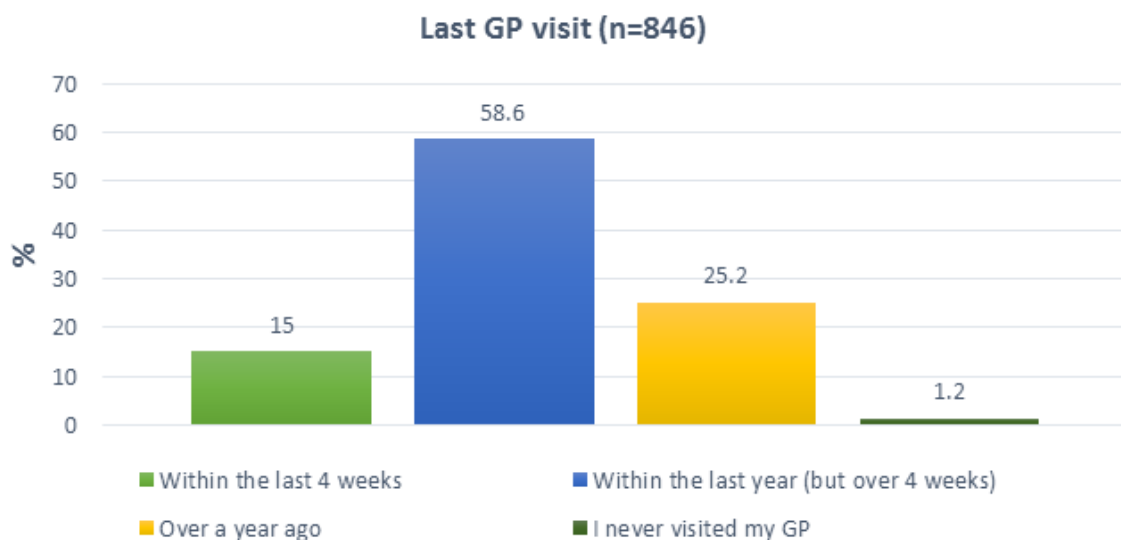
5.6 Use of and Adherence to Prescribed Medication for Cholesterol, Blood Pressure and/or Diabetes

Almost one in three farmers (31.0%; n=265) reported already being prescribed medication for either high BP, elevated cholesterol and/or type 2 diabetes (Table A9). Usage of BP (64.3%; n=166) or cholesterol (64.0%; n=165) lowering medication was mostly reported. The vast majority of farmers (95.4%; n=247) reported taking their medication as prescribed by their doctor.

Section 6
Results from the Health Check

This section presents the results from the FHH-CHP baseline health check. It details the objective clinical measurements (BP, lipid profile, blood glucose and anthropometric measurements) as well as self-reported and lifestyle risk factors for CVD (family history of heart disease, stroke and/or diabetes, smoking, alcohol consumption, physical activity, stress and well-being, and dietary habits).

6.1 Objective Clinical Measurements

6.1.1   Blood Pressure

> Blood pressure is the strength of the blood compression against the artery walls as it is pumped around the body by the heart (World Health Organization Regional Office for Europe, 2013). If this pressure is constantly high, it weakens the artery walls which can lead to heart attack, stroke or an aneurysm. High BP generally does not display physical symptoms and is referred to as 'the silent killer' (World Health Organization, 2013). The Institute of Public Health Ireland estimated that in 2020, 48.5% of the Irish population ≥45 years (non-gender specified) would have undiagnosed hypertension (Institute of Public Health Ireland, 2012)

Two out of five farmers (39.8%; n=342) were found to have high BP ≥140/90 mmHg (Table 3).

This is lower than the national average for Irish males (51.6%; *Morgan et al.*, 2008).

Table 3:- Multiple risk factors for CVD

	n (%)
Optimal <120/<80	156 (18.1)
Normal 120-129/80-84	169 (19.7)
High Normal 130-139/85-89	192 (22.4)
High ≥140/90	342 (39.8)

Of those with high BP ≥140-90 mmHg, almost one in two farmers (47.0%; n=78) reported already being prescribed medication for high BP (Table 4). This suggests that despite adhering to BP lowering medication, the condition is not fully controlled in all cases.

Three out of seven farmers (43.8%; n=256) with high BP did not report using medication for high BP. This suggests either a lack of awareness or an incomplete understanding of the condition.

Table 4:- High blood pressure (mmHg) and reported prescribed medication for high BP

Reported prescribed medication for high blood pressure	Yes (n=166) n (%)	No (n=585) n (%)
Blood pressure ≥140/90	78 (47.0)	256 (43.8)

6.1.2   *Lipid (cholesterol) Profile*

Cholesterol is a fatty (lipid) substance in our bloodstream which is needed for cell and hormone formation (World Heart Federation, 2017). There are different types of cholesterol: total cholesterol, LDL-C; HDL-C and TG. Too much cholesterol can build-up 'plaque' and narrow the arteries which could lead to CVD or acute cardiac events (World Heart Federation, 2017). Although fasting tests are traditionally deemed preferable, non-fasting cholesterol tests have been found to give similar results to fasting tests, specifically in relation to TC, LDL-C and HDL-C readings (Piepoli et al., 2016).

Almost half of farmers had high TC ≥5.0 mmol/L (46.4%; n=400), and/or elevated LDL-C ≥3.0 mmol/L (44.5%; n=358; Table 5). One in two farmers (49.4%; n=425) had raised TG ≥1.7 mmol/L. Almost one in three farmers (30.7%; n=264) had low HDL-C levels ≤1.00 mmol/L. The prevalence of 'high' cholesterol among the study group was lower when compared to the national average of 62% (*Morgan et al.*, 2008).

Table 5:- Lipids Profile mmol/L

Total cholesterol (n=862)	n (%)
<5.0	462 (53.6)
≥5.0	400 (46.4)
LDL-C (n=805)	
<3.0	447 (55.5)
≥3.0	358 (44.5)
HDL-C (n=859)	
≤1.00	264 (30.7)
>1.00	595 (69.3)
TG (n=860)	
<1.7	435 (50.6)
≥1.7	425 (49.4)

Of those farmers with elevated blood lipids, 17.0% (n=28) TC ≥5.0 mmol/L, 13.3% (n=22) had raised LDL-C: ≥3.0 mmol/L, and 47.9% (n=79) TG ≥1.7 mmol/L, reported already being prescribed medication for high cholesterol (Table 6). This indicates that the farmers risk factors are not adequately controlled despite being on medication. Most farmers with elevated blood lipids (62.6%; n=368 TC ≥5.0 mmol/L; 60.8%; n=333 LDL-C ≥3.0 mmol/L; and 57.8%; n=340 TG ≥1.7 mmol/L) did not report using medication for high cholesterol. This indicates either a lack of awareness of or an incomplete understanding of the condition.

Table 6:- Elevated lipid profile (mmol/L) and reported prescribed medication for high cholesterol

Reported prescribed medication for high cholesterol	Yes n (%)	No n (%)
Total cholesterol mmol/L ≥5.0	Yes (n=165)	No (n=588)
<3.0	28 (17.0)	368 (62.6)
≥3.0	358 (44.5)	
LDL-C mmol/L ≥3.0	Yes (n=165)	No (n=548)
≤1.00	22 (13.3)	333 (60.8)
>1.00	595 (69.3)	
TG mmol/L ≥1.7	Yes (n=165)	No (n=588)
<1.7	79 (47.9)	340 (57.8)

6.1.3   Blood Glucose

Blood glucose is a type of 'sugar' in the blood which is used by the body for energy (Health Service Executive, 2011). Type 2 diabetes occurs because your body cannot produce enough insulin or because the cells in your body do not react properly to insulin (Health Service Executive, 2011). Diabetes is strongly linked to CVD (Cosentino et al., 2020) and acute cardiac events (Shah et al., 2015). A major cause of diabetes is being overweight/obese (Health Service Executive, 2011). Blood glucose is considered high when levels ≥6.0 mmol/L (fasting) whereas non-fasting blood glucose levels are considered high ≥7.0 mmol/L. Blood glucose is strongly influenced by food intake and consequently fasting tests are preferable (Cosentino et al., 2020). In this research, most farmers took the non-fasting test. A blood glucose of ≥7.0 mmol/L is taken as an indicator of possible risk.

Almost one in four farmers (23.5%; n=202) had blood glucose levels ≥7.0 mmol/L (non-fasting threshold; Table 7). This is almost double the 12.4% of Irish males with raised blood glucose derived from SLÁN 2007 (*Balanda et al.*, 2013).

Table 7:- Blood glucose mmol/L (n=861)

<7.0	659 (76.5)
≥7.0	202 (23.5)

Of those farmers with raised blood glucose, the majority (88.5%; n=23) reported already being prescribed medication for diabetes (Table 8). This indicates that the farmers risk factors are not adequately controlled despite being on medication. Two in seven farmers (29.4%; n=173) with elevated blood glucose, did not report using medication for diabetes suggesting either a lack of awareness or an incomplete understanding of the condition.

Table 8:- Raised blood glucose (mmol/L) and reported prescribed medication for diabetes

Reported prescribed medication for diabetes	Yes (n=26) n (%)	No (n=588) n (%)
Blood glucose ≥7.0	23 (88.5)	173 (29.4)

6.1.4   *Anthropometric Measurements*

Overweight/obesity is the storage of excess fat in the body which occurs when the energy intake of food consumed is higher than the energy the body uses (World Health Organization, 2020). Overweight/obesity has been identified as a worldwide major public health issue (World Health Organization, 2014). Specifically, abdominal or central overweight/obesity is linked to type 2 diabetes and high cholesterol and consequently is recognised as a major risk factor CVD (Timmis et al., 2018).

The vast majority of farmers (85.9%; n=701) were either living with overweight (48.9%; n=399) or obesity (37.0%; n=302) based on BMI classification (Table 9). These findings are substantially higher when compared to the national average of 68% of men having/ living with overweight/obesity based on BMI (*Department of Health*, 2019). The majority of farmers (80.5%; n=688) had an 'at risk' waist circumference with 34.5% (n=295) having a 'moderate risk' and 46.0% (n=393) a 'high risk' waist circumference.

Table 9:- Anthropometric measurements

BMI kg/m2 categories WHO (n=816)	n (%)
<5.0	462 (53.6)
≥5.0	400 (46.4)
<5.0	462 (53.6)
Waist Circumference in categories WHO (n=854)	**n (%)**
Normal <94 cm	166 (19.5)
Moderate Risk 94-102 cm	295 (34.5)
High Risk ≥103 cm	393 (46.0)

6.2 Self-reported Health Outcomes and Behaviours

6.2.1   Family History of Heart Disease, Stroke and/or Diabetes

Genetics are an important risk factor for CVD. Premature (<55 years in father, <65 years in mother) parental CVD in one parent increases the risk for CVD by 2.6 times among male and 2.3 times among female offspring from the age >30 years (Lloyd-Jones et al., 2004)

One in two farmers (49.6%; n=395) reported having a family history of heart disease, and one in five of diabetes (20.6%; n=160) and stroke (18.5%; n=143; Table A17).

6.2.2   Smoking and Alcohol Habits

3 is a major risk factor for CVD and any cigarette smoked is deemed to be harmful for health. Smoking is linked to 10% of CVD cases (World Health Organization Regional Office for Europe, 2020).

Irish guidelines on 'low risk' alcohol consumption advises a maximum 17 standard drinks (containing 10-gram alcohol per drink) per week for men (Health Service Executive, 2019) whilst the ESC guidelines advise a maximum of 14 standard units (containing 8-gram of alcohol) per week for men (Piepoli et al., 2016).

One in ten farmers (10.3%; n=47) reported drinking more than 17 standard drinks per week (Table A18). For research purposes and to compare the prevalence of drinking in a European context, the standard drinks (10-gram alcohol) were converted to standard units (8-gram alcohol). When this measure is applied it indicates that 21.8% (n=99) exceed the European safe drinking threshold of 14 standard units.

Based on the outcomes from the screening tool for 'harmful drinking' (Alcohol Use Disorders Identification Test; Audit-C) almost one in three farmers (30.7%; n=247) were classified in the 'harmful drinking' category (Table A18). This is lower when compared to the findings from the National Alcohol Diary Survey 2013 which showed that 54.3% (non-gender specific) of 18-75 year olds were classified as 'harmful' drinkers (*Long and Mongan*, 2014).

Figure 8:- Smoking

Smoking (n=848)

9.3

90.7

■ Yes ■ No
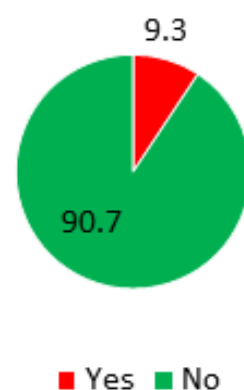
6.2.3   Physical Activity

> *Appropriate levels of moderate physical activity can be beneficial in terms of managing cholesterol, overweight/obesity and hypertension, and improving mental well-being. Physical activity is associated with a reduction in cardiovascular mortality (Warburton et al., 2006) and all-cause mortality (Ekelund et al., 2016). In line with international advice, Irish guidelines recommend 'at least 30 minutes a day of moderate activity on 5 days a week or 150 minutes a week' (Department of Health and Health Service Executive, 2009).*

Unsurprisingly, almost all farmers (93.7%; n=689) stated that their work involved PA (Table A19) and more than two out of three farmers (68.6%; n=494) reported that they were physically active outside of work. Almost three out of four farmers (72.0%; n=507) reported being physically active for at least 5 days per week, and more than two out of three farmers (68.8%; n=482) reported being active for 30 minutes or more on active days. Merging the two variables 'being physically for at least 5 days per week' AND 'being active for 30 minutes or more on active days', showed that one in three farmers (32.8%; n=231) did not meet the daily recommended physical activity guidelines which is lower compared to 46% of Irish males (*Department of Health*, 2019).

6.2.4   Stress and Well-being

> *Stress is described as 'a feeling of being overwhelmed, worried or run down caused by abnormal situations' (American Psycological Association, 2019). Stress can lead to ongoing increased heartrate, higher levels of stress hormones, high BP and is linked to the onset of CVD and acute cardiac events (American Psycological Association, 2019). In particular, work-related stress, is acknowledged as a risk factor for CVD and part of the ESC European guidelines on CVD prevention in clinical practices (Piepoli et al., 2016). Stress also can impact mental wellbeing for example by affecting feelings towards other, decision making, coping mechanisms and concentration (Health Service Executive, 2018).*

Three in four farmers (75.3%; n=602) reported experiencing some degree of stress - 'to some extent' (62.3%; n=498) or 'often / very often' (13.0%; n=104; Figure 9).

Results for wellbeing showed that more than one in three farmers (34.9%; n=286) scored 'poor' or 'below average' (Table A21).

Although measured with a different wellbeing instrument, this is higher than 14% of farmers who scored in the low mood – depressed range found by an Irish study on underlying psycho-social factors influencing farmers' risk-related behaviours (*GL Noble Denton*, 2014).

Figure 9:- Experience of stress
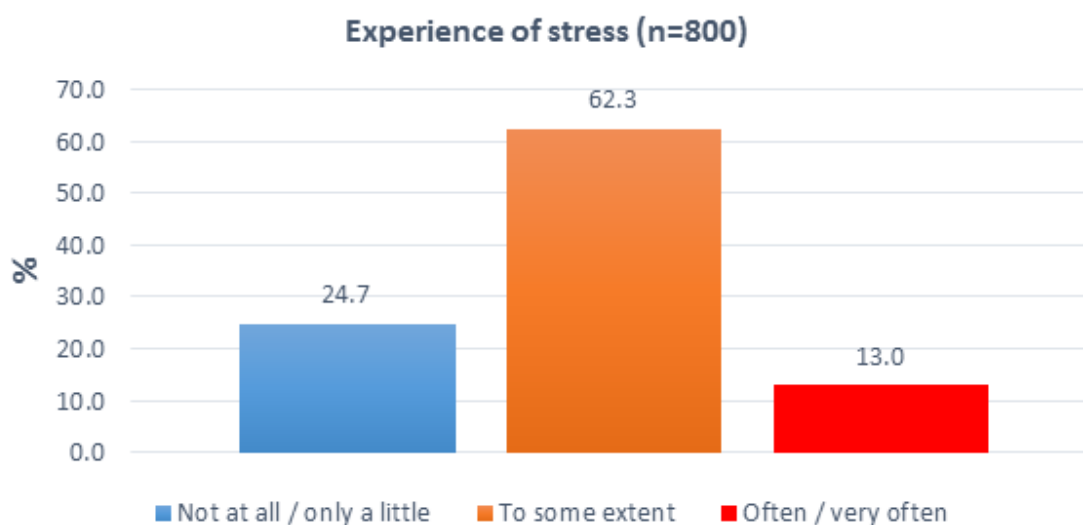
6.2.5   *Dietary Habits*

Diet is strongly associated with cardiovascular health. Unhealthy dietary habits play a key role with developing overweight/obesity. In particular, over-consumption of sugary and fatty foods is linked to overweight/obesity (Kanter and Caballero, 2012; World Health Organization, 2020). A diet high in salt and saturated fat is causally associated with cholesterol and hypertension (World Health Organization, 2018). A higher consumption (>5 portions a day) of fruit and vegetables has been found as being protective against CVD (Wang et al., 2014; Miller et al., 2017).

Three out of four farmers (76.5%; n=656) reported that the majority of their household cooking was done by others: their wife/partners or family. One in seven farmers (13.5%; n=116) reported cooking mainly for themselves whilst a small group (6.9%; n=59) reported dividing the cooking equally between their wife/partner and themselves (Table 10).

Table 10:- Cooking habits

Who does the majority of the cooking in your household? (n=857)	n (%)
Self	116 (13.5)
Wife/partner	578 (67.4)
Wife/self equally	59 (6.9)
Family	78 (9.1)
Other	26 (3.0)

The majority of farmers (72.1%; n=619) reported eating salty and/or sugary snacks one or more times a day (Table A22). This is vastly higher compared to the national average (not gender specific) of 34% (Department of Health, 2018). One in two farmers (49.4%; n=423) reported consuming meat or poultry two or more times a day and one in five farmers (21.9%; n=188) reported eating deep fried foods three or more times per week. One in seven farmers (14.7%; n=126) reported drinking daily fizzy drinks daily which is slightly higher compared to the 11% of the national population of Irish males (*Department of Health*, 2018).

The majority of farmers (63.6%; n=546) reported eating fruit every day with three in four farmers (75.3%; n=411) eating one or two pieces of fruit per day (Table A22). The vast majority of farmers (93.4%; n=798) reported consuming vegetables daily and 71.5%; (n=571) eating one or two portions of vegetables daily. Combining the intake of fruit/vegetables, the majority of farmers (79.3%; n=652) did not meet the recommended consumption of ≥5 fruit/vegetables a day (Figure 10). This is higher than that recorded for the national population of Irish males (70%; (*Department of Health*, 2018).

Figure 10:- Combined intake fruit/vegetables

Meeting recommendation fruit/vegetables consumption ≥5 portions a day (n=822)

20.7

79.3

■ Yes ■ No
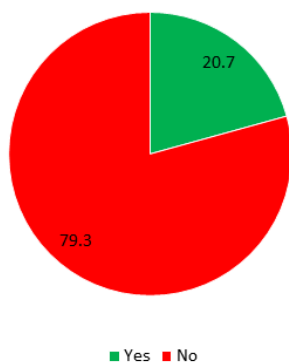
References

American Psycological Association (2019) *Stress effects on the body*. Online.

Balanda, K.P., Buckley, C.M., Barron, S.J., Fahy, L.E., Madden, J.M., Harrington, J.M., Perry, I.J. and Kearney, P.M. (2013) 'Prevalence of diabetes in the Republic of Ireland: results from the National Health Survey (SLAN) 2007'. *PLOS ONE*, 8(10), e78406.

Brown, J.D., Buscemi, J., Milsom, V., Malcolm, R. and O'Neil, P.M. (2016) 'Effects on cardiovascular risk factors of weight losses limited to 5–10 %'. *Transl Behav Med*, 6(3), 339-46.

Burton, W.N., Chen, C.Y., Conti, D.J., Schultz, A.B., Pransky, G. and Edington, D.W. (2005) 'The association of health risks with on-the-job productivity'. *J Occup Environ Med*, 47(8), 769-77.

Central Statistics Office (2016) *Farm Structure Survey 2016*. Online.

Central Statistics Office. (2017). *Census 2016 Summary Results-Part 2*. Dublin.

Central Statistics Office. (2019). *Vital Statistics Yearly 2018*. CSO Publication 31. Dublin. Online.

Cosentino, F., Grant, P.J., Aboyans, V., Bailey, C.J., Ceriello, A., Delgado, V., Federici, M., Filippatos, G., Grobbee, D.E., Hansen, T.B., Huikuri, H.V., Johansson, I., Juni, P., Lettino, M., Marx, N., Mellbin, L.G., Ostgren, C.J., Rocca, B., Roffi, M., Sattar, N., Seferovic, P.M., Sousa-Uva, M., Valensi, P. and Wheeler, D.C. (2020) '2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD'. *Eur Heart J*, 41(2), 255-323.

de Koning, L., Merchant, A.T., Pogue, J. and Anand, S.S. (2007) 'Waist circumference and waist-to-hip ratio as predictors of cardiovascular events: meta-regression analysis of prospective studies'. *European Heart Journal*, 28(7), 850-856.

Department of Agriculture Food and the Marine. (2017). *Annual Review and Outlook 2016—2017*. Dublin.

Department of Health. (2018). *Healthy Ireland Survey 2018. Summary of findings*. Dublin.

Department of Health. (2019). *Healthy Ireland Summary Report 2019*. Dublin.

Department of Health and Health Service Executive (2009) 'The National Guidelines on Physical Activity for Ireland'. 36-36.

Dillon, E., Moran, B., Lennon, J. and Donnellan, T. (2018) 'National Farm Survey 2017 Teagasc National Farm Survey 2017 Results'.

Ekelund, U., Steene-Johannessen, J., Brown, W.J., Fagerland, M.W., Owen, N., Powell, K.E., Bauman, A. and Lee, I.M. (2016) 'Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women'. *The Lancet*, 388(10051), 1302-1310.

Evans, D., Walshe, K., Gillen, P. and Connellan, M. (2009a). *'Farmers have hearts' project at the National Ploughing Championships 2007 and 2008*. Dublin.

Evans, D., Walshe, K., Gillen, P. and Connellan, M. (2009b). *Farmers Have Hearts at the National Ploughing Championships 2007 and 2008*. Dublin.

GL Noble Denton. (2014). *Determining underlying psycho-social factors influencing farmers' risk-related behaviours (both positively and negatively) in the Republic of Ireland*. Dublin.

Global BMI Mortality Collaboration, Di Angelantonio, E., Bhupathiraju Sh, N., Wormser, D., Gao, P., Kaptoge, S., Berrington de Gonzalez, A., Cairns, B.J., Huxley, R., Jackson Ch, L., Joshy, G., Lewington, S., Manson, J.E., Murphy, N., Patel, A.V., Samet,

J.M., Woodward, M., Zheng, W., Zhou, M., Bansal, N., Barricarte, A., Carter, B., Cerhan, J.R., Smith, G.D., Fang, X., Franco, O.H., Green, J., Halsey, J., Hildebrand, J.S., Jung, K.J., Korda, R.J., McLerran, D.F., Moore, S.C., O'Keeffe, L.M., Paige, E., Ramond, A., Reeves, G.K., Rolland, B., Sacerdote, C., Sattar, N., Sofianopoulou, E., Stevens, J., Thun, M., Ueshima, H., Yang, L., Yun, Y.D., Willeit, P., Banks, E., Beral, V., Chen, Z., Gapstur, S.M., Gunter, M.J., Hartge, P., Jee, S.H., Lam, T.H., Peto, R., Potter, J.D., Willett, W.C., Thompson, S.G., Danesh, J. and Hu, F.B. (2016) 'Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents'. *Lancet*, 388(10046), 776-86.

Grossmeier, J., Mangen, D.J., Terry, P.E. and Haglund-Howieson, L. (2015) 'Health risk change as a predictor of productivity change'. *J Occup Environ Med,* 57(4), 347-54.

Health Service Executive (2011) *Hyperglycaemia*. Online.

Health Service Executive (2016) 'National Men's Health Action Plan Healthy Ireland - Men HI-M 2017-2021 Working with men in Ireland to achieve optimum health and wellbeing'.

Health Service Executive (2018) *Stress - causes of stress and how it can impact on you*. Mental Health.

Health Service Executive (2019) *Alcohol. Weekly low-risk alcohol guidelines*. Online.

Institute of Public Health Ireland (2012) *Hypertension Briefing. Hypertension*. Online.

Kanter, R. and Caballero, B. (2012) 'Global gender disparities in obesity: a review'. *Adv Nutr*, 3(4), 491-8.

King, N., Janssen, I., Hagel, L., Dosman, J., Lawson, J., Trask, C., Pickett, W. and Saskatchewan Farm Injury Study Team (2016) 'Identifying and mitigating risks for agricultural injury associated with obesity'. *Preventive Medicine Reports*, 4, 220-4.

Leitzmann, M.F., Park, Y., Blair, A., Ballard-Barbash, R., Mouw, T., Hollenbeck, A.R. and Schatzkin, A. (2007) 'Physical activity recommendations and decreased risk of mortality'. *Arch Intern Med*, 167(22), 2453-60.

Lloyd-Jones, D.M., Nam, B.-H., D'Agostino, S.R.B., Levy, D., Murabito, J.M., Wang, T.J., Wilson, P.W.F. and O'Donnell, C.J. (2004) 'Parental Cardiovascular Disease as a Risk Factor for Cardiovascular Disease in Middle-aged Adults'. *JAMA*, 291(18), 2204.

Long, J. and Mongan, D. (2014). *Alcohol consumption in Ireland 2013: analysis of a national alcohol diary survey*. Dublin: Health Research Board.

Miller, V., Mente, A., Dehghan, M., Rangarajan, S., Zhang, X., Swaminathan, S., Dagenais, G., Gupta, R., Mohan, V., Lear, S., Bangdiwala, S.I., Schutte, A.E., Wentzel-Viljoen, E., Avezum, A., Altuntas, Y., Yusoff, K., Ismail, N., Peer, N., Chifamba, J., Diaz, R., Rahman, O., Mohammadifard, N., Lana, F., Zatonska, K., Wielgosz, A., Yusufali, A., Iqbal, R., Lopez-Jaramillo, P., Khatib, R., Rosengren, A., Kutty, V.R., Li, W., Liu, J., Liu, X., Yin, L., Teo, K., Anand, S. and Yusuf, S. (2017) 'Fruit, vegetable, and legume intake, and cardiovascular disease and deaths in 18 countries (PURE): a prospective cohort study'. *Lancet*, 390(10107), 2037-2049.

Morgan, K., McGee, H., Watson, D., Perry, I., Barry, M. and Lente, V.E. (2008) 'Slan 2007: Survey of lifestyle, attitudes & nutrition in Ireland: Main Report'.

Osborne, A., Finnegan, G., Blake, C., Meredith, D., McNamara, J., Phelan, J. and Cunningham, C. (2013) 'An evaluation of low back pain among farmers in Ireland'. *Occupational Medicine*, 63(1), 53-59.

Piepoli, M.F., Hoes, A.W., Agewall, S., Albus,

C., Brotons, C., Catapano, A.L., Cooney, M.-T., Corrà, U., Cosyns, B., Deaton, C., Graham, I., Hall, M.S., Hobbs, F.D.R., Løchen, M.-L., Löllgen, H., Marques-Vidal, P., Perk, J., Prescott, E., Redon, J., Richter, D.J., Sattar, N., Smulders, Y., Tiberi, M., van der Worp, H.B., van Dis, I., Verschuren, W.M.M., Binno, S. and Group, E.S.C.S.D. (2016) '2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representati'. *European Heart Journal*, 37(29), 2315-2381.

Rosengren, A., Smyth, A., Rangarajan, S., Ramasundarahettige, C., Bangdiwala, S.I., Alhabib, K.F., Avezum, A., Bengtsson Boström, K., Chifamba, J., Gulec, S., Gupta, R., Igumbor, E.U., Iqbal, R., Ismail, N., Joseph, P., Kaur, M., Khatib, R., Kruger, I.M., Lamelas, P., Lanas, F., Lear, S.A., Li, W., Wang, C., Quiang, D., Wang, Y., Lopez-Jaramillo, P., Mohammadifard, N., Mohan, V., Mony, P.K., Poirier, P., Srilatha, S., Szuba, A., Teo, K., Wielgosz, A., Yeates, K.E., Yusoff, K., Yusuf, R., Yusufali, A.H., Attaei, M.W., McKee, M. and Yusuf, S. (2019) 'Socioeconomic status and risk of cardiovascular disease in 20 low-income, middle-income, and high-income countries: the Prospective Urban Rural Epidemiologic (PURE) study'. *The Lancet Global Health*, 7(6), e748-e760.

Shah, A.D., Langenberg, C., Rapsomaniki, E., Denaxas, S., Pujades-Rodriguez, M., Gale, C.P., Deanfield, J., Smeeth, L., Timmis, A. and Hemingway, H. (2015) 'Type 2 diabetes and incidence of cardiovascular diseases: a cohort study in 1.9 million people'. *The Lancet Diabetes & Endocrinology*, 3(2), 105-113.

Smyth, B., Evans, D.S., Kelly, A., Cullen, L. and O'Donovan, D. (2013) 'The farming population in Ireland: mortality trends during the 'Celtic Tiger' years'. *European Journal of Public Health*, 23(1), 50-5.

Timmis, A., Townsend, N., Gale, C., Grobbee, R., Maniadakis, N., Flather, M., Wilkins, E., Wright, L., Vos, R., Bax, J., Blum, M., Pinto, F., Vardas, P., Goda, A., Demiraj, A.F., Weidinger, F., Metzler, B., Ibrahimov, F., Pasquet, A.A., Claeys, M., Thorton, Y., Kusljugic, Z., Smajic, E., Velchev, V., Ivanov, N., Antoniades, L., Agathangelou, P., Táborský, M., Gerdes, C., Viigima, M., Juhani, P.M., Juilliere, Y., Cattan, S., Aladashvili, A., Hamm, C., Kuck, K.-H., Papoutsis, K., Bestehorn, K., Foussas, S., Giannoulidou, G., Varounis, C., Kallikazaros, I., Kiss, R.G., Czétényi, T., Becker, D., Gudnason, T., Kearney, P., McDonald, K., Rozenman, Y., Ziv, B., Bolognese, L., Luciolli, P., Boriani, G., Berkinbayev, S., Rakisheva, A., Mirrakhimov, E., Erglis, A., Jegere, S., Marinskis, G., Beissel, J., Marchal, N., Kedev, S., Xuereb, R.G., Tilney, T., Felice, T., Popovici, M., Bax, J., Mulder, B., Simoons, M., Elsendoorn, M., Steigen, T.K., Atar, D., Kalarus, Z., Tendera, M., Cardoso, J.S., Ribeiro, J., Mateus, C., Tatu-Chitoiu, G., Seferovic, P., Beleslin, B., Simkova, I., Durcikova, P., Belicova, V., Fras, Z., Radelj, S., Gonzalez Juanatey, J.R., Legendre, S., Braunschweig, F., Kaufmann, U.P., Rudiger-Sturchler, M., Tokgozoglu, L., Unver, A., Kovalenko, V., Nesukay, E., Naum, A., De Courtelary, P.T., Martin, S., Sebastiao, D., Ghislain, D., Bardinet, I., et al. (2018) 'European Society of Cardiology: Cardiovascular Disease Statistics 2017'. *European Heart Journal*, 39(7), 508-579.

van Doorn, D., Richardson, N. and Osborne, A. (2017) 'Farmers Have Hearts: the prevalence of risk factors for cardiovascular disease among a sub-group of Irish livestock farmers'. *Journal of Agromedicine*, 22(3), 264-274.

van Doorn, D., Richardson, N., Osborne, A. and Blake, C. (2019) 'The impact of a workplace cardiovascular health screening programme 'Farmers Have Hearts' on health behaviour change among Irish farmers'. *Work*, 63(1), 113-123.

Wang, X., Ouyang, Y., Liu, J., Zhu, M., Zhao, G.,

Bao, W. and Hu, F.B. (2014) 'Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies'. BMJ (*Clinical research ed.*), 349, g4490-g4490.

Warburton, D.E., Nicol, C.W. and Bredin, S.S. (2006) 'Health benefits of physical activity: the evidence'. *CMAJ*, 174(6), 801-9.

Whelan, S., Ruane, D.J., McNamara, J., Kinsella, A. and McNamara, A. (2009) 'Disability on Irish Farms—A Real Concern'. *Journal of Agromedicine*, 14(2), 157-163.

World Health Organization (2013) 'A global brief on Hypertension. Silent killer, global public health crisis. World Health Day 2013'. 40-40.

World Health Organization (2014) *Global status report on noncommunicable diseases 2014*, World Health Organization.

World Health Organization (2018) *Healthy diet. Key facts*. Online.

World Health Organization (2019) 'Cardiovascular diseases. Data and statistics'.

World Health Organization (2020) *Fact Sheets. Detail. Obesity and overweight*. Online.

World Health Organization European Region Office. (2018). *The health and well-being of men in the WHO European Region better health through a gender approach.*

World Health Organization Regional Office for Europe (2013) 'Fact Sheet Blood Pressure'.

World Health Organization Regional Office for Europe (2020) *Cardiovascular Diseases*. Online.

World Heart Federation (2017) *Cardiovascular risk factors. Factsheets*. Online.

Yusuf, H.R., Giles, W.H., Croft, J.B., Anda, R.F. and Casper, M.L. (1998) 'Impact of multiple risk factor profiles on determining cardiovascular disease risk'. *Preventive Medicine*, 27(1), 1-9.

Appendices

Appendix 1
Detailed overview of Farmers Have Hearts Cardiovascular Health Programme Baseline Results

Table A1 Accumulated risk factors for CVD

Number of risk factors	Multiple risk factors All farmers (n=868) n (%)	Mart (n=429)	Agri-branch (n=439)
0	1 (0.1)	0 (0.0)	1 (0.2)
1	18 (2.1)	8 (1.9)	10 (2.3)
2	63 (7.3)	25 (5.8)	38 (8.7)
3	144 (16.6)	56 (13.1)	88 (20.0)
4	201 (23.2)	98 (22.8)	103 (23.5)
5	216 (24.8)	112 (26.1)	104 (23.7)
6	145 (16.7)	80 (18.6)	65 (14.8)
7	57 (6.6)	33 (7.7)	24 (5.5)
8	19 (2.2)	14 (3.3)	5 (1.1)
9	4 (0.5)	3 (0.7)	1 (0.2)

Table A2 GP referral

Are you advised to see your GP? (n=836)	n (%)
Yes	626 (74.9)
No	210 (25.1)

Table A3 Socio-demographic information

Age	All farmers	Mart (n=424)	Agri-branch (n=432)
Mean	57.55	58.2	56.9
Min-Max	22-88	22-87	24-88
St-Deviation	11.976	12.407	11.518
Age categories (n=856)	**All farmers n (%)**	**Mart (n=424)**	**Agri-branch (n=432)**
<45	126 (16.7)	70 (16.5)	73 (16.9)
45-64	477 (56.9)	217 (51.2)	270 (62.5)
≥65	253 (26.4)	137 (32.3)	89 (20.6)
What is your marital status? (n=858)	**All farmers n (%)**	**Mart (n=424) n (%)**	**Agri-branch (n=432) n (%)**
Married/ Co-habiting	669 (78.0)	306 (72.0)	363 (83.8)
Single	123 (14.3)	84 (19.8)	39 (9.0)
Separated/divorced	18 (2.1)	9 (2.0)	9 (2.1)
Widowed	20 (2.3)	13 (3.1)	7 (1.6)
In a relationship	28 (3.3)	13 (3.1)	15 (3.5)
Do you live alone? (n=858)	**All farmers n (%)**	**Mart (n=425) n (%)**	**Agri-branch (n=433) n (%)**
Yes	110 (12.8)	62 (14.6)	48 (11.1)
No	748 (87.2)	363 (85.4)	385 (88.9)
What did your education include? (n=859)	**All farmers n (%)**	**Mart (n=425) n (%)**	**Agri-branch (n=434) n (%)**
Primary or below	145 (16.9)	99 (23.3)	46 (10.6)

Some secondary	332 (38.7)	149 (35.1)	183 (42.2)
Completed leaving cert	203 (23.6)	95 (22.4)	108 (24.9)
Third level	179 (20.8)	82 (19.2)	97 (22.3)
Did you get any formal agricultural education? (n=857)	**All farmers** **n (%)**	**Mart (n=424)** **n (%)**	**Agri-branch (n=433)** **n (%)**
Yes	545 (63.6)	227 (53.5)	318 (73.4)
No	312 (36.4)	197 (46.5)	115 (26.6)
What type of agricultural education? (n=545)	**All farmers** **n (%)**	**Mart (n=227)** **n (%)**	**Agri-branch (n=318)** **n (%)**
Full time 3rd level agricultural course	90 (16.5)	44 (19.4)	46 (14.5)
Farm Apprenticeship Scheme	20 (3.7)	8 (3.5)	12 (3.8)
Certificate in farming	195 (35.8)	89 (39.2)	106 (33.3)
1 year Agricultural college	110 (20.2)	37 (16.3)	73 (23.0)
Course >60hrs	92 (16.9)	33 (14.5)	59 (18.6)
Course <60 hrs	25 (4.6)	11 (4.8)	14 (4.4)
Other	13 (2.3)	5 (2.3)	8 (2.4)

Table A4 Farming characteristics mart and agri-branch farmers

Is farming your full-time or part-time occupation? (n=857)	**All farmers** **n (%)**	**Mart (n=425)** **n (%)**	**Agri-branch (n=432)** **n (%)**
Full-time	632 (73.7)	268 (63.1)	364 (84.3)
Part-time	225 (26.3)	157 (36.9)	68 (15.7)
On average how many hours per week do you work on the farm	**All farmers**	**Mart (n=425)**	**Agri-branch (n=434)**

(n=859)			
Mean	55.19	49.81	60.45
St-Deviation	23.271	23.539	21.781
Do you mainly farm on your own? (n=856)	All farmers n (%)	Mart (n=424) n (%)	Agri-branch (n=432) n (%)
Yes	483 (56.4)	265 (62.5)	218 (50.5)
No	373 (43.6)	159 (37.5)	214 (49.5)
Do you get any help from family, friends or others with farming? (n=591)	All farmers n (%)	Mart (n=260) n (%)	Agri-branch (n=331) n (%)
Never	32 (5.4)	22 (8.5)	10 (3.0)
Less than once a month	74 (12.5)	35 (13.5)	39 (11.9)
Roughly twice a month	30 (5.1)	18 (6.9)	12 (3.6)
Weekly	132 (22.3)	74 (28.5)	58 (17.5)
Daily	323 (54.7)	111 (42.6)	212 (64.0)
What do you consider to be your MAIN farming enterprise based on farm income? (n=856)	All farmers n (%)	Mart (n=423) n (%)	Agri-branch (n=433) n (%)
Dairy	325 (38.0)	56 (13.2)	269 (62.1)
Specialised beef	331 (38.7)	238 (56.2)	93 (21.5)
Mainly sheep	35 (4.1)	32 (7.6)	3 (0.7)
Mixed livestock	119 (13.9)	82 (19.4)	37 (8.5)
Tillage	26 (3.0)	4 (0.9)	22 (5.1)
Other	20 (2.3)	11 (2.7)	9 (2.1)
How many acres do you farm? (n=853)	All farmers n (%)	Mart (n=421) n (%)	Agri-branch (n=432) n (%)

0-25	29 (3.4)	22 (5.2)	7 (1.6)
26-50	83 (9.7)	61 (14.5)	22 (5.1)
51-75	97 (11.4)	66 (15.7)	31 (7.2)
76-124	234 (27.4)	123 (29.2)	111 (25.7)
125-248	302 (35.4)	115 (27.3)	187 (43.3)
249 acres and over	108 (12.7)	34 (8.1)	74 (17.1)

Table A5 General Medical Scheme and health insurance

Do you have a medical or GP visit card? (n=854)	n (%)
Medical card	95 (11.2)
GP visit card	84 (9.8)
No card	675 (79.0)
Do you have private health insurance? (n=855)	
Yes	641 (75.0)
No	214 (25.0)

Table A6 Prompts and reasons for engagement in baseline health check

Did you go on your own initiative to the heart health check or were you encouraged by someone else? (n=858)	n (%)
Self	656 (76.5)
Wife/partner	64 (7.5)
Children/family	18 (2.1)
Male friend	22 (2.6)
Female friend	2 (0.2)

IHF Staff	68 (7.9)
Other	28 (3.2)
Why did you decide to have a cardiovascular health check? (n=856)*	
Curiosity	350 (40.9)
Convenience of location	316 (36.9)
Concerned about health	292 (34.1)
Free of charge	162 (18.9)
Encouraged by others	141 (16.5)
Other	28 (3.3)
On a scale of 1-10, how would you rate your experience with the health check? (n=858)	
5	3 (0.3)
6	4 (0.5)
7	14 (1.6)
8	78 (9.1)
9	149 (17.4)
10	610 (71.1)
Would you mind to explain your rating (n=844)*	**n (%)**
Friendly staff and nurse	214 (25.4)
Very informative	163 (19.3)
Comprehensive	156 (18.5)
Good explanation of outcomes	141 (16.7)
It's a good service	101 (12.0)

Easy	68 (8.1)
Professional	64 (7.6)
Good advice	47 (5.6)
Made me feel at ease	38 (4.5)
Convenient	34 (4.0)
Happy with the results from the health check	30 (3.6)
Received results straight away	25 (3.0)
Other	49 (5.8)
Negative experience	4 (0.5)

*Multiple answers possible

Table A7 Self-reported health rating

On a scale of 1-10 how important is your health to you? (n=858)	n (%)
1 - 4	6 (0.6)
5	17 (2.0)
6	10 (1.2)
7	31 (3.6)
8	82 (9.6)
9	88 (10.3)
10	624 (72.7)
How good is your health in general? (n=858)	
Very good	205 (23.9)
Good	538 (62.7)
Fair	105 (12.2)

Bad	10 (1.2)

Table A8 Use of GP services

Do you have a GP? (n=858)	n (%)
Yes	846 (98.6)
No	12 (1.4)
When was the last time you visited your GP? (n=846)	
Within the last 4 weeks	127 (15.0)
Within the last year (but over 4 weeks)	496 (58.6)
Over a year ago	213 (25.2)
I never visited my GP	10 (1.2)

Table A9 Use and adherence to medication for cholesterol, blood pressure and/or diabetes

Do you use medication for cholesterol, blood pressure or diabetes? (n=856)	n (%)
Yes	265 (31.0)
No	591 (69.0)
For what condition do you use medication?* (n=258)	
Cholesterol	165 (64.0)
Blood pressure	166 (64.3)
Diabetes	26 (10.1)
Cholesterol and blood pressure	71 (27.5)
Cholesterol and diabetes	1 (0.4)
Cholesterol and blood pressure and diabetes	11 (4.3)
Blood pressure and diabetes	4 (1.5)

Do you take your medication as prescribed? (n=259)	
Yes	247 (95.4)
No	12 (4.6)

*Multiple answers possible

Table A10 Blood pressure (mmHg)

Blood pressure systolic	
Mean	134.69
Min-Max	94-192
St-Deviation	16.634
Blood pressure diastolic	
Mean	80.85
Min-Max	41-181
St-Deviation	11.507
Blood pressure categorised (n=859)	**n (%)**
Optimal <120/<80	156 (18.1)
Normal 120-129/80-84	169 (19.7)
High Normal 130-139/85-89	192 (22.4)
High ≥140/90	342 (39.8)

Table A11 High blood pressure (mmHg) and reported prescribed medication for high BP

Reported prescribed medication for high blood pressure	Yes (n=166) n (%)	No (n=585) n (%)
Blood pressure ≥140/90	78 (47.0)	256 (43.8)

Table A12 Lipid profile mmol/L

Total cholesterol	
Mean	4.93
Min-Max	2.59-9.84
St-Deviation	0.9923
LDL-C	
Mean	2.88
Min-Max	0.66-7.40
St-Deviation	1.2137
HDL-C	
Mean	1.21
Min-Max	0.38-3.09
St-Deviation	0.3626
TG	
Mean	1.90
Min-Max	0.51-7.34
St-Deviation	1.9009
Total cholesterol categorized (n=862)	**n (%)**
<5.0	462 (53.6)
≥5.0	400 (46.4)
LDL-C (n=805)	
<3.0	447 (55.5)
≥3.0	358 (44.5)

HDL-C (n=859)	
≤1.00	264 (30.7)
>1.00	595 (69.3)
TG (n=860)	
<1.7	435 (50.6)
≥1.7	425 (49.4)

Table A13 Elevated lipid profile (mmol/L) and reported prescribed medication for high cholesterol

Reported prescribed medication for high cholesterol	Yes n (%)	No n (%)
Total cholesterol mmol/L ≥5.0	Yes (n=165)	No (n=588)
	28 (17.0)	368 (62.6)
LDL-C mmol/L ≥3.0	Yes (n=165)	No (n=548)
	22 (13.3)	333 (60.8)
TG mmol/L ≥1.7	Yes (n=165)	No (n=588)
	79 (47.9)	340 (57.8)

Table A14 Blood glucose mmol/L

Blood glucose (n=580)*	n (%)
Mean	6.31
Min-Max	2.78-22.70
St-Deviation	1.58450
Blood glucose (n=861)	
<7.0	659 (76.5)

≥7.0	202 (23.5)

*Non-fasting blood tests

Table A15 High blood glucose (mmol/L) and reported prescribed medication for diabetes

Reported prescribed medication for diabetes	Yes (n=26) n (%)	No (n=588) n (%)
Blood glucose ≥7.0	23 (88.5)	173 (29.4)

Table A16 Anthropometric measurements

BMI kg/m^2	
Mean	29.13
Min-Max	20.00-56.50
St-Deviation	4.6476
Waist (cm)	
Mean	102.48
Min-Max	74.00-152.20
St-Deviation	12.5007
BMI kg/m^2 categories WHO (n=816)	**n (%)**
Normal ≤24.9	115 (14.1)
Overweight 25.0-29.9	399 (48.9)
Obese ≥30.0	302 (37.0)
Waist Circumference in categories WHO (n=854)	
Normal <94 cm	166 (19.5)
Moderate Risk 94-102 cm	295 (34.5)
High Risk ≥103 cm	393 (46.0)

Table A17 Family history heart disease

Family history of heart disease, stroke and/or diabetes (n=799)*	n (%)
Yes	514 (64.3)
Heart disease	395 (49.6)
Stroke	143 (18.5)
Diabetes	160 (20.6)

*Multiple answers possible

Table A18 Smoking and alcohol consumption

Smoking (n=31)	
Mean	14.55
Min-Max	1-30
St-Deviation	14.55
Alcohol consumption (n=455)	
Mean	7.45
Min-Max	1-52
St-Deviation	7.622
Do you smoke? (n=864)	**n (%)**
Yes	79 (9.3)
No	769 (90.7)
Do you drink alcohol? (n=846)	
Yes	580 (68.6)
No	266 (31.4)
Number of standard drinks consumed per week>17* (n=455)	

1-17	408 (89.7)
>17	47 (10.3)
HSE Saor Audit-C scores (n=805)	
0-4	558 (69.3)
>4 'harmful' drinker	247 (30.7)

*Based on Irish guidelines

Table A19 Physical activity

	Yes n (%)	No n (%)
Does your work involve PA (n=735)	689 (93.7)	46 (6.3)
Are you physically active outside of your work? (n=720)	494 (68.6)	226 (31.4)
Are you active at least 5 days per week? (n=704)	507 (72.0)	197 (28.0)
Are you active for at least 30 minutes on active days? (n=701)	482 (68.8)	219 (31.2)
Are you active at least 5 days per week AND active for at least 30 minutes on active days? (n=704)	473 (67.2)	231 (32.8)

Table A20 Stress experience

Experience of stress (n=800)	n (%)
Not at all / only a little	198 (24.7)
To some extent	498 (62.3)
Often / very often	104 (13.0)

Table A21 Mental Wellbeing

Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS) 'n (%)'			
Mean score	26.55		
	None of the time /Rarely	Some of the time	Often / All of the time
I've been feeling optimistic about the future (n=846)	45 (5.3)	292 (34.5)	509 (60.2)
I've been feeling useful (n=843)	16 (1.9)	135 (16.0)	692 (82.1)
I've been feeling relaxed (n=841)	56 (6.7)	300 (35.7)	485 (57.6)
I've been dealing with problems really well (n=840)	20 (2.4)	216 (25.7)	604 (71.9)
I've been thinking clearly (n=840)	11 (1.3)	135 (16.1)	694 (82.6)
I've been feeling close to other people (n=837)	21 (2.5)	123 (14.7)	693 (82.8)
I've been able to make up my own mind about things (n=842)	4 (0.5)	83 (9.9)	755 (89.6)
Results Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS) Categorised (n=819)			
7.00-21.99 Poor	123 (15.0)		
22.00 – 23.99 Below Average	163 (19.9)		
24.00-26.99 Average	190 (23.2)		
27.00-28.99 Good	99 (12.1)		
29.00-35.00 Excellent	244 (29.8)		

Table A22 Cooking and eating habits

Who does the majority of the cooking in your household? (n=857)	n (%)
Self	116 (13.5)
Wife/partner	578 (67.4)
Wife/self equally	59 (6.9)
Family	78 (9.1)
Other	26 (3.0)
Do you eat salty foods and/or snacks one or more times a day? (n=858)	
Yes	619 (72.1)
No	239 (27.9)
Do you eat meat or poultry 2 or more times daily? (n=857)	
Yes	423 (49.4)
No	434 (50.6)
Do you eat deep fried foods or fast foods 3 or more times a week? (n=858)	
Yes	188 (21.9)
No	670 (78.1)
Do you drink fizzy drinks one or more times daily? (n=858)	
Yes	126 (14.7)
No	732 (85.3)

Table A23 Self-reported daily fruit and vegetable consumption

Do you eat fruit one or more times daily? (n=858)	n (%)
Yes	546 (63.6)
No	312 (36.4)
If yes, how many portions of fruit per day? (n=546)	
1	232 (42.5)
2	179 (32.8)
3	89 (16.3)
4	27 (4.9)
5 – 9	19 (3.5)
Do you eat vegetables one or more times daily? (n=854)	
Yes	798 (93.4)
No	56 (6.6)
If yes, how many portions of vegetables per day? (n=798)	
1	238 (29.8)
2	333 (41.7)
3	202 (25.4)
4 – 6	25 (3.1)

Table A24 Combined consumption fruit/vegetables

Fruit/vegetables consumption ≥5 portions a day (n=822)	Yes	No
	170 (20.7)	652 (79.3)

Appendix 2
Farmers Have Hearts Cardiovascular Health Programme - Baseline Methodology

This section outlines the methodology of the FHH-CHP baseline study. It describes the recruitment of farmers at marts and agri-branches, the health check, informed consent, self-selection procedure for health behaviour change interventions, baseline survey and data analysis.

Baseline health check recruitment

Recruitment at marts

To promote the health checks at the marts, the IHF provided posters to the mart managers to display in advance with the aim of informing farmers about the initiative as well as the date and time of the health checks. These posters included an IHF contact number which farmers could contact with questions or to pre-book an appointment for the health check. However, none of the mart farmers who took part in the study had pre-booked their health check. Recruitment of farmers to take part in the health checks was carried out by an IHF health promotion staff member, who adopted an opportunistic approach. This was in line with previous experiences which showed that, due to the unpredictable nature of farm practices, farmers responded best to a flexible appointments schedule. Due to the hectic nature of the livestock marts, no records of the amount of farmers who declined participation in health check are available. Among those mart farmers who took part in the health check, 536 met the inclusion criteria and were approached to participate in the research. Some 107 farmers declined, leading to a response rate of 80.0%.

Recruitment at agri-branches

Agri-branch farmers took part in the health check mostly on the basis of self-referral (pre-booking). Glanbia Ireland developed an extensive communication strategy to inform their dairy suppliers about the upcoming health checks, health behaviour change interventions and the programme evaluation research. The communication channels included: messages as part of the milk statements, communications on the intranet system used by all Glanbia Ireland farmers, and by a specially developed information leaflet which was sent to all suppliers and which was widely available in all participating agri-branches. All dates and

locations for the health checks were made available to the farmers and it was the responsibility of individual farmers to contact Glanbia Ireland Customer Service to book a place for the health check on a day, location and time that best suited them. All farmers received a confirmation text message after booking as well as a reminder text the day before the health check. Among those agri-branch farmers who took part in the health check, 469 were eligible and approached to participate in the research. Some 30 farmers declined, leading to a response rate of 93.6%.

The Farmers Have Heart Cardiovascular Health Programme baseline health check

The FHH-CHP baseline health checks were conducted by nurses from the Irish Heart Foundation. All nurses are skilled in the use of brief interventions, behaviour change and motivational interviewing techniques. Additionally, all nurses had taken part in the 'Engage National Men's Health Training' workshop.

The FHH-CHP health checks measured:

- Full lipid profile (total cholesterol, HDL-C, LDL-C, triglycerides);

- Blood glucose;

- Blood pressure;

- Carbon monoxide (if applicable);

- Anthropometric measurements (BMI, waist measurements).

Self-reported health and lifestyle behaviours were also documented by the nurse during the health check:

- Family history diabetes, heart disease and/or stroke;

- Smoking (yes/no, how many);

- Use of alcohol (yes/no, how many standard drinks a week);

- Levels of physical activity (work related, leisure);

- Stress (Perceived Stress Scale).

All farmers received their results at the health check. Based on IHF referral protocol, some were advised to go to their GP by the nurse. The degree of urgency depended on the level of abnormal results from the measurements taken during the health check.

Based on the outcomes of the health check, farmers received a brief and tailored lifestyle counselling from the nurse based on motivational interviewing techniques. The health check measurements were recorded in a Record Card, and this was given to all farmers to take home with them. All farmers also received relevant IHF health booklets on diverse aspects of cardiovascular health and a specially commissioned booklet targeted at farmers 'Staying Fit for Farming'. An additional survey was given to the farmers to self-administer during the health check (Appendix 3). In cases of literacy issues, the nurse provided assistance with completing the survey. This survey included questions on:

- Alcohol consumption (Saor II scale);
- Sedentariness;
- Sleep quantity and quality (adapted from the MORGEN study)
- Wellbeing (Short Warwick Edinburgh Wellbeing Scale).

Informed consent

An informed consent form was developed for the participants of the FHH-CHP which was detailed and asked explicit permission for participation in the different study phases. A member of the IT Carlow FHH-CHP research team was present at all health checks and asked farmers personally for informed consent after they had taken part in the health check.

The FHH-CHP research team member explained the context of the informed consent verbally and asked farmers if they understood what research participation involved. The information sheet detailed the purpose and content of the study, a description of the health behaviour change interventions, safeguarding of privacy, access to personal data, data handling and sharing, data confidentiality (including limits to confidentiality), information on the voluntary nature of the study consent, and ways to 'opt out' at any time. All farmers who consented to research participation, signed the consent form and received a copy of the information sheet to bring home with them. The information sheet also contained personal contact information of the principal researcher in case of questions or difficulties

which was also emphasised verbally. This contact information was only used occasionally by farmers and only in cases of research practicalities.

Consent also included permission to copy the results from the health checks, agreement to be contacted at Week 26 for a survey by phone and to be invited for a repeat health check at Week 52 in the same location as the FHH-CHP baseline health check. It also included self-selection to one of the four intervention options as part of the research as detailed below. Farmers who were not interested in research participation, could simply opt out by declining to partake.

Farmers Have Hearts Programme Baseline survey

After farmers had self-selected to a health behaviour change intervention of their choice, a face-to-face baseline survey was conducted. This survey, adopted from previous validated surveys, collected information regarding socio-demographic and farming characteristics, self-reported health such as health importance and health rating, consumption of fruit and vegetables, medication use and access to GP services. The baseline survey also explored farmers' experience of engaging with the health check. The baseline survey was piloted with farmers (n=6) who were opportunistically recruited at the Oak Park Teagasc office. Based on the findings of this pilot phase, the survey was adjusted, re-tested (n=4) and finalised.

Baseline data analysis

This report provides a summary of results using descriptive data analysis. Frequency analysis provides insight into the prevalence of CVD risks of the study group. Where continuous data is available, mean, minimum-maximum and standard deviation are reported. Cross tabulations are used to explore the distribution of the frequencies and compare and contrast the mart and agri-branch farmers. Cross tabs are also used to describe associations between socio-demographic information and farming characteristics with prevalence of risk factors for CVD.

Risk factor thresholds for data analysis

In order to categorise respondents based on their CVD risk profile, the study applied the 2016 ESC European Guidelines on cardiovascular disease prevention in clinical practice, risk factor thresholds. These are:

- total cholesterol ≥5.0 mmol/L.;

- HDL cholesterol <1.0 mmol/L.;

- LDL cholesterol ≥3.0 mmol/L.;

- triglycerides ≥1.7 mmol/L.; and

- non-fasting blood glucose levels, ≥7.0 mmol/L.

- BMI kg/m^2 ≥ 25 was classified as overweight and a BMI kg/m2 ≥30.0 as obese. A waist circumference ≥94 centimetres was classified as 'at risk' whereas ≥103 centimetre's was considered 'high risk'.

The threshold of self-reported and lifestyle risk factors for CVD used for establishing risk, were also adopted from the 2016 ESC guidelines. Risk factors were:

- family history of heart disease;

- diabetes or stroke 'yes';

- smoking 'yes';

- alcohol consumption >17 standard drinks per week;

- experience of stress 'often' / 'all the time';

- physical inactivity 'less than 5 days a week active AND for less than 30 minutes on active days'; and,

- consumption of fruit and vegetable <5 portions per day.

Farmers Have Hearts Cardiovascular Health Programme Baseline data collection

The health checks took place in the following counties: Carlow, Cork, Kildare, Kilkenny, Laois, Longford, Meath, Offaly, Tipperary, Waterford, Wexford and Wicklow. On each health check day, two nurses worked in each location and carried out up to 12 health checks each (max 24 health checks a day). In collaboration and agreement with the research team, Glanbia Ireland proposed the agri-branch locations whilst the IHF proposed and organised the mart locations. An IHF representative was in each location with the nurses to engage with the farmers and support the programme. The baseline data collection took place from May 2018 – March 2019. In total 32 locations were visited: 16 agri-branches and 16 marts. Data collection took place on 59 separate days.

In total, 1319 farmers, mart workers and their families took part in the health checks during the FHH-CHP baseline data collection. Only those that met the inclusion criteria, i.e. male farmers ≥18 years of age, were asked to participate in the research. Female health check participants and non-farmers were ineligible for research participation. Some male farmers were also discreetly? excluded from study participation based on certain health issues such as Alzheimer's disease or those who needed acute medical examination. In total 1005 male farmers met the inclusion criteria and were approached to participate in the study and 868 farmers consented, leading to a research response rate of 86.4%. Of the 868 farmers, 49.4% (n=429) were recruited at marts (referred to as 'mart farmers') and 50.6% (n=439) were recruited from Glanbia Ireland agri-branch sites (referred to as 'agri-branch farmers').

Appendix 3
Farmers Have Hearts Cardiovascular Health Programme
– Health Check Extra Questions

Section Lifestyle

Q1   Drinking habits - If participants answered YES to 'do you drink alcohol question' during health check:

How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times per month	2-3 times per week	4+ times p/week
How many standard drinks do you drink on a typical day when you are drinking?	1-2	3-4	5-6	7-9	10+
How often have you had six or more standard drinks on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Almost every day

Q1.2 Sitting time - During the last 7 days, how much time you spent sitting (including watching television, tractor driving, etc):

[...........] hours per day / [...........] minutes per day

Q1.3   Sleep - On average how many hours do you sleep per night)?

≤ 5hrs □^{1} 6hrs □^{2} 7hrs □^{3} 8hr s □^{4} ≥9hr s □^{5}

Q 13.1   Do you usually wake up well-rested?

Yes □^{1} No □^{2} Don't know □^{3}

SECTION WELLBEING

Q2   What would describe your feelings the best over the last two weeks:

Statements	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future					
I've been feeling useful					
I've been feeling relaxed					

I've been dealing with problems well					
I've been thinking clearly					
I've been feeling close to other people					
I've been able to make up my own mind about things					

Appendix 4
Farmers Have Hearts Cardiovascular Health Programme
- Baseline Survey

Location …………………………. Date …………………………………….

Thank you for participating in the Farmers Have Hearts Study. I would like to ask you a few questions to gather some background information for the study. This should not take longer than 5 minutes. All answers will be coded and anonymised. If there are any questions you do not want to answer, please let me know - that is no problem. Before we start, do you have any questions?

Intervention:

Control group □1   M-health □2   Health Coach □3   Health coach and M-health □4

As a results of the health check, are you thinking of making change to your lifestyle to improve your heart health?   Yes □^{1} No □^{2}

If yes, what type of changes?

Improve your Diet   □1

Increase your Physical Activity   □2

Decrease your levels of Stress   □3

Reduce my alcohol intake   □4

Stop Smoking   □5 (Refer to national programme QUIT)

Other   □6 please specify ……………………….

A1   **What age are you**?   ……………..

A2   **What is your current marital status?**

         Married/co-habiting □1   Separated – divorced □3

         Single □2   Widowed □4

         In a relationship □5

A3   **Do you live alone?** Yes □^{1} No □^{2}

A4   **What did your education include?**

Primary or below   □1   Completed Leaving Cert □3

Some secondary   □2   Third Level □4

A4a   **Did you receive any formal Agricultural Education?**

Yes □[1]   No □[2]

A4b   **If yes, What did your agricultural education include?**

Full-Time 3rd Level Agricultural Course □1   Course > 60 hours □5

Farm Apprenticeship Scheme □2   Course < 60 hours □6

Certificate in farming □3   Other □7 Please specify ……..

1 year Agricultural College □4

A5   **Is farming your full time or part time occupation?**

Full time □1   Part time □2

A5a   **On average, how many hours do you farm per week?**   ………………

A5b   **If part-time - on average, how many hours a week do you work OFF-FARM** (e.g. contracting, working for another farmer, working for a building contractor).

………………

Do you mainly farm on your own?   Yes □[1]   No □[2]

A5c   **Do you get help from family, friends or others running the farm**
1.Never
2.Less than once a month
3.Roughly twice a month
4.Weekly
5.Daily

A6   **What do you consider to be your MAIN enterprise based on farm income** (only one

answer)?

Dairy □1	Sheep / Drystock □6
Dairy and cattle □2	Tillage □7
Cattle rearing (suckler) □3	Tillage / drystock □8
Cattle other (Drystock) □4	Other □9 ……………………
Mainly Sheep □5	

A7   How many acres do you farm?

0-25 Acres □1	76 – 124 acres □4
26 –50 acres □2	125-248 acres □5
51 – 75 acres □3	≥249 acres □6

Self-reported health

B1   On a scale from 1-10: how important is your health to you? (1 not - 10 very important)

1   2   3   4   5   6   7   8   9   10

B2   How good is your health in general?

Very Good □1	Bad □4
Good □2	Very Bad □5
Fair □3	

B3   Do you use any medication for cholesterol, blood pressure or diabetes?

Yes □[1]   No □[2]

B3a   For what condition do you use medication? (multiple answers possible)

Cholesterol □   Blood pressure □   Diabetes □

B3b   Do you take the medication as prescribed by your doctor?

Yes □¹   No □²

B3b.1   If no, would you mind saying why not?

_____

B4   Do you have a GP?

Yes □¹   No □²

B4a   When was the last time you visited your GP?

Within the last 4 weeks □1   Over a year ago □3

Within the last year (but over 4 weeks) □2   I never visited my GP □4

B5   Do you have a medical card or GP visitor's card?

Medical card   □1   GP visitors card □2   No card □3

B5a   Do you have private health insurance?

Yes □¹   No □²

Health check

C1   Did you go on your own initiative to the heart health checks or were you encouraged by someone else?

Self □1   Male friend □4

Wife / partner □2   Female friend □5

Children / family □3   IH staff   □6

C2   Why did you decide to have the health check? (multiple answers possible)

Concerned about health □1   It was free □4

Convenience □2   Encouraged by others □5

Curiosity □3   Other □6   ………….

C3 **On a scale of 1-10, how would you rate your experience of the health check** (1 poor – 10 excellent)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

C3a **Would you mind explaining your rating?**

_____

_____

Lifestyle

D1 **Who does the majority of cooking in your household?**

You □1   Family □4

Wife/Partner □2   Other □5

Both my wife and I equally □3

D2 **Choose what describes you best:**

A Do you eat snacks or salty foods one or more times a day?   Yes □1   No □2

B Do you eat deep fried foods or fast foods 3 or more times a week   Yes □1   No □2

C Do you eat meat or poultry 2 or more times daily   Yes □1   No □2

D Do you drink fizzy drinks one or more times a day?   Yes □1   No □2

E Do you eat fruit one or more times daily   Yes □1   No □2

If yes, on average, how many portions fruit per day?   ……….

F Do you eat vegetables one or more times daily   Yes □1   No □2

If yes, on average, how many portions vegetables per day?   ……….

Notes

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From Left: *Professor Catherine Blake (UCD); Dr Aoife Osborne (UCD); Dr Paula Rankin (IT Carlow); Dr David Meredith (Teagasc); Dr John McNamara (Teagasc); Dr Noel Richardson (IT Carlow); Janis Morrissey (IHF); Marese Damery (IHF)*

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